DOWNLOAD PDF INTRODUCTION : THE DEVELOPMENT OF PHOTOGRAPHY AND ITS APPLICATION TO MEDICINE

Chapter 1 : Radiography - Wikipedia

Applications & Uses. There are hundreds of uses for infrared photography in many different industries. From the war on drugs to detecting new stars in the sky, infrared is helpful in more ways than most people could imagine.

In medicine, projectional radiographs and computed tomography images generally use X-rays created by X-ray generators , which generate X-rays from X-ray tubes. A number of other sources of X-ray photons are possible, and may be used in industrial radiography or research; these include betatrons , and linear accelerators linacs and synchrotrons. For gamma rays , radioactive sources such as Ir , 60Co or Cs are used. Grid[edit] A Bucky-Potter grid may be placed between the patient and the detector to reduce the quantity of scattered x-rays that reach the detector. This improves the contrast resolution of the image, but also increases radiation exposure for the patient. X-ray detector Detectors can be divided into two major categories: X-ray image intensifier As an alternative to X-ray detectors, image intensifiers are analog devices that readily convert the acquired X-ray image into one visible on a video screen. This device is made of a vacuum tube with a wide input surface coated on the inside with caesium iodide CsI. When hit by X-rays material phosphors which causes the photocathode adjacent to it to emit electrons. These electron are then focus using electron lenses inside the intensifier to an output screen coated with phosphorescent materials. The image from the output can then be recorded via a camera and displayed. These devices are made of discrete pixelated detectors known as thin-film transistors TFT which can either work indirectly by using photo detectors that detect light emitted from a scintillator material such as CsI, or directly by capturing the electrons produced when the X-rays hit the detector. Direct detector do not tend to experience the blurring or spreading effect caused by phosphorescent scintillators of or film screens since the detectors are activated directly by X-ray photons. This is the standard method for bone densitometry. It is also used in CT pulmonary angiography to decrease the required dose of iodinated contrast. He received the first Nobel Prize in Physics for his discovery. He noticed a faint green glow from the screen, about 1 metre away. When she saw the picture, she said, "I have seen my death. Initially, many kinds of staff conducted radiography in hospitals, including Physicists, Photographers, Physicians, Nurses, and Engineers. The medical speciality of radiology grew up over many years around the new technology. When new diagnostic tests were developed, it was natural for the Radiographers to be trained in and to adopt this new technology. Radiographers now perform fluoroscopy , computed tomography , mammography , ultrasound , nuclear medicine and magnetic resonance imaging as well. Although a nonspecialist dictionary might define radiography quite narrowly as "taking X-ray images", this has long been only part of the work of "X-ray Departments", Radiographers, and Radiologists. Initially, radiographs were known as roentgenograms, [30] while Skiagrapher from the Ancient Greek words for "shadow" and "writer" was used until about to mean Radiographer.

Chapter 2 : Introduction to hyphenated techniques and their applications in pharmacy

An Introduction to the Development and History of Photography GENINT This course explores the development and introduction of photography and its impact on the history of art.

When Joseph was 28, he was discussing with his brother Claude about the possibility of reproducing images with light. His focus on his new innovations began in He was in fact more interested in creating an engine for a boat. Joseph and his brother focused on that for quite some time and Claude successfully promoted his innovation moving and advancing him to England. Joseph was able to focus on the photograph and finally in , he was able to produce his first photograph of a view through his window. It took 8 hours of exposure to light to finally process it. Now, with digital imaging photos do not take that long to process. Abbey Newsletter, V26, N3. Digital imaging was developed in the s and s, largely to avoid the operational weaknesses of film cameras , for scientific and military missions including the KH program. As digital technology became cheaper in later decades, it replaced the old film methods for many purposes. The first digital image was produced in , by the Bartlane cable picture transmission system. British inventors, Harry G. Bartholomew and Maynard D. McFarlane, developed this method. Kirsch produced a device that generated digital data that could be stored in a computer; this used a drum scanner and photomultiplier tube. Weighart [4] and James F. Square wave signals were detected on the fluorescent screen of a fluoroscope to create the image. These different scanning ideas were the basis of the first designs of digital camera. Early cameras took a long time to capture an image and were poorly suited for consumer purposes. The CCD became part of the imaging systems used in telescopes, the first black-and-white digital cameras in the s. Changing environment[edit] Great strides have been made in the field of digital imaging. Negatives and exposure are foreign concepts to many, and the first digital image in led eventually to cheaper equipment, increasingly powerful yet simple software, and the growth of the Internet. From cameras and webcams to printers and scanners, the hardware is becoming sleeker, thinner, faster, and cheaper. As the cost of equipment decreases, the market for new enthusiasts widens, allowing more consumers to experience the thrill of creating their own images. Everyday personal laptops, family desktops, and company computers are able to handle photographic software. Our computers are more powerful machines with increasing capacities for running programs of any kindâ€”especially digital imaging software. And that software is quickly becoming both smarter and simpler. The Internet allows editing, viewing, and sharing digital photos and graphics. A quick browse around the web can easily turn up graphic artwork from budding artists, news photos from around the world, corporate images of new products and services, and much more. The Internet has clearly proven itself a catalyst in fostering the growth of digital imaging. Online photo sharing of images changes the way we understand photography and photographers. Online sites such as Flickr , Shutterfly, and Instagram give billions the capability to share their photography, whether they are amateurs or professionals. Photography has gone from being a luxury medium of communication and sharing to more of a fleeting moment in time. Subjects have also changed. Pictures used to be primarily taken of people and family. Now, we take them of anything. We can document our day and share it with everyone with the touch of our fingers. Everyone is now a photographer in their own way, whereas during the early s and s the expense of lasting photos was highly valued and appreciated by consumers and producers. According to the magazine article on five ways digital camera changed us states the following: The impact on professional photographers has been dramatic. Part of the world is experience differently through visual imagining of lasting memories, it has become a new form of communication with friends, family and love ones around the world without face to face interactions. Through photography it is easy to see those that you have never seen before and feel their presence without them being around, for example Instagram is a form of social media where anyone is allowed to shoot, edit, and share photos of whatever they want with friends and family. Facebook, snapshot, vine and twitter are also ways people express themselves with little or no words and are able to capture every moment that is important. Lasting memories that were hard to capture, is now easy because everyone is now able to take pictures and edit it on their phones or laptops. Photography has become a new way to communicate and it is rapidly increasing as time goes by, which has affected the world around us. Documentation style learning has no significant effects on students in these areas. He also found that students were more motivated and excited to learn when using digital imaging. As digital projectors, screens, and graphics find their way to the classroom, teachers and students alike are benefitting from the increased convenience and communication they provide, although their theft can be a common problem in schools. A recent study by the American Academy of Pediatrics suggests that proper imaging of children who may have appendicitis may reduce the amount of appendectomies needed. Further advancements include amazingly detailed and accurate imaging of the brain, lungs, tendons, and other parts of the bodyâ€”images that can be used by health professionals to better serve patients. Positive ramifications of going paperless and heading towards digitization includes the overall reduction of cost in medical care, as well as an increased global, real-time, accessibility of these images. DICOM is not only a system for taking high quality images of the aforementioned internal organs, but also is helpful in processing those images. It is a universal system that incorporates image processing, sharing, and analyzing for the convenience of patient comfort and understanding. This service is all encompassing and is beginning a necessity. This comprises the zooming process, the blurring process, the sharpening process, the gray scale to color translation process, the picture recovery process and the picture identification process.

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GC-MS, which is a hyphenated technique developed from the coupling of GC and MS, was the first of its kind to become useful for research and development purposes. Mass spectra obtained by this hyphenated technique offer more structural information based on the interpretation of fragmentations.

The users of such templates can be many. Growing firms often make use of such documents so as to relate with their partners and clients. It lays the foundation for future cooperation along with help in looking forward to the meeting. It marks your existence in the market. You can enjoy many privileges by just talking about one. Valuable clients can be informed about any updates in the company via such documents. You may also see business formal letters. What are the Benefits of Using the Templates? Advantages of writing business introduction are as follows: It presents an overall image of your company to the client. Can help in acquiring more business. You may also see official resignation letter 3. It is a mode of communication between business or firms partners. You may also see appointment letters. Valuable clients can be kept informed via such mode. Writing this kind of documents to vendors and clients ensure their maximum support to the firm. You may also see acknowledgement letter examples 7. It can be simply written but needs some special attention focused on certain parameters. The sender can start it with a brief introduction as well. You may also see job appointment letters. Online samples can be used to write perfect letter for every occasion. You may also see offer letters. If you have any DMCA issues on this post, please contact us!

Chapter 4 : Digital imaging - Wikipedia

INTRODUCTION: Artificial intelligence is a branch of computer science capable of analysing complex medical data. Their potential to exploit meaningful relationship with in a data set can be used in the diagnosis, treatment and predicting outcome in many clinical scenarios. METHODS: Medline and.

Artificial Intelligence in Medicine. Westview Press, Boulder, Colorado. Man strives to augment his abilities by building tools. From the invention of the club to lengthen his reach and strengthen his blow to the refinement of the electron microscope to sharpen his vision, tools have extended his ability to sense and to manipulate the world about him. Medicine is a field in which such help is critically needed. Our increasing expectations of the highest quality health care and the rapid growth of ever more detailed medical knowledge leave the physician without adequate time to devote to each case and struggling to keep up with the newest developments in his field. Only in rare situations can a literature search or other extended investigation be undertaken to assure the doctor and the patient that the latest knowledge is brought to bear on any particular case. Continued training and recertification procedures encourage the physician to keep more of the relevant information constantly in mind, but fundamental limitations of human memory and recall coupled with the growth of knowledge assure that most of what is known cannot be known by most individuals. In a review article, Schwartz speaks of the possibility that the computer as an intellectual tool can reshape the present system of health care, fundamentally alter the role of the physician, and profoundly change the nature of medical manpower recruitment and medical education--in short, the possibility that the health-care system by the year will be basically different from what it is today. Indeed, it seems probable that in the not too distant future the physician and the computer will engage in frequent dialogue, the computer continuously taking note of history, physical findings, laboratory data, and the like, alerting the physician to the most probable diagnoses and suggesting the appropriate, safest course of action. The techniques needed to implement computer programs to achieve these goals are still elusive, and many other factors influence the acceptability of the programs. This book is an introduction to the field of Artificial Intelligence in Medicine, abbreviated AIM which is now taking up the challenge of creating and distributing the tools mentioned above. This introductory chapter defines the problems addressed by the field, gives a short overview of other technical approaches to these problems, introduces some of the fundamental ideas of artificial intelligence, briefly describes the current state of the art of AIM, discusses its technical accomplishments and current problems, and looks at likely future developments. The other four chapters each describe one of the current AIM projects in some detail, pointing out not only the accomplishments of the programs built so far but also what we have learned In the process of creating them. Definitions What is "Artificial intelligence in Medicine? Artificial Intelligence is the study of ideas which enable computers to do the things that make people seem intelligent The central goals of Artificial Intelligence are to make computers more useful and to understand the principles which make intelligence possible. The coupling of the study of how to make computers useful with the study of the principles which underlie human intelligence clearly implies that the researcher expects the two to be related. Indeed, in the newly-developing field of cognitive science, computer models of thought are explicitly used to describe human capabilities. Historically, researchers in Al have had to defend this linkage against humanist attacks on the reduction of the human intellect to computational steps. The debate has sometimes been heated, as exemplified by the following quote from the introduction to an early collection of AI papers: Is it Possible for Computing Machines to Think? No--if one defines thinking as an activity peculiarly and exclusively human. Any such behavior in machines, therefore, would have to be called thinking-like behavior. No--if one postulates that there is something in the essence of thinking which is inscrutable, mysterious, mystical. Yes--if one admits that the question is to be answered by experiment and observation, comparing the behavior of the computer with that behavior of human beings to which the term "thinking" is generally applied. We regard the two negative views as unscientifically dogmatic. Researchers in AIM need not engage in the controversy introduced above. Most researchers adopt the latter view. The choice to model the behavior of a computer expert in medicine on the expertise of human consultants is by no means logically necessary. If we could understand the functioning in health and in disease of the human body in sufficient depth to model the detailed disease processes which disturb health, then, at least In principle, we could perform diagnosis by fitting our model to the actually observable characteristics of the patient at hand. Further, we could try out possible therapies on the model to select the optimum one to use on the patient. Unfortunately, although biomedical research strives for such a depth of understanding, it has not been achieved in virtually any area of medical practice. The AIM methodology does not dogmatically reject the use of non-human modes of expertise in the computer. Indeed, accurate computations of probabilities and solutions of simple differential equations--tasks at which human experts are rather poor without special training--play a role in some of our programs. Nevertheless, most of what we know about the practice of medicine we know from interrogating the best human practitioners; therefore, the techniques we tend to build into our programs mimic those used by our clinician informants. Relying on the knowledge of human experts to build expert computer programs is actually helpful for several additional reasons: First, the decisions and recommendations of a program can be explained to its users and evaluators in terms which are familiar to the experts. Finally, within the collaborative group of computer scientists and physicians engaged in AIM research, basing the logic of the programs on human models supports each of the three somewhat disparate goals that the researchers may hold: To develop expert computer programs for clinical use, making possible the inexpensive dissemination of the best medical expertise to geographical regions where that expertise is lacking, and making consultation help available to non-specialists who are not within easy reach of expert human consultants. To formalize medical expertise, to enable physicians to understand better what they know and td give them a systematic structure for teaching their expertise to medical students. To test AI theories in a "real world" domain and to use that domain to suggest novel problems for further AI research. History AIM is certainly not the first use of computers in medicine. Many of the administrative and financial record keeping needs of the hospital, health center, and even small group medical practice have been turned over to computer systems. Such use of computers differs little from similar applications in a wide range of businesses, and few technical developments have been motivated specifically by medical use of what could be called "business computing. It appears unlikely, however, that such business uses of computing in medical applications will fulfill the promise to "reshape" medicine. In a recent book on management decision support systems, McCosh and Scott Morton, writing about management information systems MIS , note that despite the tremendous growth in computer-related activities, [MIS] has had little significant impact on management. We believe that this can be traced in large part to the lack of proper perspective on the problems involved in augmenting the decision-making ability of management. A second, currently much smaller use of computers in medicine is their application to the substance rather than the form of health care. If the computer is a useful manager of billing records, it should also maintain medical records, laboratory data, data from clinical trials, etc. And if die computer is useful to store data, it should also help to analyze, organize, and retrieve it. Three main approaches to this second type of medical computing have so far been used: Each of these has had notable successes, but also a more limited applicability than its developers had hoped. All contribute to the development of the AI approaches described here. A good recent review of the state of the art of computer tools for medical decision making can be found in [19] and an accompanying argument for the Al orientation in [25]. Flowcharts A flowchart is conceptually the simplest decision making tool. It encodes, in principle, the sequences of actions a good clinician would perform for any one of some population of patients. We may imagine, for example, recording all sequences of questions asked, answers given, procedures performed, laboratory analyses obtained and eventual diagnoses, treatments and outcomes for a number of patients who present at the emergency room with severe chest pain. If we observe enough patients and allow expert cardiologists to suggest an appropriate retrospective analysis of each case based on their excellent knowledge of the field, we may be able to identify a suitable sequence of actions to take under all possible circumstances.

This approach has been successfully applied to the encoding of triage protocols for use by nurses [15], and has also formed the basis for several programs for patient interviewing [20]. The principal deficiency of the flowchart as a general technique for encoding medical decision making knowledge is its lack of compactness and perspicuity. When used in a very large problem domain, the flowchart is likely to become huge, because the number of possible sequences of situations to be considered is enormous. Therefore, inconsistencies may easily arise due to incomplete updating of knowledge in only some of the appropriate places, the totality of knowledge of the flowchart is difficult to characterize, and the lack of any explicit underlying model makes justification of the program very difficult. Data Bases Large data bases of clinical histories of patients sharing a common presentation or disease are now being collected in several fields. The growth of data capture and storage facilities and their co-occurring decline in cost make attractive the accumulation of enormous numbers of cases, both for research and clinical uses. Today we are engaged in numerous long-term studies of the health effects of various substances, the eventual outcomes of competing methods of treatment, and die clinical development of diseases. Large databases on significant populations, concentrating on cardiovascular disease, arthritis, cancer and other major medical problems, are now being collected and used to clarify the true incidence of diseases, to identify demographic factors and to measure therapeutic efficacy of drugs and procedures [10, 17, 29]. For clinical purposes, the typical use of large data bases is to select a set of previously known cases which are most similar to the case at hand by some statistical measures of similarity. Then, diagnostic, therapeutic and prognostic conclusions may be drawn by assuming that the current case is drawn from the same sample as members of that set and extrapolating the known outcomes of the past cases to the current one. The use of collected past records either for research or clinical practice is clearly a data-intensive activity. To sift through the voluminous information at hand, to identify the important generalizations to be found among the thousands of detailed records and to select previous cases likely to shed light on the one under current consideration, numerous statistical techniques have been developed and applied. The literature of medical statistics is large, and will not be reviewed here; a good survey may be found in [26] and accompanying articles. Although vast collections of data and processing techniques for them are an important advance, the application of this methodology to all of medicine appears unlikely for several reasons. Firstly, the collection and maintenance of the data in a consistent and accessible form is very costly and extremely time consuming. Old data are difficult to reconcile with the new, because continual refinements introduced as medical knowledge deepens introduce distinctions which were absent in previously-collected cases. Rare disorders may be infrequent enough that an insufficient number are seen within the "catchment basin" of any data collection scheme to provide adequate data. Historical and regional differences in nomenclature and interpretation can make the reconciliation of separately-collected data virtually impossible. Thus, it appears likely that only the more common and severe disorders generate enough interest, resources, and clinical cases to make the collection of data practical. Secondly, and equally importantly, the existing expertise of physicians is a highly valuable body of knowledge which cannot he recovered from just the processing of many cases by statistical techniques. A method of diagnosis, prognosis or therapy which relies on the projection of past data without detailed explanations of the causality of the illness under consideration seems unlikely to attract the confidence of physician or patient. People feel the need to explain phenomena in terms of mechanisms they understand, and tend to reject predictions which cannot be understood in such terms. Therefore, clinical judgment based on comparisons with collected data will fill an important but limited role. Other methods of computer use in medicine, relying on the encoding of knowledge held by the expert physician, will be at least as important. Decision Theory Decision theory is a mathematical theory of decision making under uncertainty. It assumes that one can quantify the a priori and conditional likelihoods of existing states and their manifestations and can similarly determine an evaluation utility of all contemplated outcomes. Given these data, decision theory offers a normative, rational theory of optimal decision making which is urged by its practitioners as an effective technique for structuring medical decision making problems [16]. Although there is considerable evidence that most human decision makers not specifically trained in decision analysis deviate from this model in their decision making activities [27], the theory is nevertheless appealing as a norm for helping to make explicit the bases of decision making and any existing disagreements among decision makers. Numerous computer programs for decision making in small domains of medicine have employed the decision theoretic formalism [6, 8]. The chief disadvantages of the decision theoretic approach are the difficulties of obtaining reasonable estimates of probabilities and utilities for a particular analysis. Although techniques such as sensitivity analysis help greatly to indicate which potential inaccuracies are unimportant, the lack of adequate data often forces artificial simplifications of the problem and lowers confidence in the outcome of the analysis. Attempts to extend these techniques to large medical domains in which multiple disorders may co-occur, temporal progressions of findings may offer important diagnostic clues, or partial effects of therapy can be used to guide further diagnostic reasoning, have not been successful. The typical language of probability and utility theory is not rich enough to discuss such issues, and its extension within the original spirit leads to untenably large decision problems. For example, one could handle the problem of multiple disorders by considering all possible subsets of the primitive disorders as mutually competing hypotheses. The number of a priori and conditional probabilities required for such an analysis is, however, exponentially larger than that needed for the original problem, and that is unacceptable. A second difficulty for decision analysis is the relatively mysterious reasoning of a decision theoretic program-an explanation of the results is to he understood in terms of the numeric manipulations involved in expected value computations, which is not a natural way of thinking for most people. The role of decision theoretic computations is discussed further in [24]. Additional Flexibility A careful analysis of the shortcomings of any of the above techniques reveals numerous possible improvements. An interesting observation of the AIM community is that the improvements more often involve bringing to bear specific knowledge on selected subproblems of an application than developing a new complete theory for it. For example, in the decision theoretic framework, if most hypotheses are disjoint and most observations are conditionally independent, then it is very helpful to be able to express the few exceptions without resorting to expanding the complete database to give joint probabilities.

Chapter 5 : Artificial Intelligence and Medicine

The development of a product based on such research results is a second phase and is carried out, for example, by companies manufacturing photogrammetric equipment.

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As it stands now, the majority of commercial nanoparticle applications in medicine are geared towards drug delivery. In biosciences, nanoparticles are replacing organic dyes in the applications that require high photo-stability as well as high multiplexing capabilities.