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Glossary

[Key chapters in which a term is used are indicated in square brackets.]

**Abstraction:** A level of medical data encoding that entails examining the recorded data and selecting an item from a terminology with which to label the data. [7]

**Accountability:** Security function that ensures users are responsible for their access to, and use of, information based on a documented need and right to know. [5]

**Acquired immunodeficiency syndrome (AIDS):** A disease of the immune system caused by a retrovirus and transmitted chiefly through blood or blood products, characterized by increased susceptibility to opportunistic infections, to certain cancers, and to neurological disorders. [3, 15, 21]

**Active storage:** In a hierarchical data storage scheme, the devices used to store data that have long-term validity and that must be accessed rapidly. [5]

**Address:** In a computer system, a number or symbol that identifies a particular cell of memory. [5]

**Administrative services only (ASO):** The practice by employers of paying their employees’ medical bills directly (self-insurance), and hiring insurance companies only to process claims. [23]

**Admission-discharge-transfer (ADT):** The core component of a hospital information system that maintains and updates the hospital census, including bed assignments of patients. [13]

**Advanced Research Projects Agency Network (ARPANET):** A large wide-area network created in the 1960s by the U.S. Department of Defense Advanced Research Projects Agency (DARPA) for the free exchange of information among universities and research organizations; the precursor to today’s Internet. [1, 5]
Advice nurse: A health professional, typically trained in nursing, who is available by telephone to answer patients’ questions and to help them to make appropriate use of health services. [23]

Aggregate content: Information from multiple sources, which can be viewed within an information retrieval system using a single interface. [19]

Alert message: A computer-generated warning that is generated when a record meets pre-specified criteria; e.g., receipt of a new laboratory test result with an abnormal value. [12]

Algorithm: A well-defined procedure or sequence of steps for solving a problem. [1]

Allocation bias: Overestimation of the effects of an intervention caused by systematic assignment of favorable subjects to the study group by investigators. [11]

Alphabetic ranking: A common ranking criterion used by information retrieval systems; for a particular field in the database, results are output based on the order of the field’s first word in the alphabet. [19]

Alphanumeric: Descriptor of data that are represented as a string of letters and numeric digits, without spaces or punctuation. [19]

Ambulatory medical record system (AMRS): A clinical information system designed to support all information requirements of an outpatient clinic, including registration, appointment scheduling, billing, order entry, results reporting, and clinical documentation. [13]


Analog signal: A signal that takes on a continuous range of values. [5]

Analog-to-digital conversion (ADC): Conversion of sampled values from a continuous-valued signal to a discrete-valued digital representation. [5,17]

Anchoring and adjustment: A heuristic used when estimating probability, in which a person first makes a rough approximation (the anchor) and then adjusts this estimate to account for additional information. [3]

Angiography: A technique used to increase the contrast resolution of X-ray images of the blood vessels by injection of radiopaque contrast material into the vessels. [9,18]

Antibiotic-assistant program: A computer program developed to assist physicians in ordering antibiotics for patients who have, or who are suspected of having, an infection. [17]
**Applets:** Small computer programs that can be embedded in an HTML document and that will execute on the user’s computer when referenced. [5]

**Application program:** A computer program designed to accomplish a user-level task. [5]

**Applications research:** Systematic investigation or experimentation with the goal of applying knowledge to achieve practical ends. [1]

**Arc (in an influence diagram):** A diagrammatic element that appears between two chance nodes and indicates that a probabilistic dependency relationship may exist between them. [3]

**Archival storage:** In a hierarchical data storage scheme, the devices used to store data for long-term backup, documentary, or legal purposes. [5]

**Arden Syntax:** A coding scheme or language that provides a canonical means for writing rules (Medical Logic Modules), which relate specific patient situations to appropriate actions for practitioners to follow. The Arden Syntax standard is maintained by HL7. [7,20]

**Art criticism approach:** An evaluation approach that relies on the review and opinions of an experienced and respected critic to highlight an information resource’s strengths and weaknesses. [11]

**Artificial intelligence (AI):** The branch of computer science concerned with endowing computers with the ability to simulate intelligent human behavior. [1,20,21]

**Artificial neural network (ANN):** A computer program that performs classification by taking as input a set of findings that describe a given situation, propagating calculated weights through a network of several layers of interconnected nodes, and generating as output a set of numbers, where each output corresponds to the likelihood of a particular classification that could explain the findings. [20]

**Assembler:** A computer program that translates assembly-language programs into machine-language instructions. [5]

**Assembly language:** A low-level language for writing computer programs using symbolic names and addresses within the computer’s memory. [5]

**Assessment bias:** Overestimation (or underestimation) of the effects of an intervention caused by systematic favorable (or unfavorable) evaluations of results by the investigators. [11]

**Asynchronous transfer mode (ATM):** A network protocol designed for sending streams of small, fixed-length cells of information over very high-speed, dedicated connections, often digital optical circuits. [5]
ATTENDING: A standalone decision-support program that critiqued a patient-specific plan for anesthetic selection, induction, and administration after that plan had been proposed by the anesthesiologist who would be managing the case. [20]

Audit trail: A chronological record of all accesses and changes to data records, often used to promote accountability for use of, and access to, medical data. [5]

Augmented reality: A user-interface method in which a computer-generated scene is superimposed on the real world, usually by painting the scene on semi-transparent goggles that track the motion of the head. [21]

Authentication: A process for positive and unique identification of users, implemented to control system access. [5]

Authoring system: In computer-aided instruction, a specialized, high-level language used by educators to create computer-based teaching programs. [21]

Authorization: Within a system, a process for limiting user activities only to actions defined as appropriate based on the user’s role. [5]

Automated indexing: The most common method of full-text indexing; words in a document are stripped of common suffixes, entered as items in the index, then assigned weights based on their ability to discriminate among documents (see vector-space model). [19]

Availability: In decision making, a heuristic method by which a person estimates the probability of an event based on the ease with which he can recall similar events. [3] In security systems, a function that ensures delivery of accurate and up-to-date information to authorized users when needed. [5]

Averaging out at chance nodes: The process by which each chance node of a decision tree is replaced in the tree by the expected value of the event that it represents. [3]

Backbone links: Sections of high-capacity trunk (backbone) network that interconnect regional and local networks. [5]

Backbone network: A high-speed communication network that carries major traffic between smaller networks. [1]

Background question: A question that asks for general information on a topic (see also foreground question). [19]

Back-projection: A method for reconstructing images, in which the measured attenuation along a path is distributed uniformly across all pixels along the path. [9]
Bandwidth: The capacity for information transmission; the number of bits that can be transmitted per unit of time. [1, 5]

Baseband transmission: A data transmission technique in which bits are sent without modulation (see modem). [5]

Baseline measurement: An observation collected prior to an intervention and used for comparison with an associated study observation. [11]

Baseline rate, population: The prevalence of the condition under consideration in the population from which the subject was selected; individual: The frequency, rate, or degree of a condition before an intervention or other perturbation. [2]

Basic Linear Alignment and Search Technique (BLAST): An algorithm for determining optimal genetic sequence alignments based on the observations that sections of proteins are often conserved without gaps and that there are statistical analyses of the occurrence of small subsequences within larger sequences that can be used to prune the search for matching sequences in a large database. [22]

Basic research: Systematic investigation or experimentation with the goal of discovering new knowledge, often by proposing new generalizations from the results of several experiments. [1]

Basic science: The enterprise of performing basic research. [1]

Batch mode: A noninteractive mode of using a computer, in which users submit jobs for processing and receive results on completion (see time-sharing mode). [5]

Baud rate: The rate of information transfer; at lower speeds, baud rate is equal to the number of bits per second being sent. [5]

Bayes’ theorem: An algebraic expression often used in clinical diagnosis for calculating posttest probability of a condition (e.g., a disease) if the pretest probability (prevalence) of the condition, as well as the sensitivity and specificity of the test, are known (also called Bayes’ rule). Bayes’ theorem also has broad applicability in other areas of biomedical informatics where probabilistic inference is pertinent, including the interpretation of data in bioinformatics. [3]

Bayesian diagnosis program: A computer-based system that uses Bayes’ theorem to assist a user in developing and refining a differential diagnosis. [20]

Before–after study: An experiment that compares study measurements to the same (baseline) measurements collected prior to introduction of the resource of interest (see historically controlled experiment). [11]
**Behaviorism:** A social science framework for analyzing and modifying behavior. [4]

**Belief network:** A diagrammatic representation used to perform probabilistic inference; an influence diagram that has only chance nodes. [3,20]

**Bias:** A systematic difference in outcome between groups that is caused by a factor other than the intervention under study. [3,11]

**Binary:** The condition of having only two values or alternatives. [5]

**Bibliographic content:** In information retrieval, information abstracted from the original source. [19]

**Bibliographic database:** A collection of citations or pointers to the published literature. [19]

**Biocomputation:** The field encompassing the modeling and simulation of tissue, cell, and genetic behavior; see biomedical computing. [1]

**Bioinformatics:** The study of how information is represented and transmitted in biological systems, starting at the molecular level. [10,22]

**Biomed Central:** An independent publishing house specializing in the publication of electronic journals in biomedicine (see www.biomedcentral.com). [19]

**Biomedical computing:** The use of computers in biology or medicine. [1]

**Biomedical engineering:** An area of engineering concerned primarily with the research and development of biomedical instrumentation and biomedical devices. [1]

**Biomedical informatics:** A field of study concerned with the broad range of issues in the management and use of biomedical information, including biomedical computing and the study of the nature of biomedical information itself. Formerly called medical informatics, the new name is intended to clarify that the domain encompasses biological and biomolecular informatics as well as clinical, imaging, and public health informatics. [1]

**Biomedical Information Science and Technology Initiative (BISTI):** An initiative launched by the NIH in 2000 to make optimal use of computer science, mathematics, and technology to address problems in biology and medicine. It includes a consortium of senior-level representatives from each of the NIH institutes and centers plus representatives of other Federal agencies concerned with biocomputing. (see http://www.bisti.nih.gov). [1]
**Biometric identifier:** A measurable physical attribute of an organism (usually, a human being) that helps to establish that individual’s identity; examples include fingerprints and retinal scans. [6]

**Bit map:** A digital representation of an image in memory, in which there is a one-to-one correspondence between groups of bits (one or more bytes) and pixels of a displayed image. [9]

**Bit rate:** The rate of information transfer; a function of the rate at which signals can be transmitted and the efficacy with which digital information is encoded in the signal. [5]

**Bit:** A digit that can assume the value of either 0 or 1. [5]

**Bit-mapped display:** A display screen that is divided into a grid of tiny areas (pixels), each associated with a bit that indicates whether the area is on (black) or off (white). [9]

**Body (of e-mail):** The portion of a simple electronic mail message that contains the free-text content of the message. [5]

**Boolean operators:** The mathematical operators AND, OR, and NOT, which are used to combine index terms in information retrieval searching. [19]

**Boolean searching:** A search method in which search criteria are logically combined using AND, OR, and NOT operators. [19]

**Bootstrap:** A small set of initial instructions that is stored in read-only memory and executed each time a computer is turned on. Execution of the bootstrap is called booting the computer. By analogy, the process of starting larger computer systems. [5]

**Bound morpheme:** A morpheme that creates a different form of a word but must always occur with another morpheme (e.g., -ed, -s). [8]

**Bridge:** A device that links or routes signals from one network to another. [5]

**Broadband transmission:** A data transmission technique in which multiple signals may be transmitted simultaneously, each modulated within an assigned frequency range. [5]

**Browser:** A user interface to the World Wide Web that allows users to search for and display remote information resources in a suitable format. [6]

**Browsing:** Scanning a database, a list of files, or the Internet, either for a particular item or for anything that seems to be of interest. [5]

**Business services:** Remote network services that are designed for controlled or contractual user access (also see informational services). [6]
**Business logic layer:** A conceptual level of system architecture that insulates the applications and processing components from the underlying data and the user interfaces that access the data. [13]

**Buttons:** Graphic elements within a dialog box or user-selectable areas within an HTML document that, when activated, perform a specified function (such as invoking other HTML documents and services). [5]

**Byte:** A sequence of 8 bits, often used to store an ASCII character. [5]

**Canonical form:** A preferred string or name for a term or collection of names; the canonical form may be determined by a set of rules (e.g., “all capital letters with words sorted in alphabetical order”) or may be simply chosen arbitrarily. [19]

**Capitated system:** System of health care reimbursement in which providers are paid a fixed amount per patient to take care of all the health needs of a population of patients. [12,23]

**Capitation:** In health care financing, the payment of premiums or dues directly to the provider organization in the form of a fixed periodic payment for comprehensive care, set in advance (also called per capita payment). [23]

**Case manager:** A health professional assigned to monitor and coordinate a patient’s care across care providers and health settings throughout an episode of treatment. [16]

**Cathode-ray tube (CRT):** A data output device that displays information by projecting streams of electrons onto a fluorescent screen to create programmed patterns of light and dark or color. [5,17]

**Centering theory:** A theory that attempts to explain what entities are indicated by referential expressions (such as pronouns) by noting how the center (focus of attention) of each sentence changes across the text. [8]

**Centers for Disease Control** (and Prevention) (CDC): The U.S. government health agency responsible for monitoring and reporting incidences and trends in infectious disease, bacterial-resistance patterns, and other public health information. [2,15]

**Central computer system:** A single system that handles all computer applications in an institution using a common set of databases and interfaces. [13]

**Central monitor:** Computer-based monitoring system with waveform analysis capabilities and high-capacity data storage. [17]

**Central processing unit (CPU):** The “brain” of the computer. The CPU executes a program stored in main memory by fetching and executing instructions in the program. [5]
Certificate:  Coded authorization information that can be verified by a certification authority to grant system access. [5]

Chance node:  A symbol that represents a chance event. By convention, a chance node is indicated in a decision tree by a circle. [3]

Charge coupled device (CCD) camera:  A device used to convert light directly to digital form without the need for film. [9]

Charges:  In a health care institution, the established prices for services; charges often do not reflect the cost of providing the service. [23]

Check tag:  In MeSH, terms that represent certain facets of medical studies, such as age, gender, human or nonhuman, and type of grant support; check tags provide additional indexing of bibliographic citations in databases such as Medline. [19]

Checklist effect:  The improvement observed in decision making due to more complete and better structured data collection when paper- or computer-based forms are used to collect patient data. [11]

Chronology:  The primary ranking criterion in many information retrieval systems, in which the most recent entries are output first. [19]

CINAHL Subject Headings:  A set of terms based on MeSH, with additional domain-specific terms added, used for indexing the Cumulative Index to Nursing and Allied Health Literature (CINAHL). [19]

Citation database:  A database of citations found in scientific articles, showing the linkages among articles in the scientific literature. [19]

Classification (of features):  In image processing, the categorization of segmented regions of an image based on the values of measured parameters, such as area and intensity. [9]

Client–server:  Information processing interaction that distributes application processing between a local computer (the client) and a remote computer resource (the server). [5]

Clinical data repository (CDR):  Clinical database optimized for storage and retrieval for individual patients and used to support patient care and daily operations. [13]

Clinical decision-support system:  A computer-based system that assists physicians in making decisions about patient care. [20]

Clinical Document Architecture (CDA):  An HL7 standard for naming and structuring clinical documents, such as reports. [19]
Clinical expert system: A computer program designed to provide decision support for diagnosis or therapy planning at a level of sophistication that an expert physician might provide. [10,20]

Clinical guidelines: Systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances. [1,20]

Clinical informatics: The application of biomedical informatics methods in the patient care domain; a combination of computer science, information science, and clinical science designed to assist in the management and processing of clinical data, information, and knowledge to support clinical practice. [1,16]

Clinical information system (CIS): The components of a health care information system designed to support the delivery of patient care, including order communications, results reporting, care planning, and clinical documentation. [13]

Clinical judgment: Decision making by clinicians that incorporates professional experience and social, ethical, psychological, financial, and other factors in addition to the objective medical data. [10]

Clinical modifications: A published set of changes to the International Classification of Diseases (ICD) that provides additional levels of detail necessary for statistical reporting in the United States. [7]

Clinical pathway: Disease-specific plan that identifies clinical goals, interventions, and expected outcomes by time period. [13,16]

Clinical practice guidelines: See clinical guidelines. [4,20]

Clinical prediction rule: A rule derived from statistical analysis of clinical observations that is used to assign a patient to a clinical subgroup with a known probability of disease. [3]

Clinical research: The collection and analysis of medical data acquired during patient care, to improve medical science and the knowledge clinicians use in caring for patients. [10]

Clinical subgroup: A subset of a population in which the members have similar characteristics and symptoms, and therefore similar likelihood of disease. [3]

Clinical trials: Experiments in which data from specific patient interactions are pooled and analyzed in order to learn about the safety and efficacy of new treatments or tests and to gain insight into disease processes that are not otherwise well understood. [1]

Clinically relevant population: The population of patients that is seen in actual practice. In the context of estimating the sensitivity and specificity of a diagnostic test, that group of patients in whom the test actually will be used. [3]
**Closed-loop control:** Regulation of a physiological variable, such as blood pressure, by monitoring the value of the variable and altering therapy without human intervention. [17]

**Coaching system:** A computer-based education system that monitors the session and intervenes only when the student requests help or makes serious mistakes (see tutoring system). [21]

**Coaxial cable:** A cable typically used in the cable television industry that has a concentric arrangement of conductors and insulators, usually with a solid wire core, an insulator sheath, and an outer web of conductor wires. [18]

**COBOL:** COmmon Business Oriented Language. A programming language designed for business data processing and the first ANSII standard programming language. [7]

**Coded:** Form of data that has been standardized and classified for processing by a computer. [12]

**Coding scheme:** A system for classifying objects and entities (such as diseases, procedures, or symptoms) using a finite set of numeric or alphanumeric identifiers. [2]

**Coercion:** A function of a computer language that provides for automatic conversion of data types when a mismatch is identified. [5]

**Cognitive artifacts:** Human-made materials, devices, and systems that extend people’s abilities in perceiving objects, encoding and retrieving information from memory, and problem solving. [4]

**Cognitive heuristics:** Mental processes by which we learn, recall, or process information; rules of thumb. [3]

**Cognitive load:** An excess of information that competes for limited cognitive resources, creating a burden on working memory. [4]

**Cognitive science:** Area of research concerned with studying the processes by which people think and behave. [1,4]

**Cognitive walkthrough:** An analytic method for characterizing the cognitive processes of users performing a task. The method is performed by an analyst or group of analysts “walking through” the sequence of actions necessary to achieve a goal, thereby seeking to identify potential usability problems that may impede the successful completion of a task or introduce complexity in a way that may frustrate users. [4]

**Coinsurance:** The percentage of charges that is paid by the insuree rather than by the insurance company once the deductible has been satisfied. [23]
**Color resolution:**  A measure of the ability to distinguish among different colors (indicated in a digital image by the number of bits per pixel). Three sets of multiple bits are required to specify the intensity of red, green, and blue components of each pixel color. [5]

**Communication (computer):**  Data transmission and information exchange between computers using accepted protocols via an exchange medium such as a telephone line or fiberoptic cable. [5]

**Community Health Information Network (CHIN):**  A computer network developed for exchange of sharable health information among independent participant organizations in a geographic area (or community). [10,15]

**Compact disk (CD):**  A round, flat piece of material used to encode data through the use of a laser that alters the material’s reflectivity. [5]

**Compact-disk read-only memory (CD-ROM):**  An optical-disk technology for storing and retrieving large numbers of prerecorded data. Data are permanently encoded through the use of a laser that marks the surface of the disk, then can be read an unlimited number of times using a finely focused semiconductor laser that detects reflections from the disk. [5]

**Comparison-based approach:**  Evaluation approach that studies an experimental resource in contrast to a control resource or placebo. [11]

**Compiler:**  A program that translates a program written in a high-level programming language to a machine-language program, which can then be executed. [5]

**Comprehensibility and control:**  Security function that ensures that data owners and data stewards have effective control over information confidentiality and access. [5]

**Computability theory:**  The foundation for assessing the feasibility and cost of computation to provide the complete and correct results to a formally stated problem. Many interesting problems cannot be computed in a finite time and require heuristics. [1]

**Computed check:**  Procedure applied to entered data that verifies values based on calculation of a correct mathematical relationship; for example, white blood cell differential counts (reported as percentages) must sum to 100. [12]

**Computed radiography:**  An imaging technique in which a latent image is recorded on a specially coated cassette that is then scanned by a computer to capture the image in digital form. [9]

**Computed tomography (CT):**  An imaging modality in which X-rays are projected through the body from multiple angles and the resultant absorption values are analyzed by a computer to produce cross-sectional slices. [5,9,12,18]
**Computer architecture:** The basic structure of a computer, including memory organization, a scheme for encoding data and instructions, and control mechanisms for performing computing operations. [5]

**Computer interpretation:** Translation by computer of voice input into appropriate text, codes, or commands. [12]

**Computer program:** A set of instructions that tells a computer which mathematical and logical operations to perform. [5]

**Computer system:** An integrated arrangement of computer hardware and software, operated by users to perform prescribed tasks. [6]

**Computer-aided instruction (CAI):** The application of computer technology to education (also called computer-assisted learning and computer-based education). [21]

**Computer-assisted learning:** See computer-aided instruction. [21]

**Computer-based education (CBE):** See computer-aided instruction. [21]

**Computer-based monitoring:** Use of computers to acquire, process, and evaluate analog physiological signals captured from patients. [17]

**Computer-based patient monitor:** A patient monitoring device that supports other data functions, such as database maintenance, report generation, and decision making. [17]

**Computer-based patient record (CPR):** See electronic health record (EHR).

**Computer-based patient record system:** See electronic health record system.

**Computer-based physician order entry (CPOE):** A clinical information system that allows physicians and other clinicians to record patient-specific orders for communication to other patient care team members and to other information systems (such as test orders to laboratory systems or medication orders to pharmacy systems). Sometimes called provider order entry or practitioner order entry to emphasize such systems’ uses by clinicians other than physicians. [13]

**Concept:** An abstract idea generalized from specific instances of objects that occur in the world. [19]

**Conceptual knowledge:** Knowledge about concepts. [4]

**Concordant (test results):** Test results that reflect the true patient state (true-positive and true-negative results). [3]
Conditional independence: Two events, $A$ and $B$, are conditionally independent if the occurrence of one does not influence the probability of the occurrence of the other, when both events are conditioned on a third event $C$. Thus, $p[A|B,C] = p[A|C]$ and $p[B|A,C] = p[B|C]$. The conditional probability of two conditionally independent events both occurring is the product of the individual conditional probabilities: $p[A,B|C] = p[A|C] \times p[B|C]$. For example, two tests for a disease are conditionally independent when the probability of the result of the second test does not depend on the result of the first test, given the disease state. For the case in which disease is present, $p[\text{second test positive}|\text{first test positive and disease present}] = p[\text{second test positive}|\text{disease present}] = p[\text{second test positive}|\text{first test negative and disease present}] = p[\text{second test positive}|\text{disease present}]$. More succinctly, the tests are conditionally independent if the sensitivity and specificity of one test do not depend on the result of the other test (see independence). [3]

Conditional probability: The probability of an event, contingent on the occurrence of another event. [3]

Conditioned event: A chance event, the probability of which is affected by another chance event (the conditioning event). [3]

Conditioning event: A chance event that affects the probability of occurrence of another chance event (the conditioned event). [3]

Confidentiality: The ability of data owners and data stewards to control access to, or release of, private information. [5,10]

Consensus opinion: With respect to medical care, general agreement regarding proper action. [11]

Consistency check: Procedure applied to entered data that detects errors based on internal inconsistencies; e.g., recognizing a problem with the recording of cancer of the prostate as the diagnosis for a female patient. [12]

Constructive (approach to learning): An approach to teaching in which students learn through reassembly of separated parts; e.g., learning anatomy by putting together body parts or by placing cross sections at the correct location in the body. [21]

Consulting model: A style of interaction in a decision-support system, in which the program serves as an adviser, accepting patient-specific data, asking questions, and generating advice for the user about diagnosis or management. [20]

Consulting system: A computer-based system that develops and suggests problem-specific recommendations based on user input (see critiquing system). [20]

Consumer health informatics (CHI): Applications of medical informatics technologies that focus on patients or healthy individuals as the primary users. [10,14]
Content structuring: The process by which distinct semantic regions of content, such as title, author names, and abstract, are identified. [19]

Content: In information retrieval, media developed to communicate information or knowledge. [19]

Context: The placement of a word in text that helps determine the intended meaning of the word. [19]

Context deficit: A lack of clues in a document that might help a human being or natural language processor infer the intended meaning of words in the document. [19]

Context-free grammar: A mathematical model of a set of strings whose members are defined as capable of being generated from a starting symbol, using rules in which a single symbol is expanded into one or more symbols. [8]

Contingency table: A 2x2 table that shows the relative frequencies of true-positive, true-negative, false-positive, and false-negative results. [3]

Continuity of care: The coordination of care received by a patient over time and across multiple health care providers. [2]

Continuous-speech recognition: Translation by computer of voice input, spoken using a natural vocabulary and cadence, into appropriate text, codes, and commands. [12]

Continuum of care: The full spectrum of health services provided to patients, including health maintenance, primary care, acute care, critical care, rehabilitation, home care, skilled nursing care, and hospice care. [16]

Contract-management system: A computer system used to support managed care contracting by estimating the costs and payments associated with potential contract terms and by comparing actual with expected payments based on contract terms. [13]

Contrast radiography: A technique used to increase the contrast resolution of X-ray images by injection of radiopaque contrast material into a body cavity or blood vessels. [9]

Contrast resolution: A measure of the ability to distinguish among small differences in intensity (indicated in a digital image by the number of bits per pixel). [5,9]

Controlled terminology: A finite, enumerated set of terms intended to convey information unambiguously. [7]

Controls: In an experiment, subjects who are not affected by the intervention of interest. [11]
**Convolution:** In image processing, a mathematical edge-enhancement technique used to sharpen blurred computed tomographic images. [9]

**Copyright law:** Protection of written materials and intellectual property from being copied verbatim. [10]

**Cost center:** An organizational department that does not have revenue associated with the services it provides (e.g., administration, data processing, billing, and housekeeping). [23]

**Cost–benefit analysis (CBA):** An analysis of the costs and benefits associated with alternative courses of action that is designed to identify the alternative that yields the maximum net benefit. CBA is generally used when it is possible to assign dollar values to all relevant costs and benefits. [11]

**Cost-effectiveness analysis (CEA):** An analysis of alternative courses of action, the objective of which is to identify either the alternative that yields the maximum effectiveness achievable for a given amount of spending, or the alternative that minimizes the cost of achieving a stipulated level of effectiveness. CEA is generally used when it is not possible to measure benefits in dollar units. [11]

**Cost-effectiveness threshold:** Threshold level in a cost-effectiveness analysis that reflects a decision maker’s value judgment regarding a maximum (or minimum) value; e.g., the maximum value of a quality-adjusted life year to be used in an analysis. [11]

**Credentialing:** Certification of an individual or resource’s quality by a recognized body such as a clinical professional association. [14]

**Critical care:** Monitoring and treatment of patients with unstable physiologic systems, with life-threatening conditions, or at high-risk of developing life-threatening conditions, typically in an intensive care or coronary care unit. [10]

**Critiquing model:** A style of interaction in a decision-support system, in which the program acts as a sounding board for the user’s ideas, expressing agreement or suggesting reasoned alternatives. [20]

**Critiquing system:** A computer-based system that evaluates and suggests modifications for plans or data analyses already formed by a user (see consulting system). [20]

**Cross validation:** Verification of the accuracy of data by comparison of two sets of data collected by alternate means. [17]

**Cryptographic encoding:** Scheme for protecting data based on use of keys for encrypting and decrypting information (see secret-key and private-key cryptography). [5]
Cumulative Index to Nursing and Allied Health Literature (CINAHL): A non-NLM bibliographic database that covers nursing and allied health literature, including physical therapy, occupational therapy, laboratory technology, health education, physician assistants, and medical records. [19]

Cursor: A blinking region of a display monitor, or a symbol such as an arrow, that indicates the currently active position on the screen. [5]

Customary, prevailing, and reasonable: The payment system used by Medicare (prior to implementation of the Resource-Based Relative Value Scale and Volume Performance Standard) that reimbursed practitioners generously for doing procedures and relatively poorly for providing cognitive services such as history taking and advice giving. [23]

Custom-designed system: A computer system designed and developed within an institution to meet the special needs of that institution. [6]

Customer: The user who interacts with the software and hardware of a computer system and uses the results. [6]

Data acquisition: The input of data into a computer system through direct data entry, acquisition from a medical device, or other means. [16]

Data bus: An electronic pathway for transferring data; e.g., between a CPU and memory. [5]

Data capture: The acquisition or recording of information. [12]

Data compression: A mathematical technique for reducing the number of bits needed to store data, with or without loss of information. [18]

Data Encryption Standard (DES): A widely used method for securing information storage and communications that uses a private (secret) key for encryption and requires the same key for decryption (see also public key cryptography). [5]

Data flow: The input, processing, storage, and output of information in a computer system. [6]

Data flow diagram (DFD): A graphical representation for the sources, transformation processes, storage, and presentation of data in a computer system. [6]

Data independence: The insulation of applications programs from changes in data storage structures and data access strategies. [5]

Data interchange standards: Adopted formats and protocols for exchange of data between independent computer systems. [7]
Data layer: A conceptual level of system architecture that isolates the data collected and stored in the enterprise from the applications and user interfaces used to access those data. [13]

Data overload: The inability to access or use crucial information due to an overwhelming number of irrelevant data or due to the poor organization of data. [17]

Data processing: The manipulation of data to convert it to some desired result (also called data transformation). [16]

Data recording: The documentation of information for archival or future use through mechanisms such as handwritten text, drawings, machine-generated traces, or photographic images. [2]

Data standard: A set of syntactic and semantic rules for defining elements of information to be recorded or exchanged. [7,16]

Data storage: The methods, programs, and structures used to organize data for subsequent use. [16]

Data transcription: The transfer of information from one data-recording system to another. Typically, the entry into a computer by clerical personnel of the handwritten or dictated notes or datasheets created by a health professional. [12]

Data transformation: The manipulation of data to convert it to some desired result (also called data processing). [16]

Data warehouse: Database optimized for long-term storage, retrieval, and analysis of records aggregated across patient populations, often serving the longer-term business and clinical analysis needs of an organization. [13]

Database: A collection of stored data—typically organized into fields, records, and files—and an associated description (schema). [2,5]

Database management system (DBMS): An integrated set of programs that manages access to databases. [5]

Database mediator: A software component that serves as a conduit between one or more other client software components and a database server. The mediator insulates the client components from logistical issues associated with accessing the database server. [20]

Datum: Any single observation of fact. A medical datum generally can be regarded as the value of a specific parameter (e.g., red blood cell count) for a particular object (e.g., a patient) at a given point in time. [2]
**Debugger:** A system program that provides traces, memory dumps, and other tools to assist programmers in locating and eliminating errors in their programs. [5]

**Decision analysis:** A methodology for making decisions by identifying alternatives and assessing them with regard to both the likelihood of possible outcomes and the costs and benefits of those outcomes. [20]

**Decision node:** A symbol that represents a choice among actions. By convention, a decision node is represented in a decision tree by a square. [3]

**Decision tree:** A diagrammatic representation of the outcomes associated with chance events and voluntary actions. [3]

**Decision facilitation approach:** A formative evaluation approach designed to resolve issues important to system developers and administrators by asking and answering successive questions during the course of resource development. [11]

**Decryption:** The process of transforming encrypted information back to its original form; see encryption. [1]

**Deductible:** A set dollar amount of covered charges that must be paid by the insuree before the insurance company begins to reimburse for outlays or to make direct payments to providers of service. [23]

**Deformable model:** In image processing, a generic shape that is close in shape to a structure of interest, and which can be reshaped (deformed) until it matches the imaged structure. The deformation is controlled by an optimization procedure that minimizes a cost function. [9,18]

**Delta check:** Procedure applied to entered data that compares the values of new and previous results to detect large and unlikely differences in value; e.g., a recorded weight change of 100 pounds in 2 weeks. [12]

**Demonstration study:** An experiment designed to draw inferences about performance, perceptions, or effects of an information resource. [11]

**Deoxyribonucleic acid (DNA):** The genetic material that is the basis for heredity. DNA is a long polymer chemical made of four basic subunits. The sequence in which these subunits occur in the polymer distinguishes one DNA molecule from another and in turn directs a cell’s production of proteins and all other basic cellular processes. [22]

**Departmental system:** A system that focuses on a specific niche area in the health care setting, such as a laboratory, pharmacy, radiology department, etc. [13]
**Dependent variable:** In a statistical analysis, the variable that measures experimental outcome. Its value is assumed to be a function of the experimental conditions (independent variables). [11]

**Derivational morpheme:** A morpheme that changes the meaning or part of the speech of a word (e.g., -ful as in painful, converting a noun to an adjective). [8]

**Derived parameter:** A parameter that is calculated indirectly from multiple parameters that are measured directly. [17]

**Descriptive (or uncontrolled) study:** Experiment in which there is no control group for comparison. [11]

**Diagnosis:** The process of analyzing available data to determine the pathophysiologic explanation for a patient’s symptoms. [1,10,20]

**Diagnosis-related group (DRG):** One of almost 500 categories based on major diagnosis, length of stay, secondary diagnosis, surgical procedure, age, and types of services required. Used to determine the fixed payment per case that Medicare will reimburse hospitals for providing care to elderly patients. [21,23]

**Diagnostic process:** The activity of deciding which questions to ask, which tests to order, or which procedures to perform, and determining the value of the results relative to associated risks or financial costs. [20]

**DICOM (Digital Imaging and Communications in Medicine):** A standard developed by the National Equipment Manufacturers Association for the electronic exchange of medical images and the data associated with the image, related to the patient, the study, the series, the image acquisition and presentation method, annotations, and associated reports. This multipart standard has been widely adopted and is one of the most successful examples of the benefits of standardization. [18]

**Differential diagnosis:** The set of active hypotheses (possible diagnoses) that a physician develops when determining the source of a patient’s problem. [2]

**Digital acquisition of images:** Medical images may be acquired from a number of image generation devices. Digital acquisition refers to the process of obtaining the image data in electronic form, usually in the form of an array of picture elements (pixels) or for three-dimensional images, volume elements (voxels). Digital acquisition may be primary through a variety of digital image capture technologies, or secondary, through scanning of film-based images. [18]

**Digital computer:** A computer that processes discrete values based on the binary digit or bit. Essentially all modern computers are digital, but analog computers also existed in the past. [5]
**Digital image:** An image that is stored as a grid of numbers, where each picture element (pixel) in the grid represents the intensity, and possibly color, of a small area. [9,18]

**Digital Imaging and Communications in Medicine:** See DICOM.

**Digital library:** Organized collections of electronic content, intended for specific communities or domains. [19]

**Digital object identifier (DOI):** A system for providing unique identifiers for published digital objects, consisting of a prefix that is assigned by the International DOI Foundation to the publishing entity and a suffix that is assigned and maintained by the entity. [19]

**Digital Preservation Coalition:** An initiative in the United Kingdom directed at insuring the preservation of scientific information. [19]

**Digital radiography:** The process of producing X-ray images, which are stored in digital form in computer memory, rather than on film. [9]

**Digital radiology:** The use of digital radiographic methods for medical imaging to support the clinical interpretation of those images. [18]

**Digital signal processing (DSP) chip:** An integrated circuit designed for high-speed data manipulation and used in audio communications, image manipulation, and other data acquisition and control applications. [5]

**Digital signal:** A signal that takes on discrete values from a specified range of values. [5]

**Digital subscriber line (DSL):** A digital telephone service that allows high-speed network communication using conventional (twisted pair) telephone wiring. [5]

**Digital subtraction angiography (DSA):** A radiologic technique for imaging blood vessels in which a digital image acquired before injection of contrast material is subtracted pixel by pixel from an image acquired after injection. The resulting image shows only the differences in the two images, highlighting those areas where the contrast material has accumulated. [9]

**Digital versatile disk (DVD):** A plastic-and-metal disk that is used to store data optically, at a very high density; also called a digital video disk. [5]

**Digital video disk (DVD):** Next generation optical disk storage technology that allows encoding and high-volume storage of video, audio, and computer data on a compact disk. [5,21]

**Direct cost:** A cost that can be directly assigned to the production of goods or services. For example, direct costs in the laboratory include the cost of the technician's salary, equipment, and supplies. [11]
**Direct entry:** The entry of data into a computer system by the individual who personally made the observations. [12]

**Discounting:** Calculation that accounts for time preference by reducing the value of expenditures and payments that accrue in the future relative to those that occur immediately. [11]

**Discrimination learning:** An approach to teaching in which students are presented with a series of examples of increasing complexity, thereby learning to detect subtle differences. [21]

**Display monitor:** A device for presenting output to users through use of a screen (see also cathode-ray tube). [5]

**Display:** In information retrieval, the last step of the information retrieval process, in which the final result set is shown to the user. [19]

**Distributed cognition:** A view of cognition that considers groups, material artifacts, and cultures and that emphasizes the inherently social and collaborative nature of cognition. [4]

**Distributed computer system:** A collection of independent computers that share data, programs, and other resources. [13]

**DNA arrays:** Small glass plates onto which specific DNA fragments can be affixed and then used to detect other DNA fragments present in a cell extract. [22]

**DNA sequence database:** A searchable, stored collection of known DNA sequences (GENBANK is one of the largest). Individual databases may also contain information about the biological source of the sequence, reference information, and annotations regarding the data. [22]

**Domain Name System (DNS):** A hierarchical name management system used to translate computer names to Internet protocol (IP) addresses. [5]

**Domain:** A unique corporate or institutional address that designates one or multiple hosts on the Internet. [1]

**Doppler shift:** A perceived change in frequency of a signal as the signal source moves toward or away from a signal receiver. [18]

**Double-blind:** A clinical study methodology in which neither the researchers nor the subjects know to which study group a subject has been assigned. [2]

**Drill and practice:** An approach to teaching in which students are presented with a small amount of information, and then asked questions about the material, and thus receive immediate feedback to support the learning process. [21]
Dublin Core Metadata Initiative (DCMI): A standard metadata model for indexing published documents. [19]

DXplain: A diagnostic decision-support system produced by the Massachusetts General Hospital that maintains profiles of findings for over 2000 diseases and generates differential diagnoses when sets of findings are entered. [19,20]

Dynamic (simulation program attribute): A simulation program that models changes in patient state over time and in response to students’ therapeutic decisions. [21]

Dynamic programming: A computationally intensive computer science technique used, for example, to determine optimal sequence alignments in many computational biology applications. [22]

EBM database (evidence-based medicine database): A highly organized collection of clinical evidence to support medical decisions based on the results of controlled clinical trials. [19]

Edge-detection technique: A method, such as application of an edge-following algorithm, used to identify a region of interest from an overall image by delineating the borders of the region. [9]

Efficacy: The capacity for producing a desired result. [11]

Electrocardiogram (ECG): The graphic recording of minute differences in electric potential caused by heart action. Also often called EKG. [5,7,17]

Electroencephalography (EEG): A method for measuring the electromagnetic fields generated by the electrical activity of the neurons using scalp sensors, the outputs of which may be processed to localize the source of the electrical activity inside the brain. [9]

Electronic Data Interchange (EDI): Electronic exchange of standard data transactions, such as claims submission and electronic funds transfer. [7,13]

Electronic health record (EHR): A repository of electronically maintained information about an individual's lifetime health status and health care, stored such that it can serve the multiple legitimate users of the record. [12]

Electronic health record system: The addition to an electronic health record of information management tools that provide clinical alerts and reminders, linkages with external health knowledge sources, and tools for data analysis. [12]

Electronic textbook: An online reference containing nonpatient-specific information. [20]

Electronic-long, paper-short system (ELPS): A publication method that provides on the Web site supplemental material that did not appear in the print version of the journal. [19]
**Electrophoresis:** A method of separating substances based on the rate of movement of each component in a colloidal suspension while under the influence of an electric field, for the purpose of analyzing molecular structure. [22]

**EMBASE:** A commercial biomedical and pharmacological database from Excerpta Medica that provides information about medical and drug-related subjects. [19]

**Emergent:** Experimental design whereby the results of earlier stages of investigation are used to identify future issues for evaluation. [11]

**Empiricism:** The view that experience is the only source of knowledge. [4]

**EMTREE:** A hierarchically structured, controlled vocabulary used for subject indexing, used to index EMBASE. [19]

**Encrypted:** Data that have been rendered unreadable through the process of encryption. [1]

**Encryption:** The process of transforming information such that its meaning is hidden, with the intent of keeping it secret, such that only those who know how to decrypt it can read it; see decryption. [1,5]

**Enterprise master patient index (EMPI):** An architectural component that serves as the name authority in a health care information system composed of multiple independent systems; the EMPI provides an index of patient names and identification numbers used by the connected information systems. [13]

**Entrez:** A search engine from the National Center for Biotechnology Information (NCBI), at the National Library of Medicine; Entrez can be used to search a variety of life sciences databases, including PubMed. [19]

**Entry term:** A synonym form for a subject heading in the Medical Subject Headings (MeSH) controlled, hierarchical vocabulary. [19]

**Epidemiology:** The study of the incidence, distribution, and causes of disease in a population. [1,15]

**Escrow:** Use of a trusted third party to hold cryptographic keys, computer source code, or other valuable information to protect against loss or inappropriate access. [5]

**Ethernet:** A network standard that uses a bus or star topology and regulates communication traffic using the Carrier Sense Multiple Access with Collision Detection (CSMA/CD) approach. [5]
**Ethics:** A system of moral principles; the rules of conduct recognized in respect to a particular class of human actions or a particular group or culture. [10]

**Ethnography:** A branch of anthropology dealing with the scientific description of individual cultures. [11]

**Evaluation:** Data collection and analysis designed to appraise a situation, answer a question, or judge the success of an intervention. [11,19,21]

**Evidence-based guidelines:** Consensus approaches for handing recurring health management problems aimed at reducing practice variability and improving health outcomes. Clinical guideline development emphasizes using clear evidence from the existing literature, rather than expert opinion alone, as the basis for the advisory materials. [1]

**Evidence-based medicine (EBM):** An approach to medical practice whereby the best possible evidence from the medical literature is incorporated in decision making. Generally such evidence is derived from controlled clinical trials. [10,19]

**Evoking strength (ES):** One of two numbers used by the Internist-1 decision-support system to reflect the strength of the relationship between a disease and a finding; the evoking strength is a number between 0 and 5 that reflects the likelihood that a patient with the finding has the disease in question (see frequency weight). [20]

**Exact-match searching:** A search method that looks for a literal match of the search term, allowing precise control over the items retrieved. [19]

**Excerpta Medica:** A collection of life sciences databases published by Elsevier Science Publishers. [19]

**Expected value:** The value that is expected on average for a specified chance event or decision. [3]

**Expected-value decision making:** A method for decision making in which the decision maker selects the option that will produce the best result on average (i.e., the option that has the highest expected value). [3]

**Experimental science:** Systematic study characterized by posing hypotheses, designing experiments, performing analyses, and interpreting results to validate or disprove hypotheses and to suggest new hypotheses for study. [1]

**Expert system:** See knowledge-based system.

**Expert witness:** A person, such as a physician, who provides testimony at a legal proceeding in the form of professional opinions. [10]
Explosion: In information retrieval systems, the process in which a general vocabulary term and the more specific terms beneath it in the hierarchy are combined using the OR Boolean operator. [19]

Extended Binary Coded Decimal Interchange Code (EBCDIC): An 8-bit code for representing alphanumeric characters and other symbols. [7]

Extensible Markup Language (XML): A subset of the Standard Generalized Markup Language (SGML) from the World Wide Web Consortium (W3C), designed especially for Web documents. It allows designers to create their own custom-tailored tags, enabling the definition, transmission, validation, and interpretation of data between applications and between organizations. [19]

External router: A computer that resides on multiple networks and that can forward and translate message packets sent from a local or enterprise network to a regional network beyond the bounds of the organization. [5]

External validity: Characteristic of a well-founded study methodology, such that the study conclusions can be generalized from the specific setting, subjects, and intervention studied to the broader range of settings that other people will encounter. [11]

Factual knowledge: Knowledge of facts without necessarily having any in-depth understanding of their origin or implications. [4]

False-negative rate (FNR): The probability of a negative result, given that the condition under consideration is true—e.g., the probability of a negative test result in a patient who has the disease under consideration. [3]

False-negative result (FN): A negative result when the condition under consideration is true—e.g., a negative test result in a patient who has the disease under consideration. [3]

False-positive rate (FPR): The probability of a positive result, given that the condition under consideration is false—e.g., the probability of a positive test result in a patient who does not have the disease under consideration. [3]

False-positive result (FP): A positive result when the condition under consideration is false—e.g., a positive test result in a patient who does not have the disease under consideration. [3]

Feature detection: In image processing, determination of parameters, such as volume or length, from segmented regions of an image. In signal processing, identification of specific waveforms or other patterns of interest in a signal. [9,17]

Feature extraction: Computer processing to identify patterns of interest and characteristics within imaged, waveforms, and other signals (see feature detection). [17]
Feedback: In a computer-based education program, system-generated responses, such as explanations, summaries, and references, provided to further a student’s progress in learning. [21]

Fee-for-service model: Unrestricted system of health care reimbursement in which payers pay providers for those services the provider has deemed necessary. [12]

Fiber-optic cable: A communication medium that uses thin glass fibers to guide light waves to transmit information signals. [5,18]

Field qualification: In information retrieval systems, the designation of which index or field should be searched. [19]

Field: The smallest named unit of data in a database. Fields are grouped together to form records. [5] In the context of an evaluation study, the setting or settings in which the activity under study is carried out. [11]

File server: A computer that is dedicated to storing shared or private data files. [5]

File Transfer Protocol (FTP): The protocol used for copying files to and from remote computer systems on a network using TCP/IP. [5]

File: In a database, a collection of similar records. [5]

Filtering algorithm: A defined procedure applied to input data to reduce the effect of noise. [5]

Finite state automaton: See finite state machine. [8]

Finite state machine: A mathematical model of a set of strings whose members are defined by following transitions (characters of a given alphabet) among a finite number of states, until arriving at a designated final state. [8]

Firewall: A security system intended to protect an organization’s network against external threats by preventing computers in the organization’s network from communicating directly with computers external to the network, and vice versa. [5]

Fixed cost: A cost that does not vary with the volume of production during a given period. Examples are expenses for plant, equipment, and administrative salaries. [23]

Fixed fee: Restricted system of health care reimbursement in which payers pay providers a set amount for health services approved by the payer. [12]

Flash card: A portable electronic storage medium that uses a semiconductor chip with a standard physical interface; a convenient method for moving data between computers. [5]
**Floppy disk:** An inexpensive magnetic disk that can be removed from the disk-drive unit and thereby used to transfer or archive files. [5]

**Flowsheet:** A tabular summary of information that is arranged to display the values of variables as they change over time. [12]

**Fluoroscopy:** An imaging method in which a screen coated with a fluorescent substance is used for viewing objects by means of X-ray or other radiation. [9]

**Food and Drug Administration (FDA):** Division of the Department of Health and Human Services that regulates medical devices, as well as food, drugs, and cosmetics. [10,17,20]

**Foreground question:** Question that asks for general information related to a specific patient (see also background question). [19]

**Formal systems analysis:** A methodology for evaluating requirements and generating specifications for developing computer systems and other information resources. [11]

**Formative decision:** A decision made as a result of a study undertaken while a resource is being developed and that can affect future development of the resource. [11]

**Formative evaluation:** An assessment of a system’s behavior and capabilities conducted during the development process and used to guide future development of the system. [21]

**Fortran (also FORTRAN):** A computer programming language developed in the 1950s and used for scientific and numerical computation. The name stands for Formula Translator/Translation. [5]

**Fourier transform:** A mathematical method for analyzing complex electrical or sound signals to extract intensities of multiple frequencies over time. [18]

**Frame relay:** A high-speed network protocol designed for sending digital information over shared wide-area networks using variable length packets of information. [5]

**Free morpheme:** A morpheme that is a word and that does not contain another morpheme (e.g., arm, pain). [8]

**Free text:** Unstructured, uncoded representation of information in text format; e.g., sentences describing the results of a patient’s physical examination. [12]

**Frequency weight (FW):** One of two numbers used by the Internist-1 decision-support system to reflect the strength of the relationship between a disease and a finding; the FW is a number between 1 and 5, where 1 means that the finding is seldom seen in the disease and 5 means it is essentially always seen (see evoking strength). [20]
Frequency modulation: A method of encoding information in which changes in input signal amplitude are encoded as frequency changes in a corresponding transmitted signal around the base frequency of a carrier wave. Because the input amplitude is encoded as a frequency shift, the encoded signal is less subject to outside interference, which primarily affects the amplitude of transmitted signals. [5]

Front-end application: In database applications, a front-end application is a program, often with a graphical user interface, that helps a user manipulate information in the database without having to know details of the database design or how to program queries. [5]

Full disclosure: In ECG monitoring, a process whereby all data regarding the full set of leads are stored and available for reconstruction of the complete cardiogram as it would have appeared during a period of abnormal rhythms. [17]

Full-text content: The complete textual information contained in a bibliographic source. [19]

Full-text database: A bibliographic database that contains the entire text of journal articles, books, and other literature, rather than only citations and abstracts. [19]

Functional image: An image, such as a computed tomographic image or a digital subtraction angiogram image, which is computed from derived quantities, rather than being measured directly. [9]

Functional magnetic resonance imaging (fMRI): A magnetic resonance imaging method that reveals changes in blood oxygenation that occur following neural activity. [9]

Functional mapping: An imaging method that relates specific sites on images to particular physiologic functions. [9,18]

Gateway: A computer that resides on multiple networks and that can forward and translate message packets sent between nodes in networks running different protocols. [5]

Gene: A hereditary unit consisting of a sequence of DNA that occupies a specific location on a chromosome and determines a particular characteristic in an organism. [22]

Genetic data: Information regarding a person or organism’s genome and heredity. [10]

Genome: The total collection of DNA for a person or other organism. [22]

Genomics: The study of all of the nucleotide sequences, including structural genes, regulatory sequences, and noncoding DNA segments, in the chromosomes of an organism. [22]

Genomics database: An organized collection of information from gene sequencing, protein characterization, and other genomic research. [19]
Genotype: The genetic makeup, as distinguished from the physical appearance, of an organism or a group of organisms. [22]

Gigabits per second (Gbps): A common unit of measure for data transmission over high-speed networks. [5]

Gigabyte: \(2^{30}\) or 1,073,741,824 bytes. [5]

Global processing: Any image-enhancement technique in which the same computation is applied to every pixel in an image. [9]

Goal-free approach: An evaluation approach in which evaluators are purposely unaware of the intended effects of an information resource and collect evidence to enable identification of all effects, intended or not. [11]

Gold-standard test: The test or procedure whose result is used to determine the true state of the subject—e.g., a pathology test such as a biopsy used to determine a patient’s true disease state. [3]

Google: A commercial search engine that provides free searching of documents on the World Wide Web. [19]

Grammar: A mathematical model of a potentially infinite set of strings. [8]

Granularity: The level of detail of a search strategy, ranging from general topics to very specific concepts. [19]

Graphic editor: A program used to create and manipulate drawings or images for storage as computer files. [5]

Graphical user interface (GUI): A type of environment that represents programs, files, and options by means of icons, menus, and dialog boxes on the screen. [4, 5]

Gray scale: A scheme for representing intensity in a black-and-white image. Multiple bits per pixel are used to represent intermediate levels of gray. [5]

Group-model HMO: A type of HMO that is based on contracts between physicians organized in a medical group and the HMO; the medical group accepts risks of costs of care and usually rewards the partners if the group is successful in managing costs (see staff-model HMO). [23]

Guidance: In a computer-based education program, proactive feedback, help facilities, and other tools designed to assist a student in learning the covered material. [21]

Haptic feedback: A user interface feature in which physical sensations are transmitted to the user to provide a tactile sensation as part of a simulated activity. [18]
Hard disk: A magnetic disk used for data storage and typically fixed in the disk-drive unit. [5]

Hardware: The physical equipment of a computer system, including the central processing unit, memory, data storage devices, workstations, terminals, and printers. [5,6]

Hashing: A method of transforming a search key into an address for the purpose of efficiently storing and retrieving items of data. [19]

Hawthorne effect: The tendency for humans to improve their performance if they know it is being studied. [11]

Header (of email): The portion of a simple electronic mail message that contains information about the date and time of the message, the address of the sender, the addresses of the recipients, the subject, and other optional information. [5]

Health information infrastructure: The set of public and private resources, including networks, databases, and policies, for collecting, storing and transmitting health information. [15]

Health Insurance Portability and Accountability Act (HIPPA): A law enacted in 1996 to protect health insurance coverage for workers and their families when they change or lose their jobs. An “administrative simplification” provision requires the Department of Health and Human Services to establish national standards for electronic health care transactions and national identifiers for providers, health plans, and employers. It also addresses the security and privacy of health data. [5]

Health Level 7 (HL7): An ad hoc standards group formed to develop standards for exchange of health care data between independent computer applications; more specifically, the health care data messaging standard developed and adopted by the HL7 standards group. [1,7,12,]


Health Security Act: The 1994 proposal (by then President Clinton) drafted to overhaul the health care financing and delivery system and to provide universal health insurance coverage for all Americans. [23]

Health care information system (HCIS): An information system used within a health care organization to facilitate communication, to integrate information, to document health care interventions, to perform record keeping, or otherwise to support the functions of the organization. [13]

Health care organizations (HCO): Any organization, such as a physician's practice, hospital, or health maintenance organization, that provides care to patients. [13]
Health care team: A coordinated group of health professionals including physicians, nurses, case managers, dieticians, pharmacists, therapists, and other practitioners who collaborate in caring for a patient. [2]

Health maintenance organization (HMO): A group practice or affiliation of independent practitioners that contracts with patients to provide comprehensive health care for a fixed periodic payment specified in advance. [7,23]

Hearsay evidence: Testimony based on what a witness has heard from another source rather than on direct personal knowledge or experience. [10]

HELP sector: A decision rule encoded in the HELP system, a clinical information system that was developed by researchers at LDS Hospital in Salt Lake City. [20]

Helpers (plug-ins): Applications that are launched by a Web browser when the browser downloads a file that the browser is not able to process itself. [5]

Heuristic: A mental “trick” or rule of thumb; a cognitive process used in learning or problem solving. [2]

Heuristic evaluation: A usability inspection method, in which the system is evaluated on the basis of a small set of well-tested design principles such as visibility of system status, user control and freedom, consistency and standards, flexibility and efficiency of use. [4]

High-level process: A complex process comprising multiple lower-level processes. [1]

Histogram equalization: An image-enhancement technique that spreads the image’s gray levels throughout the visible range to maximize the visibility of those gray levels that are used frequently. [9,18]

Historically controlled experiment: A study that makes and compares the same measurements before and after the introduction of the resource of interest (see before–after study). [11]

Hospital information system (HIS): Computer system designed to support the comprehensive information requirements of hospitals and medical centers, including patient, clinical, ancillary, and financial management. [1,5,6,7,12,13,16,18]

Human–computer interaction (HCI): Formal methods for addressing the ways in which human beings and computer programs exchange information. [4]

Human Genome Project: An international undertaking, the goal of which is to determine the complete sequence of human deoxyribonucleic acid (DNA), as it is encoded in each of the 23 chromosomes. [22]
**Human immunodeficiency virus (HIV):** A retrovirus that invades and inactivates helper T cells of the immune system and is a cause of AIDS and AIDS-related complex. [5,7,15,21]

**Hypertext:** Text linked together in a nonsequential web of associations. Users can traverse highlighted portions of text to retrieve additional related information. [5,19]

**HyperText Markup Language (HTML):** The document specification language used for documents on the World Wide Web. [5,6,19,20,21]

**HyperText Transfer Protocol (HTTP):** The client–server protocol used to access information on the World Wide Web. [5,19]

**Hypothetico-deductive approach:** In clinical medicine, an iterative approach to diagnosis in which physicians perform sequential, staged data collection, data interpretation, and hypothesis generation to determine and refine a differential diagnosis. [2]

**ICD-9-CM:** see *Ninth International Classification of Diseases–Clinical Modification (ICD-9-CM).* [7]

**Icon:** In a graphical interface, a pictorial representation of an object or function. [5]

**IDF^TF weighting:** A simple weighting measure used for document retrieval based on term frequency (TF) and inverse document frequency (IDF); terms that occur often in only a small number of documents are given the highest weighting. [19]

**Image database:** An organized collection of clinical image files, such as X-rays, photographs, and microscopic images. [19]

**Image enhancement:** The use of global processing methods to improve the appearance of an image, either for human viewing or for subsequent processing by computer. [9,18]

**Image generation:** The process of producing images. [9,18]

**Image integration:** The combination of images with other information needed for interpretation, management, and other tasks. [9]

**Image management:** The application of methods for storing, transmitting, displaying, retrieving, and organizing images. [9,18]

**Image manipulation:** The use of pre- and postprocessing methods to enhance, visualize, or analyze images. [9,18]

**Image processing:** The transformation of one or more input images, either into one or more output images, or into an abstract representation of the contents of the input images. [9,18]
**Imaging informatics**: A subdiscipline of biomedical informatics concerned with the common issues that arise in all image modalities, relating to the acquisition of images in or conversion to digital form, and the analysis, manipulation, and use of those images once they are in digital form. [1, 9, 18]

**Imaging modality**: A method for producing images. Examples of medical applications are X-ray imaging, computed tomography, ultrasonography, magnetic resonance imaging, and photography. [9,18]

**Immersive simulated environment**: A teaching environment in which a student manipulates tools to control simulated instruments, producing visual, pressure, and other feedback to the tool controls and instruments. [21]

**Immunization registries**: Confidential, population based, computer-based information systems that contain data about children and vaccinations. [15]

**Impact printer**: Output device that uses typewriter, print chain, or drum technologies to contact a paper, thus producing a character or mark. [5]

**Implementation phase**: A major step in the system life cycle in which the system is constructed based on its design specifications. [6]

**Import number**: A number used by the Internist-1 decision-support system; the import number captures the notion that some abnormalities have serious implications and must be explained, whereas others may be safely ignored. [20]

**Inaccessibility**: Unavailability; a limitation of traditional medical records, which can be used by only one person at a time. [12]

**Incremental cost-effectiveness ratio**: The difference in the costs between two interventions or options divided by the difference in benefits. [11]

**Incrementalist**: Person who is able to make changes gradually, by degrees. [11]

**Indemnity insurance**: A type of insurance modeled on casualty insurance. Typically, an insuree is reimbursed a specified amount for a hospital day, or for each of a list of surgical procedures. [23]

**Independence**: Two events, $A$ and $B$, are considered independent if the occurrence of one does not influence the probability of the occurrence of the other. Thus, $p(A | B) = p(A)$. The probability of two independent events $A$ and $B$ both occurring is given by the product of the individual probabilities: $p(A, B) = p(A) \times p(B)$. (See conditional independence.) [3]

**Independent variable**: A variable believed to affect the outcome (dependent variable) of an experiment. [11]
Index: In information retrieval, a shorthand guide to the content that allows users to find relevant content quickly. [19,21]

Index attribute: A term that describes some aspect of an index item, such as the document numbers where the item appears or the frequency of the item within a document. [19]

Index item: A unit of information used for matching with a query during searching. [19]

Index Medicus: The printed index used to catalog the medical literature. Journal articles are indexed by author name and subject heading, and then aggregated in bound volumes. The Medline database was originally constructed as an online version of the Index Medicus. [19]

Index test: The diagnostic test whose performance is being measured. [3]

Indexing: In information retrieval, the assignment to each document of specific terms that indicate the subject matter of the document and that are used in searching. [19]

Indexing Initiative: An effort from the National Library of Medicine to investigate methods whereby automated indexing methods can partially or completely substitute for current (manual) indexing practices. [19]

Indirect care: Activities of health professionals that are not directly related to patient care, such as teaching and supervising students, continuing education, and attending staff meetings. [16]

Individual practice association (IPA): A group of individual physicians that has joined together to contract with one or more insurance carriers to see patients enrolled with those carriers. The physicians continue to practice in their own offices and continue to see patients with other forms of insurance coverage. The group is paid on a per capita basis for services delivered by member physicians under the IPA contracts. Individual physician members agree to fee schedules, management controls, and risk-sharing arrangements (also known as network-model HMOs). [23]

Inflectional morpheme: A morpheme that creates a different form of a word without changing the meaning of the word or the part of speech (e.g., -ed, -s, -ing as in activated, activates, activating.) [8]

Influence diagram: A belief network in which explicit decision and utility nodes are also incorporated. [3,20]

InfoMastery: For Information Mastery, a set of methods from evidence-based medicine for determining the value and validity of information. [19]

Information: Organized data or knowledge that provide a basis for decision making. [2]
Information extraction: Methods that process text to capture and organize specific information in the text and also to capture and organize specific relations between the pieces of information. [8]

Information need: In information retrieval, the searchers’ expression, in their own language, of the information that they desire. [19]

Information resources: In biomedical informatics, computer systems developed to collect, process, and disseminate health information. [11]

Information retrieval (IR): Methods that efficiently and effectively search and obtain data, particularly text, from very large collections or databases. It is also the science and practice of identification and efficient use of recorded media. [8,19]

Information retrieval (IR) database: An organized collection of stored bibliographic data, which typically contains both an index and the full original content. [19,8]

Information science: The field of study concerned with issues related to the management of both paper-based and electronically stored information. [1]

Information Sources Map (ISM): One component of the Unified Medical Language System, the Information Sources Map (ISM) is a database of available databases, indexed by terms in the Metathesaurus. [19]

Information theory: The theory and mathematics underlying the processes of communication. [1]

Informational services: Remote network services that are designed to be broadly accessible (see also business services). [6]

Ink-jet printer: Output device that uses a moveable head to spray liquid ink on paper; the head moves back and forth for each line of pixels. [5]

Input: The data that represent state information, to be stored and processed to produce results (output). [6]

Institute of Electrical and Electronics Engineers (IEEE): An international organization through which many of the world’s standards in telecommunications, electronics, electrical applications, and computers have been developed. [7,17]

Institutional review board (IRB): A committee responsible for reviewing an institution’s research projects involving human subjects in order to protect their safety, rights, and welfare. [5,8]

Integrated circuit (IC): A circuit of transistors, resistors, and capacitors constructed on a single chip and interconnected to perform a specific function. [5]
**Integrated delivery network (IDN):** A large conglomerate health care organization developed to provide and manage comprehensive health care services. [10,13,18]

**Integrated Services Digital Network (ISDN):** An international communications standard for sending digital information over telephone lines. ISDN supports data transfer rates of 64 Kbps. [5]

**Integrative model:** Model for understanding a phenomenon that draws from multiple disciplines and is not necessarily based on first principles. [22]

**Intellectual property:** Software programs, knowledge bases, Internet pages, and other creative assets that require protection against copying and other unauthorized use. [10]

**Intensive care unit (ICU):** A hospital unit in which critically ill patients are monitored closely. [1,7,17]

**Interdisciplinary care:** A patient care approach that recognizes and coordinates the complementary contributions of multiple clinicians, including physicians, nurses, dieticians, pharmacists, physical therapists, etc. [16]

**Interface engine:** A computer system that translates and formats data for exchange between independent (sending and receiving) computer systems. [12, 13]

**Intermittent monitoring:** The periodic measurement of a physiological parameter. [17]

**Internal validity:** Characteristic of a well-founded experiment; the ability to have confidence in an experiment’s conclusions due to the quality of its methodology. [11]

**Internet:** A worldwide collection of gateways and networks that communicate with each other using the TCP/IP protocol, collectively providing a range of services including electronic mail and World Wide Web access. [5]

**Internet 2:** The initial project of the University Consortium for Advanced Internet Development (UCAID), Internet 2 is a test bed for high-bandwidth communications to support research and education that builds on existing federally funded or experimental networks. [1]

**Internet (or IP) address:** A 32-bit number, written as a sequence of four 8-bit numbers, that identifies uniquely a device attached to the Internet. IP addresses are often written as a dotted sequence of numbers: a.b.c.d. Although not assigned geographically, the first number identifies a region, the second a local area, the third a local net, and the fourth a specific computer. [5]

**Internet Control Message Protocol (ICMP):** A network-level Internet protocol that provides error correction and other information relevant to processing data packets. [5]
**Internet Corporation for Assigned Names and Numbers (ICANN):** The organization responsible for managing Internet domain name and IP address assignments. [5]

**Internet Mail Access Protocol (IMAP):** A protocol used by electronic mail programs to access messages stored on a mail server. [5]

**Internet Protocol (IP):** The protocol within TCP/IP that governs the creation and routing of data packets and their reassembly into data messages. [5]

**Internet service provider (ISP):** A commercial communications company that supplies fee-for-service Internet connectivity to individuals and organizations. [5]

**Internet standards:** The set of conventions and protocols all Internet participants use to enable effective data communications. [5]

**Interoperability:** The ability for systems to exchange data and operate in a coordinated, seamless manner. [19]

**Interpreter:** A program that converts each statement in a high-level program to a machine-language representation and then executes the binary instruction(s). [5]

**Interventional radiology:** The use of needles, catheters, biopsy instruments, or other invasive methodologies with the aim of producing a diagnostic or therapeutic, or possibly palliative, effect. Examples are balloon angioplasty for coronary stenosis and cyst aspiration and drainage. [18]

**Intranet:** An enterprise-wide network that is managed and controlled by an organization for communication and information access within the organization by authorized users. [1]

**Intuitionist-pluralist:** A philosophical orientation whereby an observation depends on both the resource under study and the perspective of the observer. [11]

**Invasive monitoring technique:** A method for measuring a physiological parameter that requires breaking the skin or otherwise entering the body. [17]

**Inverse document frequency (IDF):** A measure of how infrequently a term occurs in a document collection. \[\text{IDF}_i = \log\left(\frac{\text{number of documents}}{\text{number of documents with term } i}\right) + 1.\] [19]

**Inverted index:** In information retrieval, a simple guide to the content that includes items (such as words) and item attributes (such as documents that contain the words). [19]

**Ionizing radiation:** X-rays and other forms of radiation that penetrate cells, and, when sufficiently intense, inhibit cell division, thereby causing cell death. [9]
IP address: A 32-bit number that uniquely identifies a computer connected to the Internet. [5]

Job: A set of tasks submitted by a user for processing by a computer system. [5]

Joystick: A lever-like device (like the steering stick of an airplane) that a user moves to control the position of a cursor on a screen. [5]

“Just in time” information model: An approach to providing necessary information to a user at the moment it is needed, usually through anticipation of the need. [19]

Kernel: The core of the operating system that resides in memory and runs in the background to supervise and control the execution of all other programs and direct operation of the hardware. [5]

Key field: A field in the record of a file that uniquely identifies the record within the file. [5]

Keyboard: A data input device used to enter alphanumeric characters through typing. [5]

Kilobyte: $2^{10}$ or 1024 bytes. [5]

Knowledge: Relationships, facts, assumptions, heuristics, and models derived through the formal or informal analysis (or interpretation) of data. [2]

Knowledge base: A collection of stored facts, heuristics, and models that can be used for problem solving. [2, 20]

Knowledge-based information: Information that has been derived and organized from observational or experimental research. [19]

Knowledge-based system: A program that symbolically encodes, in a knowledge base, facts, heuristics, and models derived from experts in a field and uses that knowledge to provide problem analysis or advice that the expert might have provided if asked the same question. Also known as expert system. [10, 20]

Large-Scale Networking: A federal initiative to coordinate advanced network components, technologies, security, infrastructure, and middleware; grid and collaboration networking tools and services; and engineering, management, and use of large-scale networks for science and engineering research and development. It is the successor to the Next Generation Internet program that was active in the 1990s (see http://www.nitrd.gov/subcommittee/lsn.html). [1]

Laser printer: Output device that uses an electromechanically controlled laser beam to generate an image on a xerographic surface, which is then used to produce paper copies. [5]
Latency:  The time required for a signal to travel between two points in a network. [1]

Legacy system:  A computer system that remains in use and is difficult to phase out after an organization installs new systems. [13]

Legal issues:  The aspects of using software applications in clinical practice and in biomedical research that are defined by law, including liability under tort law, legislation governing privacy and confidentiality, and intellectual property issues. [10]

Level:  One of a set of discrete values that can be assumed by a categorical variable. [11]

Lexeme:  A minimal lexical unit in a language that represents different forms of the same word. [8]

Lexical-statistical retrieval:  Retrieval based on a combination of word matching and relevance ranking. [19]

Lexicography:  The study of analyzing electronic dictionaries and creating lexical resources. [8]

Light pen:  A penlike photosensitive device with which a user can select and enter data by pointing at the screen of a video display terminal. [5]

Light:  Electromagnetic radiation that can be detected by the organs of sight. [9]

Likelihood ratio (LR):  A measure of the discriminatory power of a test. The LR is the ratio of the probability of a result when the condition under consideration is true to the probability of a result when the condition under consideration is false (e.g., the probability of a result in a diseased patient to the probability of a result in a nondiseased patient). The LR for a positive test is the ratio of true-positive rate (TPR) to false-positive rate (FPR). [3]

Link-based indexing:  An indexing approach that gives relevance weight to web pages based on how often they are cited by other pages. [19]

Liquid crystal display (LCD):  A display technology that uses rod-shaped molecules to bend light and alter contrast and viewing angle to produce images. [5,17]

Listserve:  A distribution list for electronic mail messages. [5]

Literature reference database:  See bibliographic database. [19]

Local-area network (LAN):  A network for data communication that connects multiple nodes, all typically owned by a single institution and located within a small geographic area. [5,18]
Logical link control (LLC): A sublayer of the data link layer of the ISO Open Systems Interconnection model. [7]

Logical positivism: The view that all statements are analytic (true by logical deduction), verifiable by observation, or meaningless. [4]

Logical-positivist: A philosophical orientation that holds factual only that which has verifiable consequences in experience. [11]

Long-term memory: The part of memory that acquires information from short-term memory and retains it for long periods of time. [4]

Lossless compression: A mathematical technique for reducing the number of bits needed to store data while still allowing for the re-creation of the original data. [18]

Lossy compression: A mathematical technique for reducing the number of bits needed to store data but which results in loss of information. [18]

Lots of Copies Keep Stuff Safe (LOCKSS): An initiative that seeks to preserve important documents by making numerous digital copies, combined with the ability to detect and repair damaged copies as well as to prevent subversion of the data. [19]

Low-level process: An elementary process that has its basis in the physical world of chemistry or physics. [1]

Machine code: The set of primitive instructions to a computer represented in binary code (machine language). [5]

Machine language: The set of primitive instructions represented in binary code. [5]

Machine translation: Automatic mapping of text written in one natural language into text of another language. [8]

Macro: In assembly language, a set of instructions, often with parameters that specify arguments or conditions for assembly, that provide a higher level operator for programming above the machine instruction. As with subroutines, macros make programming easier and facilitate reuse of common program segments (like saving a block of registers to the stack). [5]

Magnetic disk: A round, flat plate of material that can accept and store magnetic charge. Data are encoded on magnetic disk as sequences of charges on concentric tracks. [5]

Magnetic resonance imaging (MRI): A modality that produces images by evaluating the differential response of atomic nuclei in the body when the patient is placed in an intense magnetic field and perturbed by an orthogonal radiofrequency pulse. [5,9,18]
Magnetic tape: A long ribbon of material that can accept and store magnetic charge. Data are encoded on magnetic tape as sequences of charges along longitudinal tracks. [5]

Magnetism: The properties of attraction possessed by magnets. Many atomic nuclei within the body act like tiny magnets, a characteristic that is used in the creation of images through methods such as nuclear magnetic resonance spectroscopy. [9]

Magnetoencephalography (MEG): A method for measuring the electromagnetic fields generated by the electrical activity of the neurons using a large arrays of scalp sensors, the outputs of which are processed in a similar way to CT in order to localize the neuronal activity. [9]

Mailing list: A set of mailing addresses used for bulk distribution of electronic or physical mail. [5]

Mainframe computer: A large, expensive, multiuser computer, typically operated and maintained by professional computing personnel. [5]

Maintenance phase: The final step in the system life cycle during which the system is in routine use and is periodically modified based on changing requirements. [6]

Major medical insurance: Comprehensive insurance for medical expenses. Typically, the insurer pays a certain percentage of covered charges once the insuree has satisfied the deductible. [23]

Malpractice: Class of litigation in health care based on negligence theory; failure of a health professional to render proper services in keeping with the standards of the community. [10]

Managed competition: A strategy used by health services purchasers intended to use market forces to transform the health care delivery system; to create integrated, efficient provider organizations capable of delivering high-value health services and good health outcomes; and to create incentives for continuous quality improvement and cost reduction. [23]

Management: The process of treating a patient (or allowing the condition to resolve on its own) once the medical diagnosis has been determined. [20]

Manual indexing: The process by which human indexers, usually using standardized terminology, assign indexing terms and attributes to documents, often following a specific protocol. [19]

Marginal cost: The increase in total cost associated with the production of one more unit of a good or service. [23]
Marginal cost-effectiveness ratio: The relative value of two interventions, calculated as the difference in the measured costs of the two interventions divided by the difference in the measured benefits of the interventions. [11]

Markov cycle: The period of time specified for a transition probability within a Markov model. [3]

Markov model: A mathematical model of a set of strings in which the probability of a given symbol occurring depends on the identity of the immediately preceding symbol or the two immediately preceding symbols. Processes modeled in this way are often called Markov processes. [3,8]

Markup language: A document specification language that identifies and labels the components of the document’s contents. [6]

Markup: Labeling of distinct semantic regions of content in a document. [19]

Master patient index (MPI): The module of a health care information system used to identify a patient uniquely within the system. Typically, the MPI stores patient identification information, basic demographic data, and basic encounter-level data such as dates and locations of service. [13]

Matching: The first step of the information retrieval process, in which a query is compared against an index to create a result set. [19]

Mean average precision (MAP): A method for measuring overall retrieval precision in which precision is measured at every point at which a relevant document is obtained, and the MAP measure is found by averaging these points for the whole query. [19]

Measurement study: An experiment that seeks to determine how accurately an attribute of interest can be measured in a population of objects. [11]

Measurement: The process of assigning a value corresponding to presence, absence, or degree of a specific attribute in a specific object. [11]

Measures of concordance: Measures of agreement in test performance: the true-positive and true-negative rates. [3]


Medicaid: A program of federal grants to help states pay for the medical care of welfare recipients and of other individuals who fall into special categories of support for their health care needs. [23]
**Medical computer science:** The subdivision of computer science that applies the methods of computing to medical topics. [1]

**Medical computing:** The application of methods of computing to medical topics (see medical computer science). [1]

**Medical datum:** Any single observation of medical fact; the value of a specific parameter (e.g., red blood cell count) for a particular object (e.g., a patient) at a given point in time. [2]

**Medical informatics:** Former name for biomedical informatics, now generally viewed as a synonym for clinical informatics, although these definitions and conventions are in transition. [1]

**Medical information bus (MIB):** A data communication system that supports data acquisition from a variety of independent devices. [7,17]

**Medical information science:** The field of study concerned with issues related to the management and use of biomedical information (see also biomedical informatics). [1]

**Medical Literature Analysis and Retrieval System (MEDLARS):** The initial electronic version of Index Medicus developed by the National Library of Medicine. [19]

**Medical logic module (MLM):** A single chunk of medical reasoning or decision rule, typically encoded using the Arden Syntax. [20]

**Medical management:** Process employed by a health plan or integrated delivery network to manage patient care proactively and to ensure delivery of (only) appropriate health services. [13]

**Medical record:** A paper-based or computer-stored document in which are recorded the data gathered during a patient’s encounters with the health care system. [12]

**Medical spreadsheet:** A tool within the Quick Medical Reference decision-support system used to determine how coexisting diseases might give rise to a user-specified combination of diseases or findings. [20]

**Medical Subject Headings (MeSH):** Some 18,000 terms used to identify the subject content of the biomedical literature. The National Library of Medicine MeSH vocabulary has emerged as the de facto standard for biomedical indexing. [7,19]

**Medical technology:** Techniques, drugs, equipment, and procedures used by health care professionals in delivering medical care to individuals, and the system within which such care is delivered. [11]
**Medical record committee:** An institutional panel charged with ensuring appropriate use of medical records within the organization. [10]

**Medicare:** The federal program of hospital and medical insurance for Social Security retirees, the long-term disabled, and patients suffering from chronic renal failure. [23]

**MEDLARS Online (MEDLINE):** The National Library of Medicine’s electronic catalog of the biomedical literature, which includes information abstracted from journal articles, including author names, article title, journal source, publication date, abstract, and medical subject headings. [19]

**MEDLINEplus:** An online resource from the National Library of Medicine that contains health topics, drug information, medical dictionaries, directories, and other resources, organized for use by health care consumers. [19]

**MedWeaver:** A Web application that was designed to integrate functions from the DXplain decision-support system, the WebMedline literature search system, and the CliniWeb clinical Web search system using the UMLS Metathesaurus for vocabulary translation. [19]

**Megabit:** One million bits; usually used in reference to transmission speed, as in “megabits per second”. [5]

**Megabits per second (Mbps):** A common unit of measure for specifying a rate of data transmission. [5]

**Megabyte:** $2^{20}$ or 1,048,576 bytes. [5]

**Member checking:** Step in a subjectivist study during which the investigator shares emerging thoughts and beliefs with the participants themselves in order to validate and reorganize the structure of the study. [11]

**Memorandum of understanding:** Document that represents the general goals, scope, methods, conditions, and expected outcomes of a research study. [11]

**Memory stick:** A portable electronic storage medium that uses a semiconductor chip with a standard physical interface; a convenient method for moving data between computers. [5]

**Memory:** Areas that are used to store programs and data. The computer’s working memory comprises read-only memory (ROM) and random-access memory (RAM). [5]

**Mental models:** A form of mental representation that enables one to understand how something in the world works. One can “run” a mental model to predict future states of a system (e.g., what happens when I click on this link?) or to explain the cause of a change in state of a system (e.g., why did my computer crash?). [4]
**Menu**: In a user interface, a displayed list of valid commands or options from which a user may choose. [5]

**Merck Medicus**: An aggregated set of resources, including Harrison’s Online, MDConsult, and DXplain. [19]

**MeSH**: See Medical Subject Headings.

**MeSH subheading**: One of 76 qualifier terms that can be added to an MeSH entry term to specify the meaning further. [19]

**Metadata**: Literally, data about data, describing the format and meaning of a set of data. [5,19]

**Meta-analysis**: A summary study that combines quantitatively the estimates from individual studies. [3]

**Meta data**: In database applications, abstract descriptors of record structures and their interrelationships that facilitate locating records and fields and manipulating their contents. If programs use meta data to access and process database information, they can achieve data independence in that changes to a database structure can be made and reflected in the meta data in such a way that the program continues to operate without reprogramming. [5]

**Metacontent**: Information that describes the content of an information resource and thus adds structure to the content. [21]

**Meta-tool**: A computer program used to generate automatically a domain-specific knowledge-elicitation tool based on a model of the intended application area for a decision-support system. [20]

**Metathesaurus**: One component of the Unified Medical Language System, the Metathesaurus contains linkages between terms in Medical Subject Headings (MeSH) and in dozens of controlled vocabularies. [19]

**Microarray chip**: A microchip that holds DNA probes that can recognize DNA from samples being tested. [22]

**Middleware**: Software that resides between, and translates information between, two or more types of software. For example, middleware components may support access, processing, analysis, and composition of lower-level resources available through basic services, such as access to image data or clinical data. [18]
**Mixed-initiative system**: An educational program in which user and program share control of the interaction. Usually, the program guides the interaction, but the student can assume control and digress when new questions arise during a study session. [21]

**Model organism database**: Organized reference databases that combine bibliographic databases, full text, and databases of sequences, structure, and function for organisms whose genomic data has been highly characterized, such as the mouse, fruit fly, and Sarcchomyces yeast. [19]

**Modeling**: Task in the creation of a computer-based decision-support system that entails deciding what distinctions and data are relevant, identifying the concepts and relationships among concepts that bear on the decision-making task, and ascertaining a problem-solving strategy that can use the relevant knowledge to reach appropriate conclusions. [20]

**Modem**: A device used to modulate and demodulate digital signals for transmission to a remote computer over telephone lines; converts digital data to audible analog signals, and vice versa. [5]

**Modular computer system**: A system composed of separate units, each of which performs a specific set of functions. [13]

**Molecular imaging**: A technique for capturing images at the cellular and subcellular level by marking particular chemicals in ways that can be detected with image or radiodetection. [9]

**Morpheme**: The smallest unit in the grammar of a language that has a meaning or a linguistic function; it can be a root of a word (e.g., -arm), a prefix (e.g., re-), or a suffix (e.g., -it/-is). [8]

**Morphology**: The study of meaningful units in language and how they combine to form words. [8, 19]

**Morphometrics**: The quantitative study of growth and development, a research area that depends on the use of imaging methods. [9,18]

**Mouse (input device)**: A small boxlike device that is moved on a flat surface to position a cursor on the screen of a display monitor. A user can select and mark data for entry by depressing buttons on the mouse. [5]

**Multi-axial terminology**: A terminology that separates terms into multiple “axes” (usually, separate hierarchies) for the purposes of selecting terms from more than one axis to express meaning (see postcoordination). [7]
Multidisciplinary care: A system of patient care characterized by the collaboration of health professionals, including physicians, nurses, therapists, technicians, dieticians, pharmacists, and other care providers. [16]

Multimedia content: Information sources that encompass all common computer-based forms of information, including texts, graphics, images, video, and sound. [19]

Multimodality image fusion: Image processing that uses multiple techniques of image manipulation to generate a composite visualization that combines images from more than one source. [9]

Multiprocessing: The use of multiple processors in a single computer system to increase the power of the system (see parallel processing). [5]

Multiprogramming: A scheme by which multiple programs simultaneously reside in the main memory of a single central processing unit. [5]

Multipurpose Internet Mail Extensions (MIME): An extended standard for exchange of electronic mail that allows the direct transmission of video, sound, and binary data files by Internet electronic mail. [5]

Multiuser system: A computer system that shares its resources among multiple simultaneous users. [5]

MUMPS: Massachusetts General Hospital Utility Multi-Programming System; a specialized programming language (the second ANSII standard programming language, after COBOL) developed for use in medical applications; also known as M. [1]

Mutually exclusive: State in which one, and only one, of the possible conditions is true, e.g., either A or not A is true, and one of the statements is false. When using Bayes’ theorem to perform medical diagnosis, we generally assume that diseases are mutually exclusive, meaning that the patient has exactly one of the diseases under consideration and not more. [3]

MYCIN: A computer-assisted decision support system developed in the 1970s that used artificial intelligence techniques (production rules) to recommend appropriate therapy for patients with infections. [20]

Name authority: The component of a health care information system that uniquely identifies a patient within the system. [13]

Name-server: In networked environments such as the Internet, computers that convert a host name into an IP address before the message is placed on the network. [5]

National Digital Information Infrastructure Preservation Program (NDIIPP): A program of the U.S. Library of Congress intended to help assure preservation of scientific
information through a preservation program that will evolve with technical storage modalities. [19]

**National Center for Biotechnology Information (NCBI):** Established in 1988 as a national resource for molecular biology information, the NCBI is a component of the National Library of Medicine that creates public databases, conducts research in computational biology, develops software tools for analyzing genome data, and disseminates biomedical information. [19]

**National Guidelines Clearinghouse:** A public resource, coordinated by the Agency for Health Research and Quality, that collects and distributes evidence-based clinical practice guidelines (see www.guideline.gov). [19]

**National Health Information Infrastructure (NHII):** A comprehensive knowledge-based network of interoperable systems of clinical, public health, and personal health information that is intended to improve decision making by making health information available when and where it is needed. [1]

**National Information Standards Organization (NISO):** A nonprofit association accredited by the American National Standards Institute (ANSI) that identifies, develops, maintains, and publishes technical standards to manage information (see www.niso.org). [19]

**National Institute for Standards and Technology (NIST):** A nonregulatory federal agency within the U.S. Commerce Department’s Technology Administration; its mission is to develop and promote measurement, standards, and technology to enhance productivity, facilitate trade, and improve the quality of life (see www.nist.gov). [19]

**Natural-language query:** A question expressed in unconstrained text, from which meaning must somehow be extracted or inferred so that a suitable response can be generated. [19]

**Naturalistic:** In evaluation studies, an environment that is drawn from the real world and not constrained or externally controlled as a part of the study design. [11]

**Negative Dictionary:** A list of stop words used in information retrieval. [19]

**Negative predictive value (PV–):** The probability that the condition of interest is absent if the result is negative—e.g., the probability that a specific disease is absent given a negative test result. [3]

**Negligence law:** Laws, such as those governing medical malpractice, that are based on negligence theory. [20]

**Negligence theory:** A concept from tort law that states that providers of goods and services are expected to uphold the standards of the community, thereby facing claims of negligence if individuals are harmed by substandard goods or services. [10]
**Net present value (NPV):** The difference between the present value of benefits and the present value of costs (see present value). [11]

**Network access provider:** A company that builds and maintains high-speed networks to which customers can connect, generally to access the Internet (see also Internet service provider). [5]

**Network-based hypermedia:** The mechanism by which media of all types (text, graphics, images, audio, and video) are integrated, interlinked, and delivered via networks. [19]

**Network-model HMO:** A model whereby groups of physicians in private practice band together to offer contracted services, generally simulating a prepaid group practice approach (see also individual practice associations). [23]

**Network node:** One of the interconnected computers or devices linked in a communications network. [5]

**Network protocol:** The set of rules or conventions that specifies how data are prepared and transmitted over a network and that governs data communication among the nodes of a network. [5]

**Network stack:** The method within a single machine by which the responsibilities for network communications are divided into different levels, with clear interfaces between the levels, thereby making network software more modular. [5]

**Network topology:** The configuration of the physical connections among the nodes of a communications network. [5]

**Neuroinformatics:** An emerging subarea of biomedical informatics in which the discipline's methods are applied to the management of neurological data sets and the modeling of neural structures and function. [9]

**Next Generation Internet:** A federally funded research program in the late 1990s and early in the current decade that sought to provide technical enhancements to the Internet to support future applications, which currently are infeasible or are incapable of scaling for routine use. [1]

**Ninth International Classification of Diseases–Clinical Modification (ICD-9-CM):** A coding system for medical diagnoses, symptoms, and nonspecific complaints. It is frequently used on insurance claim forms to identify the reasons for providing medical services. [7]

**Node:** In networking topologies, a machine on the network that sits at the intersection of incoming and outgoing communications channels. [5]
Noise: The component of acquired data that is attributable to factors other than the underlying phenomenon being measured (e.g., electromagnetic interference, inaccuracy in sensors, or poor contact between sensor and source). [5]

Nomenclature: A system of terms used in a scientific discipline to denote classifications and relationships among objects and processes. [2,4,7]

Noninvasive monitoring technique: A method for measuring a physiological parameter that does not require breaking the skin or otherwise entering the body. [17]

Nonionizing radiation: Radiation that does not cause damage to cells; e.g., the sound waves used in ultrasonography (see ionizing radiation). [9]

Nonquantifiable benefits and costs: In a cost-benefit analysis, those elements that are important to consider but may defy formal numeric measurements. [23]

Notifiable disease: In communicable disease management, a disease that must be reported to a public health agency when a new case occurs. [15]

NP hard: A complexity class of problems, which are intrinsically harder than those that can be solved in polynomial time. When a definitive version of a combinatorial optimization problem is proven to belong to a class of well-known complex problems such as satisfiability, traveling salesman, and bin packing, an optimization version is said to be NP hard. [11]

Nuclear magnetic resonance (NMR) spectroscopy: A spectral technique used in chemistry to characterize chemical compounds by measuring magnetic characteristics of their atomic nuclei. [9]

Nuclear-medicine imaging: A modality for producing images by measuring the radiation emitted by a radioactive isotope that has been attached to a biologically active compound and injected into the body. [9]

Null hypothesis: In evaluation studies, the negatively stated hypothesis that is the subject of study, generally because of a suspicion that the hypothesis is incorrect. [11]

Nursing care plan: A proposed series of nursing interventions based on nursing assessments and nursing diagnoses. It identifies nursing care problems, states specific actions to address the problems, specifies the actions taken, and includes an evaluation of a client’s response to care. [16]

Nursing informatics: The application of biomedical informatics methods and techniques to problems derived from the field of nursing. Viewed as a subarea of clinical informatics. [16]
Nursing information system (NIS): A computer-based information system that supports nurses’ professional duties in clinical practice, nursing administration, nursing research, and education. [16]

Nursing intervention: Any of a variety of interactions between nurse and client, including physical care, emotional support, and client education. [16]

Nyquist frequency: The minimum sampling rate necessary to achieve reasonable signal quality. In general, it is twice the frequency of the highest-frequency component of interest in a signal. [5]

Object-oriented database: A database that is structured around individual objects (concepts) that generally include relationships among those objects and, in some cases, executable code that is relevant to the management and or understanding of that object. [22]

Object-oriented programming: An approach to computer programming in which individual concepts are modeled as objects that are acted upon by incoming messages and that act upon other objects by outgoing messages. [6]

Objectives-based approach: An evaluation methodology in which a study seeks to determine whether a resource meets its designers’ objectives. [11]

Objectivist: A philosophy of evaluation that suggests that the merit and worth of an information resource—the attributes of most interest in evaluation—can in principle be measured with all observations yielding the same result. [11]

Occam’s razor: A philosophical and scientific rule that the simpler explanation is preferred to a more complicated one, all else being equal. [2]

Odds: An expression of the probability of the occurrence of an event relative to the probability that it will not occur. [3]

Odds-likelihood form: See odds-ratio form. [3]

Odds-ratio form: An algebraic expression for calculating the posttest odds of a disease, or other condition of interest, if the pretest odds and likelihood ratio are known (an alternative formulation of Bayes’ theorem, also called the odds-likelihood form). [3]

Offline device: A device that operates independently of the processor; e.g., a photographic printer with input from storage devices such as flash memory cards or memory sticks. [5]

ONCOCIN: An expert system built in the 1980s to assist physicians with the management of patients enrolled in cancer chemotherapy clinical trials. [20]
**Online bibliographic searching:** The use of computers to search electronically stored databases of indexed literature references. [19]

**Online device:** A device that is under the direct control of a computer’s processor; e.g., a magnetic-disk drive. [5]

**Ontology:** A description (like a formal specification of a program) of the concepts and relationships that can exist for an agent or a community of agents. In biomedicine, such ontologies typically specify the meanings and hierarchical relationships among terms and concepts in a domain. [9, 20]

**OPAL:** A knowledge acquisition program, related to ONCOCIN, designed to allow clinicians to specify the logic of cancer clinical trials using visual-programming techniques. [20]

**Open Archives Initiative:** An effort to provide persistent access to electronic archives of scientific (and other) publications; its fundamental activity is to promote the specification of archives’ metadata such that digital library systems can learn what content is available and how it can be obtained. [19]

**Open-loop control:** A computer system that assists in regulation of a physiological variable, such as blood pressure, by monitoring the value of the variable and reporting measured values or therapy recommendations. Health care personnel retain responsibility for therapeutic interventions (see closed-loop control). [17]

**Open policy:** In standards group, a policy that allows anyone to become involved in discussing and defining the standard. [7]

**Open source:** An approach to software development in which programmers can read, redistribute, and modify the source code for a piece of software, resulting in community development of a shared product. [12]

**Operating system (OS):** A program that allocates computer hardware resources to user programs and that supervises and controls the execution of all other programs. [5]

**Opportunity cost:** The value of the alternatives foregone that might have been produced with those resources (also called the economic cost). [23]

**Optical disk:** A round, flat plate of plastic or metal that is used to store information. Data are encoded through the use of a laser that marks the surface of the disk. [5]

**Order entry:** In a hospital or health care information system, online entry of orders for drugs, laboratory tests, and procedures, usually by nurses or physicians. [13]

**Order-entry systems:** See computer-based physician order-entry (CPOE) systems. [1]
**Orienting issues:** Initial investigations that help to define the issues of interest in a subjectivist study design. [11]

**Orienting questions:** The aims of a study, defined at the outset and sometimes contractually mandated. [11]

**Original content:** Online information created and provided by the same organization. [19]

**Outcomes:** In a study, the events or measurements that reflect the possible influences of the interventions being studied. [11]

**Outcomes data:** Formal information regarding the results of interventions. [10]

**Outcome measure:** A parameter for evaluating the success of a system; the parameter reflects the top-level goals of the system. [11]

**Outcome variable:** See **outcome measure.** [11]

**Output:** The results produced when a process is applied to input. Some forms of output are hardcopy documents, images displayed on video display terminals, and calculated values of variables. [5,6]

**Overhead:** See **indirect cost.** [23]

**Packet:** In networking, a variable-length message containing data plus the network addresses of the sending and receiving nodes, and other control information. [5]

**Page:** A partitioned component of a computer user’s programs and data that can be kept in temporary storage and brought into main memory by the operating system as needed. [5]

**PageRank (PR) indexing:** In indexing for information retrieval on the Internet, an algorithmic scheme for giving more weight to a Web page when a large number of other pages link to it. [19]

**Parallel processing:** The use of multiple processing units running in parallel to solve a single problem (see **multiprocessing**). [5]

**Parse tree:** The representation of structural relationships that results when using a grammar (usually context-free) to analyze a given sentence. [8]

**Part of speech tagging:** Assignment of syntactic classes to a given sequence of words, e.g., determiner, adjective, noun and verb. [8]

**Partial-match searching:** An approach to information retrieval that recognizes the inexact nature of both indexing and retrieval, and attempts to return the user content ranked by how close it comes to the user’s query. [19]
**Patent**: A specific legal approach for protecting methods used in implementing or instantiating ideas (see intellectual property). [10]

**Pathfinder**: A computer program that uses Bayesian methods in the diagnosis of lymph node pathology. [20]

**Pathognomonic**: Distinctively characteristic, and thus, uniquely identifying a condition or object (100 percent specific). [2,20]

**Pathways**: See clinical pathways. [1]

**Patient care system**: Comprehensive computer systems used by health workers in the management of individual patients, usually in hospital settings. [16]

**Patient chart**: Another name for the medical record of a patient. [12]

**Patient monitor**: An instrument that collects and displays physiological data, often for the purpose of watching for, and warning against, life-threatening changes in physiological state. [17]

**Patient monitoring**: Repeated or continuous measurement of physiological parameters for the purpose of guiding therapeutic management. [17]

**Patient record**: Another name for the medical record, but one often preferred by those who wish to emphasize that such records often need to contain information about patients that extends beyond the details of their diseases and medical or surgical management. [12]

**Patient-specific information**: Clinical information about a particular patient (as opposed to general knowledge of a disease, syndrome, relationship, etc.). [19]

**Patient-tracking application**: A computer system used to monitor and manage the movement of patients through multistep processes, such as in the emergency department or imaging department. [13]

**Patient triage**: A computer system that helps health professionals to classify new patients and direct them to appropriate health resources. [13]

**Pattern check**: A method for verifying the accuracy of an identifier by assuring that it follows a predefined pattern (e.g., that a Social Security Number must be of the form xxx-yy-zzzz where x, y, and z are digits). [12]

**Pattern recognition**: The process of organizing visual, auditory, or other data and identifying meaningful motifs. [17]

**Peer review**: In scientific publication, the process of requiring that articles be reviewed by other scientists who are peers of the author and that, before acceptance for publication-
tion, the author subsequently revise the paper in response to comments and criticisms from such reviewers. [19]

**Per capita payment:**  See capitation. [23]

**Perimeter definition:**  Specification of the boundaries of trusted access to an information system, both physically and logically. [5]

**Personal computer (PC):**  A small, relatively inexpensive, single-user computer. [5,21]

**Personal digital assistant (PDA):**  A small, relatively inexpensive, handheld device with electronic schedule and contact list capabilities, possibly with handwriting recognition and other productivity tools. [13]

**Phantom:**  In image processing, an object of known shape, used to calibrate imaging machines. The reconstructed image is compared to the object’s known shape. [9]

**Pharmacokinetic parameters:**  The drug-specific and patient-specific parameters that determine the shape of the mathematical models used to forecast drug concentrations as a function of drug regimen. [20]

**Pharmacokinetics:**  The study of the routes and mechanisms of drug disposition over time, from initial introduction into the body, through distribution in body tissues, biotransformation, and ultimate elimination. [1,20]

**Pharmacy benefits managers (PBMs):**  A product of the U.S. health care financing system, PBMs are hired by health plans, insurers, and large employers to fulfill the prescription benefits that are due to their members. A PBM generally negotiates for bulk discounts in purchasing drugs from pharmaceutical companies, and seeks to reduce the total drug cost to the payers, while often providing other services such as mail-order pharmacy deliveries. [24]

**Pharmacy information system:**  A computer-based information system that supports pharmacy personnel. [13]

**Phased installation:**  The incremental introduction of a system into an institution. [6]

**Phenotype:**  The observable physical characteristics of an organism, produced by the interaction of genotype with environment. [22]

**Physician-hospital organization (PHO):**  An approach wherein one or a group of hospitals team up with their medical staffs to offer subscribers comprehensive health services for a per capita prepayment. [23]

**Picture-archiving and communication system (PACS):**  An integrated computer system that acquires, stores, retrieves, and displays digital images. [18]
Picture-archiving and communication system (PACS) workbench: A set of tools to study PACS design and to conduct experiments related to image acquisition, transmission, archiving, and viewing. [7,18]

Pixel: One of the small picture elements that makes up a digital image. The number of pixels per square inch determines the spatial resolution. Pixels can be associated with a single bit to indicate black and white or with multiple bits to indicate color or gray scale. [5,9,18]

Placebo effect: In some drug trials, simply giving patients an inactive tablet or other placebo can cause a measurable improvement in some clinical variables because patients feel good about receiving attention and potentially useful medication. This placebo effect may be more powerful than the drug effect itself, and may obscure a complete absence of pharmaceutical benefit. [11]

Plug-ins: Software components that are added to Web browsers or other programs to allow them a special functionality, such as an ability to deal with certain kinds of media (e.g., video or audio). [5]

Point-of-care system: A hospital information system that includes bedside terminals or other devices for capturing and entering data at the location where patients receive care. [13]

Point of service (POS): A type of health plan introduced by HMOs in the mid-1980s to allow patients, at some expense, to seek care outside of the network that includes their contracted providers. [23]

Pointing device: A manual device, such as a mouse, light pen, or joystick, that can be used to specify an area of interest on a computer screen. [5]

Polysemy: The characteristic of a word having multiple possible meanings. [19]

Population-based atlas: An atlas that encodes the anatomy and variation from a group of individuals constituting some relevant population. Compare with a template atlas that is created from a single individual. [9]

Portable Document Format (PDF): Invented by Adobe, Inc., PDF is a published specification used for secure, reliable electronic document distribution and exchange. When converted to PDF, a document maintains its original look and integrity. [19]

Positive predictive value (PV+): The probability that the condition of interest is true if the result is positive—e.g., the probability that a disease is present given a positive test result. [3]

Positron emission tomography (PET): A tomographic imaging method that measures the uptake of various metabolic products (generally a combination of a positron-emitting tracer with a chemical such as glucose), e.g., by the functioning brain, heart, or lung. [9]
**Postcoordination:** Coding of data by using multiple terms, as needed, to express meaning that cannot be accurately captured by any single term. [7]

**Postgenomic database:** A database that combines molecular and genetic information with data of clinical importance or relevance. *Online Mendelian Inheritance in Man* (OMIM) is a frequently cited example of such a database. [22]

**Postgenomic era:** The coming period in which genomic information will be combined with other types of clinical or patient-specific data to provide new approaches to diagnosis and therapy. [9]

**Post Office Protocol (POP):** A protocol used in the delivery of electronic mail services to any of a number of client software packages used to read e-mail from a central server. [5]

**Posterior probability:** The updated probability that the condition of interest is present after additional information has been acquired. [3]

**Post-test probability:** The updated probability that the disease or other condition under consideration is present after the test result is known (more generally, the posterior probability). [3]

**Practice management system (PMS):** A computer information system designed to support all information requirements of a physician office or group practice, including registration, appointment scheduling, billing, and clinical documentation. [13]

**Pragmatics:** The study of how contextual information affects the interpretation of the underlying meaning of the language. [8]

**Precision:** The degree of accuracy with which the value of a sampled observation matches the value of the underlying condition, or the exactness with which an operation is performed. In information retrieval, a measure of a system’s performance in retrieving relevant information (expressed as the fraction of relevant records among total records retrieved in a search). [5,19]

**Precoordination:** Expansion of a terminology, as needed, to express meanings with single terms, without needing to resort to the use of multiple terms (see postcoordination). [7]

**Predicate calculus:** The branch of symbolic logic that uses symbols for quantifiers and for arguments and predicates of propositions as well as for unanalyzed propositions and logical connectives. [4]

**Predictive model:** In evaluation studies, the unusual situation in which investigators have a mechanism to tell them what would have happened to patients if they had not intervened. Such models allow comparisons of what actually happens with what is predicted. [11]
Predictive value: The posttest probability that a condition is present based on the results of a test (see positive predictive value and negative predictive value). [2]

Preferred-provider insurance (PPI): In managed care, an insurance plan in which companies contract with large numbers of providers that are not otherwise related to one another. [23]

Preferred-provider organization (PPO): A method of health care financing based on selective contracting in advance for the services of health care providers. A PPO typically is composed of a panel of providers, a negotiated fee schedule that providers agree to accept as payment in full for their services, a mechanism for utilization control, and incentives for consumers to select providers from the panel, usually in the form of reduced coinsurance. [7,23]

Prepaid group practice: An affiliation of health care providers that agrees to provide comprehensive health care to members for a fixed annual fee set in advance. [23]

Present value (PV): The current value of a payment or stream of payments to be received in the future. The concept of present value generally reflects the fact that $1 received 1 year from now is not worth as much as $1 received today both because of inflation and because that dollar is not available to earn interest over the course of the year. [23]

Presentation: The forms in which information is delivered to the end user after processing. [16]

Presentation layer: In software systems, the components that interact with the user. The term generally connotes an architecture in which the system components are modular and layered between the underlying data structures and the user interface. [18]

President’s Information Technology Advisory Committee (PITAC): A federal advisory body, comprising individuals from academia and industry in the private sector, which was created under the High Performance Computing and Communications initiative of the 1990s and provides advice to the White House on matters related to information technology, including its role in science and health care. [19]

Pressure transducer: A device that produces electrical signals proportional in magnitude to the level of a pressure reading. [17]

Pretest probability: The probability that the disease or other condition under consideration is present before the test result is known (more generally, the prior probability). [3]

Prevalence: The frequency of the condition under consideration in the population. For example, we calculate the prevalence of disease by dividing the number of diseased individuals by the number of individuals in the population. Prevalence is the prior probability of a specific condition (or diagnosis), before any other information is available. [2,3]
Primary care: The level of care normally provided by a personal physician or walk-in clinic. The point of entry to the health care system. [12]

Primary care gatekeepers: In managed care settings, those primary care physicians who provide all initial care and then make determinations about when referral of a patient to a specialist is necessary or appropriate. [23]

Primary knowledge-based information: The original source of knowledge, generally in a peer-reviewed journal article that reports on a research project’s results. [19]

Primary literature: Scientific articles that present the initial research results, as opposed to review articles or textbooks that synthesize such studies into general coverage of a topic. [19]

Prior probability: The probability that the condition of interest is present before additional information has been acquired. In a population, the prior probability also is called the prevalence. [3]

Privacy: A concept that applies to people, rather than documents, in which there is a presumed right to protect that individual from unauthorized divulging of personal data of any kind. [5,10]

Privacy-Enhanced Mail protocol (PEM): A protocol whereby electronic mail is encrypted to assure that only the sender and intended receiver can read it. [5]

Private branch exchange (PBX): A telephone switching center. PBXs can be extended to provide a local-area network in which digital data are converted to analog signals and are transmitted over an existing telephone system. [5]

Probabilistic context-free grammar: A context-free grammar in which the possible ways to expand a given symbol have varying probabilities rather than equal weight. [8]

Probabilistic relationship: Exists when the occurrence of one chance event affects the probability of the occurrence of another chance event. [3]

Probability: Informally, a means of expressing belief in the likelihood of an event. Probability is more precisely defined mathematically in terms of its essential properties. [3]

Problem-oriented medical record (POMR): A clinical record in which the data collected, the physician’s assessment, and the proposed therapeutic plans are grouped by association with the patient’s specific medical problems. [12]

Problem solver: A program designed to address a certain class of problems using a defined methodology. [20]

Problem space: The range of possible solutions to a problem. [4]
Procedural knowledge: Knowledge of how to perform a task (as opposed to factual knowledge about the world). [4]

Process measure: A parameter for evaluating the success of a system; the parameter measures a byproduct of the system's function. [11]

Product: An object that goes through the processes of design, manufacture, distribution, and sale. [10]

Production: The process of executing a product's design in an ongoing, maintained manner. [21]

Production rule: A conditional statement that relates premise conditions to associated actions or inferences. [20]

Productivity cost: Costs that accrue because of changes in productivity due to illness or death. [11]

Professional-developed: A reference to educational and other resources created by health professionals and their organizations for direct use by patients. [14]

Professional–patient relationship: Refers to a set of assumptions regarding the primacy of patient well-being rather than other external factors in the determination of actions by health professionals. [10]

Professional-review approach: An approach to evaluation in which panels of experienced peers spend several days in the environment where the resource or activity to be assessed is operational. [11]

Professional Standards Review Organization (PSRO): A physicians’ organization created to review use of Medicare and Medicaid services and to deny payment for unnecessary services. [23]

Prognostic scoring system: An approach to prediction of patient outcomes based on formal analysis of current variables, generally through methods that compare the patient in some way with large numbers of similar patients from the past. [10]

Projection: In imaging systems, a measured attenuation or superposition. [9]

Proposition: An expression, generally in language or other symbolic form, that can be believed, doubted, or denied or is either true or false. [4]

Prospective payment: A method of health care reimbursement in which providers receive a set payment specified in advance for providing a global unit of care, such as hospitalization for a specified illness or a hospital day. [23]
Prospective payment system (PPS): A scheme for health care financing enacted by Congress in 1983, in which hospitals receive from Medicare a fixed payment per hospital admission, adjusted for diagnosis-related group. [23]

Prospective study: An experiment in which researchers, before collecting data for analysis, define study questions and hypotheses, the study population, and data to be collected. [2,12]

PROTÉGÉ: A software meta-tool used by developers to create automatically domain-specific knowledge-elicitation tools by taking as input analysts’ models of the relevant applications areas. [20]

Protein-sequence database: A database that contains the known sequences of amino acids of proteins. [22]

Proteomics: By analogy with genomics, and the study of genes, the study of the structure and function of proteins. [22]

Protocol: A standardized method or approach. [5,20]

Protocol analysis: In cognitive psychology, methods for gathering and interpreting data that are presumed to reveal the mental processes used during problem solving (e.g., analysis of “think-aloud” protocols). [4]

Protocol for Metadata Harvesting (PMH): A method for harvesting summary information from metadata, which are stored with archival materials (see Open Archive Initiative). [19]

Prototype system: A working model of a planned system that demonstrates essential features of the operation and interface. [6,21]

Provider-profiling system: Computer system used to manage utilization of health resources by tracking and comparing physicians’ resource utilization (e.g., cost of drugs prescribed, laboratory tests ordered) compared to severity-adjusted outcomes of the providers’ patients. [13]

Proximity searching: A technique used with full-text databases that retrieves documents containing the specified words when they are adjacent in the text, or when they occur within a certain number of words of each other. [19]

PubMed: A software environment for searching the Medline database, developed as part of the suite of search packages, known as Entrez, by the NLM’s National Center for Biotechnology Information (NCBI). [19]

PubMed Central: An effort by the National Library of Medicine to gather the full text of scientific articles in a freely accessible database, enhancing the value of Medline by providing the full articles in addition to titles, authors, and abstracts. [19]
**Public health:** The field that deals with monitoring and influencing trends in habits and disease in an effort to protect or enhance the health of the population. [10,15]

**Public Health Informatics:** An application area of biomedical informatics in which the field’s methods and techniques are applied to problems drawn from the domain of public health. [1]

**Publication type:** One of several classes of articles or books into which a new publication will fall (e.g., review articles, case reports, original research, textbook, etc.). [19]

**Public-key cryptography:** In data encryption, a method whereby two keys are used, one to encrypt the information and a second to decrypt it. Because two keys are involved, only one needs to be kept secret. [5]

**Purchasing coalitions:** Groups of employers that together structure their health care benefits program and negotiate with health plans. [23]

**QRS wave:** In an electrocardiogram (ECG), the portion of the waveform that represents the time it takes for depolarization of the ventricles. [5]

**Qualitative arrangement:** An approach to image retrieval that looks at the relative relationships of regions in the image, without trying to identify them, and retrieves images that have similar relationships. [18]

**Qualitative model:** A method for capturing the characteristics of a process or phenomenon in descriptive terms without attempting to define or simulate it quantitatively. [20]

**Quality-adjusted life year (QALY):** A measure of the value of a health outcome that reflects both longevity and morbidity; it is the expected length of life in years, adjusted to account for diminished quality of life due to physical or mental disability, pain, and so on. [3]

**Quality assurance:** A means for monitoring and maintaining the goodness of a service, product, or process. [23]

**Quality management:** A specific effort to let quality of care be the goal that determines changes in processes, staffing, or investments. [16]

**Quantitation:** In imaging, global processing and segmentation to characterize meaningful regions of interest. [9]

**Quasi-legal approach:** An evaluation method that establishes a mock trial, or other formal adversarial proceeding, to judge a resource. [11]

**Query:** In a database system, a request for specific information that is stored in the computer. By extension, updates to the database. [12,19]
**Query formulation:** The process of stating information needs in terms of queries. Also the process by which information needs are translated into queries suitable for searching. [19]

**Query and retrieval:** An approach to information retrieval in which the user selects the terms. Terms can be matched against a predetermined index or against a thesaurus that searches for synonyms, more global concepts, and more specific concepts. [21]

**Queue:** In a computer system, an ordered set of jobs waiting to be executed. [5]

**Quick Medical Reference (QMR):** A decision-support system that grew out of the Internist-I program. QMR has been marketed commercially for use by both students and practitioners. [20,21]

**Radioactive isotope:** Chemical compounds used in nuclear medicine imaging techniques. Specific compounds are selected because they tend to concentrate in specific types of tissues. [9]

**Radiography:** The process of making images by projecting X-rays through the patient onto X-ray-sensitive film. [9]

**Radiology:** The medical field that deals with the definition of health conditions through the use of visual images that reflect information from within the human body. [9,18]

**Radiology information system (RIS):** Computer-based information system that supports radiology department operations; includes management of the film library, scheduling of patient examinations, reporting of results, and billing. [7,18]

**Random-access memory (RAM):** The portion of a computer’s working memory that can be both read and written into. It is used to store the results of intermediate computation, and the programs and data that are currently in use (also called variable memory or core memory). [5,18]

**Randomization:** A research technique for assigning subjects to study groups without a specific pattern. Designed to minimize experimental bias. [11]

**Randomized clinical trial (RCT):** A prospective experiment in which subjects are randomly assigned to study subgroups to compare the effects of alternate treatments. [2]

**Randomly:** Without bias. [2]

**Range check:** Verification that a clinical parameter falls in an expected (normal) range. [12]

**Ranking:** In information retrieval, the specification of a retrieved item’s match to the query, based on some kind of sorting criteria. [19]
**Raster-scan display:** A pattern of closely spaced rows of dots that forms an image on the cathode-ray tube of a video display monitor. [9]

**Readability:** In information retrieval, the notion of identifying and displaying an information resource that uses words, concepts, and sentence structures that will be understandable to the typical user of the search tool in question. [19]

**Read-only memory (ROM):** The portion of a computer’s working memory that can be read, but not written into. [5,17]

**Real-time acquisition:** The continuous measurement and recording of electronic signals through a direct connection with the signal source. [5]

**Recall:** In information retrieval, the ability of a system to retrieve relevant information (expressed as the ratio of relevant records retrieved to all relevant records in the database). [19]

**Receiver:** In data interchange, the program or system that receives a transmitted message. [7]

**Receiver operating characteristic (ROC) curve:** A curve that depicts the trade-off between the sensitivity and specificity of a test as the criteria for when that test is to be judged abnormal are varied. [3]

**Record:** In a data file, a group of data fields that collectively represent information about a single entity. [5]

**Reductionist approach:** An attempt to explain phenomena by reducing them to common, and often simple, first principles. [22]

**Region-detection techniques:** A technique in which structures are delineated by their composition on the image. [9]

**Regional network:** A network that provides regional access from local organizations and individuals to the major backbone networks that interconnect regions. [5]

**Reference Information Model (RIM):** The data model for HL7 version 3.0. [7]

**Referent:** A person, object or event referenced by a given linguistic expression, e.g., the pronoun “she” in clinical text typically has the patient as its referent. [8]

**Referential expression:** A sequence of one or more words that refers to a particular person, object or event, e.g., “she,” “Dr. Jones,” or “that procedure”. [8]

**Referral bias:** In evaluation studies, a bias that is introduced when the patients entering a study are in some way atypical of the total population, generally because they have
been referred to the study based on criteria that reflect some kind of bias by the referring physicians. [3]

**Refinement:** In information retrieval, the adjustment of a search query in order to obtain more appropriate information than was initially retrieved. [19]

**Region-detection technique:** A method, such as application of a connected-components algorithm, used to identify a region of interest from an overall image by grouping together pixels that are both adjacent and have similar intensities. [9]

**Regional Health Information Network (RHIN):** A public–private alliance among health care providers, pharmacies, public health departments and payers, designed to share health information among all health participants, thereby improving community health and health care (see also CHIN). [13,15]

**Regional Health Information Organization (RHIO):** An organization that works to create a RHIN. [15]

**Register:** In a computer, a group of electronic switches used to store and manipulate numbers or text. [5]

**Registration:** One of the problems to solve in multimodality image fusion, specifically the alignment of separately acquired image volumes. [9]

**Regular expression:** A mathematical model of a set of strings, defined using characters of an alphabet and the operators concatenation, union and closure (zero or more occurrences of an expression). [8]

**Relative recall:** An approach to measuring recall when it is unrealistic to enumerate all the relevant documents in a database. Thus the denominator in the calculation of recall is redefined to represent the number of relevant documents identified by multiple searches on the query topic. [19]

**Relevance feedback:** The process that allows a searcher to obtain more relevant documents by designating retrieved documents as relevant and adding terms from them into a new query. [19]

**Relevance ranking:** The degree to which the results are relevant to the information need specified in a query. [19]

**Reliability:** In networking, the ability of a networked resource to be available and to meet expectations for performance, as related to network bandwidth and quality of service. [1]

**Reminder systems:** A decision-support system that monitors a patient’s care over time and uses encoded logic to generate warnings and reminders to clinicians when situations arise that require clinical attention. [20]
Remote access: Access to a system or to information therein, typically by telephone or communications network, by a user who is physically removed from the system. [5]

Remote-presence health care: The use of video teleconferencing, image transmission, and other technologies that allow clinicians to evaluate and treat patients in other than face-to-face situations. [10]

Report generation: A mechanism by which users specify their data requests on the input screen of a program that then produces the actual query, using information stored in a database schema, often at predetermined intervals. [5]

Representation: A level of medical data encoding, the process by which as much detail as possible is coded. [7]

Representativeness: A heuristic by which a person judges the chance that a condition is true based on the degree of similarity between the current situation and the stereotypical situation in which the condition is true. For example, a physician might estimate the probability that a patient has a particular disease based on the degree to which the patient’s symptoms matches the classic disease profile. [3]

Requirements analysis: An initial analysis performed to define a problem clearly and to specify the nature of the proposed solution (e.g., the functions of a proposed system). [6]

Research protocol: In clinical research, a prescribed plan for managing subjects that describes what actions to take under specific conditions. [2]

Resource-based relative value scale (RBRVS): A system authorized by Congress for paying for Medicare physician’s services, intended to correct the large inequities and perverse incentives in Medicare’s “customary, prevailing, and reasonable” payment system (see also volume performance standard). [23]

Resource Description Framework (RDF): An emerging standard for cataloging metadata about information resources (such as Web pages) using the Extensible Markup Language (XML). [19]

Responsive-illuminative approach: An approach to evaluation that seeks to represent the viewpoints of both users of the resource and the people who are an otherwise significant part of the clinical environment where the resource operates. [11]

Results reporting: In a hospital or health care information system, online access to the results of laboratory tests and other procedures. [13]

Retrieval: A process by which queries are compared against an index to create results for the user who specified the query. [19]
Retrospective chart review: Extraction and analysis of data from medical records to investigate a question that was not a subject of study at the time the data were collected. [2]

Retrospective payment: A method of health care financing in which providers are reimbursed based on charges for the services actually delivered. [23]

Retrospective study: An analysis of pre-existing sets of data to answer experimental questions. [12]

Revenue center: In a health care institution, a department that charges patients directly for the services provided (see also cost center). [13]

Review of systems: The component of a typical history and physical examination in which the physician asks general questions about each of the body's major organ systems to discover problems that may not have been suggested by the patient's chief complaint. [2]

Risk attitude: A person's willingness to take risks. [3]

Risk-neutral: Having the characteristic of being indifferent between the expected value of a gamble and the gamble itself. [3]

Role-limited access: The mechanism by which an individual's access to information in a database, such as a medical record, is limited depending upon that user's job characteristics and their need to have access to the information. [5]

Router: In networking, a device that is connected between multiple networks and receives messages from a network and forwards them to another connected network according to their intended destination. [5]

RS-232-C: A commonly used standard for serial data communication that defines the number and type of the wire connections, the voltage, and the characteristics of the signal, and thus allows data communication among electronic devices produced by different manufacturers. [5]

Rule interpreter: The software component of a rule-based system that assesses individual rules and determines their applicability in a specific case or situation. [20]

Sample attrition rate: The proportion of the sample population that drops out before the study is complete. [11]

Sampling rate: The rate at which the continuously varying values of an analog signal are measured and recorded. [5]

Schema: In a database management system, a machine-readable definition of the contents and organization of a database. [5]
Schema (cognitive science): A mental structure that represents an aspect of the world. Schemas are used to organize categories of knowledge and enable understanding. [4]

Screening: The use of global processing, segmentation, feature detection, and classification to determine whether an image should be flagged for careful review by a human being who is an expert in an image-processing domain. [9]

Script: In software systems, a keystroke-by-keystroke record of the actions performed for later reuse. [5]

Search intermediary: In information retrieval, a specially trained information specialist who interprets users’ requests for information, formulates search requests in terms of the commands and vocabulary of the search systems, and carries out the search. [19]

Secondary care: The level of care normally provided by a typical hospital. [13]

Secondary knowledge-based information: Writing that reviews, condenses, and/or synthesizes the primary literature (see primary knowledge-based information). [19]

Secret-key cryptography: In data encryption, a method whereby the same key is used to encrypt and to decrypt information. Thus, the key must be kept secret, known to only the sender and intended receiver of information. [5]

Secure Sockets Layer (SSL): a protocol developed by Netscape for transmitting private documents via the Internet. By convention, URLs that require an SSL connection start with ‘https:’ instead of ‘http:’. [5]

Security: The process of protecting information from destruction or misuse, including both physical and computer-based mechanisms. [5]

Segmentation: In image processing, the extraction of selected regions of interest from an image using automated or manual techniques. [9]

Selection bias: An error in the estimates of disease prevalence and other population parameters that results when the criteria for admission to a study produce systematic differences between the study population and the clinically relevant population. [11]

Selectivity: In data collection and recording, the process that accounts for individual styles, reflecting an ongoing decision-making process, and often reflecting marked distinctions among clinicians. [2]

Self-insured plans: The system whereby (large) employers pay their employees’ medical bills directly, hire insurance companies to perform claims processing, and perhaps buy outside insurance for only truly catastrophic cases. [23]
**Semantic analysis:** The study of how symbols or signs are used to designate the meaning of words and the study of how words combine to form or fail to form meaning. [8]

**Semantic grammar:** A mathematical model of a set of sentences based on patterns of semantic categories, e.g., patient, doctor, medication, treatment, and diagnosis. [8]

**Semantic pattern:** The study of the patterns formed by the co-occurrence of individual words in a phrase or the co-occurrence of the associated semantic types of the words. [8]

**Semantic relation:** A classification of the meaning of a linguistic relationship, e.g., “treated in 1995” signifies time while “treated in ER” signifies location. [8]

**Semantics:** The meaning of individual words and the meaning of phrases or sentences consisting of combinations of words. [5,8,19,20]

**Semantic type:** The categorization of words into semantic classes according to meaning. Usually, the classes that are formed are relevant to specific domains. [8]

**Semantic Web:** A future view that envisions the Internet not only as a source of content but also as a source of intelligently linked, agent-driven, structured collections of machine-readable information. [19]

**Semi-structured interview:** The process whereby an investigator specifies in advance a set of topics that he would like to address, but is flexible as to the order in which these topics are addressed and is open to discussion of topics not on the prespecified list. [11]

**Sender:** In data interchange, the program or system that sends a transmitted message. [7]

**Sensitivity (of a test):** The probability of a positive result, given that the condition under consideration is present—e.g., the probability of a positive test result in a person who has the disease under consideration (also called the true-positive rate). [2,3]

**Sensitivity analysis:** A technique for testing the robustness of a decision analysis result by repeating the analysis over a range of probability and utility estimates. [3]

**Sensitivity calculation:** An analysis to determine which parameters, scenarios, and uncertainties affect a decision, and by how much. [3]

**Sequence alignment:** An arrangement of two or more sequences (usually of DNA or RNA), highlighting their similarity. The sequences are padded with gaps (usually denoted by dashes) so that wherever possible, columns contain identical or similar characters from the sequences involved. [22]

**Sequence information:** Information from a database that captures the sequence of component elements in a biological structure (e.g., the sequence of amino acids in a protein or of nucleotides in a DNA segment). [22]
**Server:** A computer that shares its resources with other computers and supports the activities of many users simultaneously within an enterprise. [5]

**Service:** An intangible activity provided to consumers, generally at a price, by a (presumably) qualified individual or system. [10]

**Service benefit:** A type of health insurance benefit, created to ensure that the providers are paid in the manner most acceptable to them—i.e., they can choose to be paid through cost reimbursement, or through payment of billed charges to hospitals and fee-for-service payment to physicians. [23]

**Service bureau:** A data-processing business that produces bills, third-party invoices, and financial reports for medical practices from information recorded on encounter forms. [13]

**Set-based searching:** Constraining a search to include only documents in a given class or set (e.g., from a given institution or journal). [19]

**Shadowgraph:** In radiology, a superposition of all the structures traversed by each X-ray beam. Various body tissues differentially absorb the beams, and the X-rays produce shadows on the radiographic film. [9]

**Short-run cost:** The cost of producing a good or service when the levels of some inputs (e.g., plant and equipment) remain fixed (see long-run cost). [23]

**Signal artifact:** A false feature of the measured signal caused by noise or other interference. [17]

**Simple Mail Transport Protocol (SMTP):** The standard protocol used by networked systems, including the Internet, for packaging and distributing email so that it can be processed by a wide variety of software systems. [5]

**Simulation:** A system that behaves according to a model of a process or another system; for example, simulation of a patient’s response to therapeutic interventions allows a student to learn which techniques are effective without risking human life. [21]

**Simultaneous access:** Access to shared, computer-stored information by multiple concurrent users. [5]

**Simultaneous controls:** In an evaluation study, subjects who are not subject to the intervention under consideration but who are subject to the other influences of the clinical environment in question. [11]

**Single nucleotide polymorphism (SNP):** A DNA sequence variation, occurring when a single nucleotide in the genome is altered. For example, an SNP might change the nucleotide sequence AAGCCTA to AAGCTTA. A variation must occur in at least 1% of the population to be considered an SNP. [22]
**Single-user system:** Computers designed for use by single individuals, such as personal computers, as opposed to servers or other resources that are designed to be shared by multiple people at the same time. [5]

**Site visit:** An evaluation method whereby experts visit the site of a study or experiment in order to assess the detailed local components of the study as well as the relevant expertise of the investigators. [11]

**Situation-action rules:** Rules in software environments that propose a specific action that should be taken when a situation arises (see production rules). [20]

**Skeletal plans:** A general approach to a problem, generally expressed as a set of steps, which can be used as the basis for developing a custom-tailored approach by adjusting one or more steps in the skeletal plan. [20]

**Software:** Computer programs that direct the hardware how to carry out specific automated processes. [5,6]

**Software engineering:** The discipline concerned with organizing and managing the software development process (the process of creating computer programs and documentation) to facilitate production of high-quality systems in a timely and cost-effective manner. [6]

**Software-oversight committees:** Groups within organizations that are constituted to oversee computer programs and to assess their safety and efficacy in the local setting. [10]

**Spamming:** The process of sending unsolicited e-mail to large numbers of unwilling recipients, typically to sell a product or make a political statement. [5]

**Spatial resolution:** A measure of the ability to distinguish among points that are close to each other (indicated in a digital image by the number of pixels per square inch). [5,9]

**Specialist Lexicon:** one of three UMLS Knowledge Sources, this lexicon is intended to be a general English lexicon that includes many biomedical terms and supports natural-language processing. [19]

**Specialized registry:** A bibliographic database containing documents that may extend beyond those found in the scientific literature. The National Guideline Clearinghouse is one such example. [19]

**Specification phase:** In system design, the stage during which general system requirements are analyzed and formalized. [6]

**Specificity** (of a test): The probability of a negative result, given that the condition under consideration is absent—e.g., the probability of a negative test result in a person who does not have a disease under consideration (also called the true-negative rate). [2,3]
**Spectrum bias:** Systematic error in the estimate of a study parameter that results when the study population includes only selected subgroups of the clinically relevant population—e.g., the systematic error in the estimates of sensitivity and specificity that results when test performance is measured in a study population consisting of only healthy volunteers and patients with advanced disease. [3]

**Speech understanding:** The field of computer science related to the development of computer programs that appropriately interpret and act upon information that is entered using human speech through a microphone. [5]

**Speech recognition:** The process of taking as input a spoken utterance (generally entered via a microphone) and translating it into a corresponding text representation in natural language. [5]

**Spelling check:** The software process whereby a specified selection of text is assessed for accuracy of the spelling of its words. [12]

**Spiral model:** A software engineering model in which an initial prototype is presented to the customers, who assess it, and expand and modify requirements in an ongoing iterative process. [6]

**Spirometry:** Evaluation of the air capacity and physiologic function of the lungs. [17]

**Staff-model HMOs:** A health maintenance organization in which doctors are retained as salaried employees on the organization’s staff (see also group-model HMOs). [23]

**Staged evaluation:** Incremental evaluation of a system, in which different criteria for success are applied at successive stages of development. [11]

**Standard-gamble:** A technique for utility assessment that enables an analyst to determine the utility of an outcome by comparing an individual’s preference for a chance event when compared with a situation of certain outcome. [3]

**Standard of care:** The community-accepted norm for management of a specified clinical problem. [10]

**Standardized coding and classification (SCC):** A generic term describing any system that is used to define a standard for data coding. [16]

**Standards development organization (SDO):** An organization charged with developing a standard that is accepted by the community of affected individuals. [7]

**Static:** In patient simulations, a program that presents a predefined case in detail but that does not vary in its response depending on the actions taken by the learner. [21]
Statistical error: In a model relating $x$ to $y$, the portion of the variance in the dependent variable that cannot be explained by variance in the independent variables. [11]

Statistical life: An anonymous individual, such as a person affected by a policy that saves “one life in a thousand” (see identified life). [11]


Stop-loss coverage: Reinsurance, which shifts the risk of a catastrophic case to an insurance company, thereby making it possible for small employers to self-insure (as large employers do). [23]

Stop-word list: In full-text indexing, a list of words that are low in semantic content (e.g., “the”, “a”, “an”) and are generally not useful as mechanisms for retrieving documents. [19]

Stemmed: The process of converting a word to its root form by removing common suffixes from the end. [19]

Strict product liability: The principle that states that a product must not be harmful. [10,20]

String: A sequence of like items, such as bits, characters, or words. [19]

Structural alignment: In biological sequences, the task of aligning a new structure against a database of known structures, to determine regions of identity or similarity. [22]

Structural informatics: The study of methods for organizing and managing diverse sources of information about the physical organization of the body and other physical structures. [1,9]

Structured data: Data that are organized according to a particular format. [8]

Structured encounter form: A form for collecting and recording specific information during a patient visit. [12]

Structured Query Language (SQL): A commonly used syntax for retrieving information from relational databases. [5]

Structured content: The organization and labeling of text (or other information) according to subsections that represent coherent concepts. [21]

Structured programming: The composition of computer programs using only sequences of statements and formal constructs for iteration ($\text{do while}$) and selection ($\text{if...then...else}$); implies modularity, absence of $\text{go to}$ statements, and the use of stylistic conventions, such as indentation and the use of meaningful variable and subroutine names. [6]
Structured interview:  An evaluation method that uses a schedule of questions that are always presented in the same words and in the same order. [11]

Study population:  The population of subjects—usually a subset of the clinically relevant population—in whom experimental outcomes (e.g., the performance of a diagnostic test) are measured. [3]


Subject:  An individual about whom data are collected during the conduct of a study. [11]

Subject heading:  In information retrieval, the standardized terms used to categorize documents in order to facilitate their retrieval when appropriate. [19]

Subjectivist:  A philosophy of evaluation that suggests that what is observed about a resource depends in fundamental ways on the observer. [11]

Subheading:  In MeSH, qualifiers of subject headings that narrow the focus of a term. [19]

Sublanguage:  Language of a specialized domain, such as medicine, biology, or law. [8]

Summary ROC curve:  A composite ROC curve developed by using estimates from many studies. [3]

Summative decision:  A decision made after a resource is installed in its envisioned environment; deals explicitly with how effectively the resource performs in that environment. [11]

Superbill:  An itemized bill that summarizes the financial transactions occurring during a patient–physician encounter, including specification of the type of visit and a listing of the procedures performed and drugs administered; also, a checklist form for generating such a bill. [20]

Supervised learning:  In automated neural networks, a process by which the values for weights are determined in an incremental fashion as the network is trained on a large collection of previously classified examples. [20]

Surface-based warping:  A method for aligning 3-D surface models of anatomical structures extracted from image volumes by establishing a non-linear transformation (warp) that relates the two surface models. (see also volume-based warping). [9]

Surface rendering:  A visualization technique that provides an alternative to volume rendering. This is the primary technique used in computer graphics, and has been applied widely in the entertainment industry for movies such as Toy Story. Surface
rendering requires that the surface of interest be segmented from the image volume, after which rendering speeds on standard workstations are much faster than those possible with volume rendering. [9]

**Surveillance:** In a computer-based medical record system, systematic review of patients’ clinical data to detect and flag conditions that merit attention. [12] In public health, the ongoing collection, analysis, interpretation, and dissemination of data on health conditions and threats to health [15]

**Switch:** In networking, a device that joins multiple computers or LAN segments together. A switch operates at the Data Link Layer and can inspect data packets to forward them only to the intended connected device, thereby conserving network bandwidth. [5]

**Symbolic programming language:** A programming language in which a programmer defines variables to represent abstract entities and can specify arithmetic, logical, and/or symbolic operations without worrying about the details of how the hardware performs these operations. Symbolic languages may support mathematical operations, text or string processing, database retrievals, logical operations involved in decision processes, and so on. [5]

**Syndromic surveillance:** An ongoing process for monitoring of clinical data, generally from public health, hospital, or outpatient resources, whereby the goal is early identification of outbreaks, epidemics, new diseases, or, in recent years, bioterrorist events. [10]

**Synonymy:** Occurs when two words have identical meanings. [19]

**Synoptic content:** Information in computer systems and databases that is created by extracting important observations and principles from sources of original content, as well as from personal experience. [19]

**Syntactic:** That which relates to the *structure* of words, phrases, or sentences (as opposed to their meanings). [19]

**Syntax:** The grammatical structure of language describing the relations among words in a sentence. [5,8]

**System:** A set of integrated entities that operates as a whole to accomplish a prescribed task. [6]

**System integration:** The process by which software systems and components are brought together to work as a coherent whole. [6]

**System programs:** The operating system, compilers, and other software that are included with a computer system and that allow users to operate the hardware. [5]

**System review form:** A paper form used during a physical examination to record findings related to each of the body’s major systems. [2,12]
**Systematic Classification of Proteins (SCOP):** A currently available online resource that classifies proteins based on shape and function. [22]

**Systematic review:** A type of journal article that reviews the literature related to a specific clinical question, analyzing the data in accordance with formal methods to assure that data are suitably compared and pooled. [19]

**Systematized Nomenclature Of MEDicine (SNOMED):** The expanded form of the diagnostic coding scheme, formerly known as SNOP (Systematized Nomenclature of Pathology). A multiaxial nomenclature system for the coding of several aspects of a diagnosis or other clinical entity. [2,7]

**Systematized Nomenclature Of Pathology (SNOP):** A widely used diagnostic coding scheme, developed by pathologists. A nomenclature system of the College of American Pathologists based on four coding axes: topography, morphology, etiology, and function. A predecessor to SNOMED. [2,7]

**Systems aggregation:** A situation in which functions from disparate and widely distributed information systems are brought together in one application. [19]

**Tactile feedback:** In virtual or telepresence environments, the process of providing (through technology) a sensation of touching an object that is imaginary or otherwise beyond the user’s reach (see also haptic feedback). [5]

**Task:** An activity of study, when computers or people solve problems or work through clinical cases. [11]

**Taxonomy:** An orderly classification, reflecting natural relationships among objects. [4]

**Technical characteristics:** The first stage in a technology assessment, in which the formal capabilities of a studied technology are defined and assessed. [11]

**Technology assessment:** Any process of examining and reporting properties of a medical technology used in health care, such as safety, efficacy, feasibility, and indication for use, cost, and cost-effectiveness, as well as social, economic, and ethical consequences, whether intended or unintended. [11]

**Teledermatology:** The application of telemedicine methods to dermatology, in which an expert dermatologist examines skin lesions on a patient at a distance by the use of photography and networked communication. [18]

**Telemedicine:** A broad term used to describe the delivery of health care at a distance, increasingly but not exclusively by means of the Internet. [1,10,14]

**Telepathology:** Use of telecommunication technologies to transmit data and images to and from a remote site for diagnosis, education, and research in pathology. [18]
**Telepresence**: A technique of telemedicine in which a viewer can be physically removed from an actual medical procedure or surgery, viewing the abnormality through a video monitor that displays the patient or operative field and allows the observer to participate in the procedure. [18]

**Teleradiology**: The provision of remote interpretations, increasing as a mode of delivery of radiology services. [18]

**Telerobotics**: A technique of telemedicine in which the manipulation of a biomedical device (e.g., a robot arm, a microscope, or an endoscope) is controlled at a distance by the hand movements of a remote operator. [18]

**Template atlas**: A (usually 3-D) labeled and segmented anatomical model from a single individual, to which the anatomy of other individuals is registered [9]

**Temporal resolution**: The time between acquisition of each of a series of images. Limited by the time needed to produce each image. [9,18]

**Temporal subtraction**: A technique of image enhancement that subtracts a reference image from later images that are registered to the first. A common use of temporal subtraction is digital-subtraction angiography (DSA), in which a background image is subtracted from an image taken following the injection of contrast material. [9]

**Term**: In information retrieval, a word or phrase that forms part of the basis for a search request. [19]

**Term frequency (TF)**: In information retrieval, a measurement of how frequently a term occurs in a document. [19]

**Term weighting**: The assignment of metrics to terms so as to help specify their utility in retrieving documents well matched to a query. [19]

**Terminal**: A simple device that has no processing capability of its own but allows a user to access a server. [5]

**Terminal interface processor (TIP)**: A utility communications computer that is used to attach video display terminals and other communications devices to a LAN. [5]

**Terminology**: A set of terms representing the system of concepts of a particular subject field. [7]

**Terminology authority**: The component of a health care information system that defines the vocabulary standard and valid terms within the system; the medical entities dictionary. [13]
**Terminology services:** A set of functions provided by a health care information system and used to link, translate, and cross-reference diverse vocabulary terms for consistent use within the system. [13]

**Tertiary care:** The level of care normally provided by a specialized medical center. [13]

**Test interpretation bias:** Systematic error in the estimates of sensitivity and specificity that results when the index and gold standard test are not interpreted independently. [3]

**Test referral bias:** Systematic error in the estimates of sensitivity and specificity that results when subjects with a positive index test are more likely to receive the gold standard test. [3]

**Testing:** The process of formally running a newly developed computer system or set of programs to exercise them fully and to determine their reliability, accuracy, and freedom from programming errors. [6]

**Text editor:** A program used to create files of character strings, such as other computer programs and documents. [5]

**Text generation:** Methods that create coherent natural-language text from structured data or from textual documents in order to satisfy a communication goal. [8]

**Text parsing:** Conversion of unstructured text into a structured representation, using a given grammar. [8]

**Text REtrieval Conference (TREC):** Organized by NIST, an annual conference on text retrieval that has provided a test bed for evaluation and a forum for presentation of results (see trec.nist.gov). [19]

**Text-scanning devices:** A mechanical device that scans a paper document and converts text into computer-interpretable elements. [5]

**Text-word searching:** In an information retrieval, retrieval of relevant articles based on the words that appear in titles and abstracts, rather than the index terms that have been assigned to each entry. [19]

**TF*IDF weighting:** A specific approach to term weighting that combines the inverse document frequency (IDF) and term frequency (TF). [19]

**Thesaurus:** A set of subject headings or descriptors, usually with a cross-reference system for use in the organization of a collection of documents for reference and retrieval. [19]

**Thin client:** A program on a local computer system that mostly provides connectivity to a larger resource over a computer network, thereby providing access to computational power that is not provided by the machine, which is local to the user. [20]
Think-aloud protocols: In cognitive science, the generation of descriptions of what a person is thinking or considering as they solve a problem. [4]

Three-dimensional reconstruction and visualization: The process of producing three-dimensional models from uniform data (typically from slices through a structure) and rendering them for computer visualization and manipulation. [9]

Three-dimensional-structure information: In a biological database, information regarding the three-dimensional relationships among elements in a molecular structure. [22]

Tiling: A technique used in three-dimensional surface segmentation wherein a surface is applied over manually or automatically segmented two-dimensional contours that have been stacked together, creating a continuous surface. [9]

Time-sharing mode: An interactive mode for communicating with a computer in which the operating system switches rapidly among all the jobs that require CPU services (see batch mode). [5]

Time trade-off: A common approach to utility assessment, comparing a better state of health lasting a shorter time, with a lesser state of health lasting a longer time. The time trade-off technique provides a convenient method for valuing outcomes that accounts for gains (or losses) in both length and quality of life. [3]

Tokenization: The process of breaking an unstructured sequence of characters into larger units called “token”, e.g., words, numbers, dates, and punctuation. [8]

Token Ring: A type of local-area network, typically used by IBM systems (see also Ethernet). [5]

Topology: In networking, the overall connectivity of the nodes in a network. [5]

Touch screen: A display screen that allows users to select items by touching them on the screen. [5]

Track ball: An interactive device that uses a mounted ball, which, when rolled in its housing, manipulates a pointer on the computer screen. [5]

Transaction set: In data transfer, the full set of information exchanged between a sender and a receiver. [7]

Transcription: The conversion of dictated notes into ASCII text by a typist. [12]

Transducer: A device that produces electrical signals proportional in magnitude to the level of a measured parameter, such as blood pressure. [17]
**Transformation-based learning:** A method of machine learning in which structural transformations are acquired incrementally by attempting to convert a random or naive representation of a text into the target or correct representation. [8]

**Transition matrix:** A table of numbers giving the probability of moving from one state in a Markov model into another state or the state that is reached in a finite-state machine depending on the current character of the alphabet. [8]

**Transition probabilities:** The probabilities that a person will transit from one health state to another during a specified time period. [3]


**Treatment threshold probability:** The probability of disease at which the expected values of withholding or giving treatment are equal. Above the threshold, treatment is recommended; below the threshold, treatment is not recommended and further testing may be warranted. [3]

**Tree:** In information retrieval, the hierarchically organized sets of index terms. [19]

**Trigger event:** In monitoring, events that cause a set of transactions to be generated. [7]

**True-negative rate (TNR):** The probability of a negative result, given that the condition under consideration is false—e.g., the probability of a negative test result in a patient who does not have the disease under consideration (also called *specificity*). [3]

**True-negative result (TN):** A negative result when the condition under consideration is false—e.g., a negative test result in a patient who does not have the disease under consideration. [3]

**True-positive rate (TPR):** The probability of a positive result, given that the condition under consideration is true—e.g., the probability of a positive test result in a patient who has the disease under consideration (also called *sensitivity*). [3]

**True-positive result (TP):** A positive result when the condition under consideration is true—e.g., a positive test result in a patient who has the disease under consideration. [3]

**Turnaround document:** A form that serves first as a summary form for presenting results and subsequently as a data collection form. [12]

**Turnkey system:** A computer system that is purchased from a vendor and that can be installed and operated with minimal modification. [6]
Tutoring system: A computer program designed to provide self-directed education to a student or trainee. [21]

Twisted-pair wires: The typical copper wiring used for routine telephone service but adaptable for newer communication technologies. [5]

Type checking: In computer programming, the act of checking that the types of values, such as integers, decimal numbers, and strings of characters, match throughout their use. [5]

Type I error: A false-positive error in an evaluation study such that the resource being studied is ineffective, but for some reason the study mistakenly shows that it is effective. [11]

Type II error: A false-negative error in an evaluation study such that the resource being studied is effective, but for some reason the study mistakenly fails to show that it is. [11]

Typology: A classification scheme (e.g., of evaluation methods). [11]

Ultrasonography: The use of pulses of high-frequency sound waves, rather than ionizing radiation, to produce images of body structures. [9,18]

Ultrasound (US): A common energy source derived from high-frequency sound waves. [9,18]

Ultrasound imaging: The transmission of sound waves through the body, with analysis of the returning echoes to produce images. [9,18]

UMLS Semantic Network: A knowledge source in the UMLS that provides a consistent categorization of all concepts represented in the Metathesaurus. Each Metathesaurus concept is assigned at least one semantic type from the Semantic Network. [19]

Unicode: A representation for international character sets using 16 bits per character; ASCII is a small subset of Unicode. [5]

Unified Medical Language System (UMLS): A terminology system, developed under the direction of the National Library of Medicine, to produce a common structure that ties together the various vocabularies that have been created for biomedical domains. [2,7,9,18,19]


Uniform resource identifier (URI): The combination of a URN and URL, intended to provide persistent access to digital objects. [19]
Uniform resource name (URN): A name for a Web page, intended to be more persistent than a URL, which often changes over time as domains evolve or web sites are reorganized. [19]

Universal workstation: A computer of moderate size and cost that is used to access all computer resources connected to a network. [13]

Unit-dose dispensing: An approach to the distribution of drugs, whereby patients’ drugs are packaged on a unit-of-dose basis to reduce wastage and to control drug use. [13]

Unobtrusive measures: Records or data for an evaluation that are accrued as part of a routine activity under study and therefore require no special intervention. [11]

Unsharp masking: A technique of image enhancement, in which a blurred image is subtracted from the original image to increase local contrast and to enhance the visibility of fine-detail (high-frequency) structures. [9]

Unstructured interview: An interview in an evaluation study in which there are no predefined questions to be asked. [11]

Usability: The characteristic of being convenient and practicable for use. Generally applied to whether a computer system is optimally usable by its intended audience. [4]

User interface: An application that allows users to enter data into a computer and that presents data to the user. [8]

User-interface layer: A conceptual level of a system architecture that insulates the programs designed to interact with users from the underlying data and the applications that process those data. [13]

Usual, customary, and reasonable fee: The typical fee used as the basis for billed charges and retrospective cost reimbursement. [23]

Utility: In decision making, a number that represents the value of a specific outcome to a decision maker (see, for example, quality-adjusted life years). [3,20]

Utilization review: In a hospital, inspection of patients’ medical records to identify cases of inappropriate care, including excessive or insufficient use of resources. [13]

Validation: Verification of correctness. [6]

Validity check: In a database system or computer-based medical record system, a test (such as a range check or a pattern check) that is used to detect invalid data values. [12]
Variable:  In evaluations, specific characteristics of subjects that either are measured purposefully by the investigator or are self-evident properties of the subjects that do not require measurement. [11]

Variable cost: A cost that changes with the volume of goods or services produced during a given period. [23]

Variable memory: See random-access memory. [5]

Vector-space model: A method of full-text indexing in which documents can be conceptualized as vectors of terms, with retrieval based on the cosine similarity of the angle between the query and document vectors. [19]

Vendor system: A host computer system owned by a third party that provides users with access to multiple databases or other services. [6]

Video display terminal (VDT): An input–output device that is used for communication with a remote computer and that has a cathode-ray tube display for viewing output and a keyboard for entering data. [5]

View: In a database management system, a logical submodel of the contents and structure of a database used to support one or a subset of applications. [5,12]

View schemas: An application-specific description of a view that supports that program’s activities with respect to some general database for which there are multiple views. [5]

Virtual addressing: A technique in memory management such that each address referenced by the CPU goes through an address mapping from the virtual address of the program to a physical address in main memory. [5]

Virtual memory: A scheme by which users can access information stored in auxiliary memory as though it were in main memory. Virtual memory addresses are automatically translated into actual addresses by the hardware. [5]

Virtual Private Network (VPN): A secured communications channel, often used to secure access to resources within a company or organization by a user connecting from a remote site. VPNs typically operate over public networks using encryption to keep packet content from being disclosed. [5]

Virtual reality (VR): A collection of interface methods that simulate reality more closely than does the standard display monitor, generally with a response to user maneuvers that heighten the sense of being connected to the simulation (see also augmented reality). [18,21]
**Virus:** A software program that is written for malicious purposes to spread from one machine to another and to do some kind of damage. Such programs are generally self-replicating, which has led to the comparison with biological viruses. [5]

**Visible Human Project:** A project of the National Library of Medicine in which detailed high-resolution images and other digital data were created from human cadavers (one male and one female) and made publicly available for research and education purposes. [19]

**Visual-analog scale:** A method for valuing health outcomes, wherein a person simply rates the quality of life with a health outcome on a scale from 0 to 100. [3]

**Vital signs:** A person’s core temperature, pulse rate, respiratory rate, and arterial blood pressure. [17]

**Viterbi algorithm:** A procedure that computes the most likely sequence of states in a Markov model, given a sequence of symbols. [8]

**Vocabulary:** A dictionary containing the terminology of a subject field. [4, 7]

**Volatile:** A characteristic of a computer’s memory, in that contents are changed when the next program runs and are not retained when power is turned off. [5]

**Volume-based warping:** A method for aligning the anatomical structures depicted in two image volumes as closely as possible by establishing a non-linear transformation (warp) that relates voxels in one volume to corresponding voxels in the other volume. Only voxel intensities are used to determine the warp. (see also *surface-based warping*). [9]

**Volume performance standard (VPS):** A system authorized by Congress for paying for Medicare physicians’ services, intended to control volume. This approach may have instead motivated an increase in physician services as doctors sought to protect their real incomes in the face of controlled prices and a surplus of doctors (see *resource-based relative value scale*). [23]

**Volume rendering:** A method whereby a computer program projects a two-dimensional image directly from a three-dimensional voxel array by casting rays from the eye of the observer through the volume array to the image plane. [9]

**von Neuman machine:** A computer architecture that comprises a single processing unit, computer memory, and a memory bus. [5]

**Voxel:** A volume element, or small region of a three-dimensional digital image (see *pixel*). [9]
**Waterfall model:** A software development model in which development is seen as flowing steadily through the phases of requirements analysis, design, implementation, testing (validation), integration, and maintenance. [6]

**Waveform template:** A wave pattern that is stored in a computer and compared to collected waveforms, such as those acquired from patients. Used to identify and classify abnormal wave patterns. [17]

**Wavelet compression:** A method of lossy compression for grayscale and color images and video. Unlike methods such as JPEG and MPEG, which compress small blocks of 8 × 8 pixels, wavelet algorithms process the entire image, achieving compression ratios for grayscale images that can exceed 50:1. Nonuniform compression is possible, whereby different regions of an image can be compressed at different ratios. The methods are based on locally operative mathematical transforms into the frequency domain. [9, 18]

**Web browser:** A computer program used to access and display information resources on the World Wide Web. [5]

**Web catalog:** Web pages containing mainly links to other Web pages and sites. [19]

**WebMedline:** The first World Wide Web interface developed for searching the MEDLINE database. [19]

**Weights:** Values associated with the nodes of an artificial neural network; the weights propagate through the layers of the network to perform classification based on a set of inputs. [20]

**White space:** Spaces, punctuation, carriage returns, and other nonalphanumeric characters that appear in a text. [19]

**Wide-area network (WAN):** A network that connects computers owned by independent institutions and distributed over long distances. [5, 18]

**Wildcard character:** In search and retrieval applications, a method that allows unspecified single- or multiple-character expansion somewhere in a string that is being used as the basis for the search. [19]

**Willingness to pay:** An approach to valuing human life based on the values implied by the choices people make every day to change their probabilities of living or dying. For example, a person’s implicit valuation for life could be calculated based on how much he is willing to pay for a car airbag that will reduce his chance of by death by a certain incremental amount. [3]

**Word:** In computer memory, a sequence of bits that can be accessed as a unit. [5]
**Word size:** The number of bits that define a word in a given computer. [5]

**Working memory:** In cognitive science, the portion of one’s memory that is used to perform the tasks related to the current focus of attention. [4]

**Workstation:** A powerful desktop computer system designed to support a single user. Workstations provide specialized hardware and software to facilitate the problem-solving and information-processing tasks of professionals in their domains of expertise. [5]

**World Intellectual Property Organization (WIPO):** An international organization, headquartered in Geneva and dedicated to promoting the use and protection of intellectual property. [19]

**World Wide Web (WWW):** An application implemented on the Internet in which multimedia information resources are made accessible by any of a number of protocols, the most common of which is the **HyperText Transfer Protocol (HTTP)**. [5]

**Worm:** A self-replicating computer program, similar to a computer virus; a worm is self-contained and does not need to be part of another program to propagate itself. [5]

**Write-it-once system:** A type of paper-based billing system that uses carbon paper or photocopying to generate bills from patient-encounter information that has been transcribed onto ledger cards. [12]

**Write once, read many (WORM):** A storage medium that is suitable for reuse but cannot be erased or rewritten. [5]

**XML format:** Content that is expressed using the **Extensible Markup Language (XML)**. [6]

**X-ray:** A type of **ionizing radiation** that has been harnessed to provide a technique of medical imaging, allowing the capture of views of structures within the body. [9]

**X-ray crystallography:** A technique in crystallography in which the pattern produced by the diffraction of X-rays through the closely spaced lattice of atoms in a crystal is recorded and then analyzed to reveal the nature of that lattice, generally leading to an understanding of the material and molecular structure of a substance. [22]
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Figure 9.3. Automated screening of Papanicolaou (PAP) smears. Since large numbers of PAP smears are acquired routinely, there is a need to reduce the cost and potential errors associated with purely manual interpretation. (A) Raw microscopic image of cervical cells. (B) Segmented image. The program has segmented the cells and nuclei from the raw image, prior to feature detection and classification based on the features. Abnormally classified cells are flagged for review by the human operator. Photograph courtesy of Peter Locht, Visible Diagnostics, http://www.imm.dtu.dk/visiondag/VD03/medicinsk/pl.pdf.
Figure 9.5. The Digital Anatomist Dynamic Scene Generator (see text). This scene was created by requesting the following structures from the scene generator server: the parts of the aorta, the branches of the ascending aorta, the tributaries of the right atrium, the branches of the tracheobronchial tree, and the parts of the thoracic vertebral column. The server was then requested to rotate the camera 45 degrees, and to provide the name of a structure selected with the mouse, in this case the third thoracic vertebra. The selected structure was then hidden (note the gap indicated by the arrow). The left frame shows a partial view of the FMA part of hierarchy for the thoracic vertebral column. Checked structures are associated with three-dimensional “primitive” meshes that were loaded into the scene. Photograph courtesy of the Structural Informatics Group, University of Washington.
Figure 9.7. Probabilistic brain atlas, coronal section. Individual MRI image volumes from 53 subjects were linearly aligned, and each subject’s lobes and deep nuclei were manually delineated. These delineations were averaged across the subjects and used to create probability maps for the likelihood of finding the specified lobe or nuclei at a given voxel position. Each structure is depicted in a different color in the color version of this image. The intensity of the color is proportional to the probability of finding that structure at the specified location. Photograph courtesy of Arthur Toga, Laboratory for Neuro Imaging, UCLA. http://www.loni.ucla.edu/NCRR/NCRR.Probabilistic.html.
Figure 9.9. Remote visualization of integrated structural and functional brain data mapped onto a single patient’s brain. MRI, MRV (veins), and MRA (arteries) brain-image volumes are acquired and registered, then segmented to generate the cortical surface, arteries, and brains. fMRI data representing areas of language processing are registered to the structural volumes, then projected to the surface as the light-colored regions. Cortical stimulation mapping (CSM) data (small spheres) acquired during neurosurgery are also registered to the patient’s anatomy. The integrated data are rendered on a visualization server, which can be accessed from a web browser using a simple Java applet. Photograph courtesy of the Structural Informatics Group, University of Washington.