



## Intricacies of Computer Science Influencing Medical Sciences in the Contemporary Context

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### ABSTRACT

Computer science plays an important role in Medical sciences past, present and in the future. In fact, computer science is often central to much scientific research. This research requires not just domain experts, such as medical and environmental researchers, but also people with deep knowledge of computer science who are able to develop algorithms and complex applications to facilitate scientific research. Computers with the application of physics are playing a decisive role in the modern medical science.

Computers are omnipresent, doctors use computers to record progress notes. Nurses use computers to transmit orders to other departments and in patient profile. Or the most part, All healthcare sector workers use computers.

This paper "Intricacies of Computer Science Influencing Medical Sciences in the Contemporary Context" highlights the many roles computers play in these medical sciences advancements and the abundant opportunities that are available for those interested in applying their computer science expertise in ways that might mitigate the suffering of the ailing humanity. Doctors use computers from data entry of disease profile to diagnose to treatment modalities. Nurses to follow the instructions and record the readings for further management. All basic healthcare workers use computers in the form of tablets or palentops to generate village profits. Medical informatics has shifted its focus from acquisition and storage of healthcare data by integrating computational, informational, cognitive and organisational sciences to semantic analysis of the data for problem solving and clinical decision-making. In this transition, bioinformatics tools and resources are the most appropriate means to improve the analysis, as major biological databases are now containing clinical data alongside genomics, proteomics and other biological data. This paper briefly reviews bioinformatics tools and resources and then discusses their applications in analysing clinical data for diagnostics.

Keywords: PDA,CAL,VR, EMR, Medical informatics, tumours

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### 1. INTRODUCTION

With the development in Computer Science, there has been a significant change in medical education all over the world. The changes is that majority of

the medical students are computer science literate these days. New information on medical topics is readily accessible via the Internet and handheld

computers such as palmtops, personal digital assistants (PDA).



Computer Science Technology can assist medical education in various ways such as in college intranet. Computer-assisted learning (CAL), Virtual reality (VR), Human patient simulators are some options. With the help of organizations networks and Internet, the medical students as well as the trainers may stay in contact in real time.

At Present Rapid communication can be established with the help of electronic mail system (e-mails) and course information, handouts, and feedbacks can be circulated easily. Many medical schools these days use online programs such as "Blackboard" or "student central" to underline and coordinate their courses. Such programs allow speedy access to information and quick turnaround of evaluation and messaging, and allow all tutors, assessors, and students at any site to look at the curricular context of their own particular contribution. Similarly, the Internet provides opportunities to gain up-to-date information on different aspects of health and disease and to discuss with others in different continents via net conferencing. Free access to Medline, various medical journals, online textbooks and the latest information on new development in medicine also encourages learning and research.

Computer science is of immense use to the healthcare sector. One example of a significant advancement that it has provided to hospitals is the development of electronic medical records (EMR). This technology can convert medical information into a single database. Not only does this technology reduce paper costs, it allows healthcare providers to access pertinent patient information such as

medical history, medications, insurance information, etc with just the click of a mouse.

EMRs hold great promise in the clinical arena. The ability to care for patients with a record that is integrated with laboratory and pharmacy information, and provides point of service information regarding preventive services, diagnosis, treatment, and follow up represents a dramatic advance in patient care. Improving and measuring quality would be instantly improved if all clinicians used EMRs. For example, it would be easy to prompt clinicians that their patient with diabetes needs an eye examination or a haemoglobin A1C level.

Prescription patterns of individual clinicians could be carefully evaluated and compared to established standards. In fact, computer based clinical support as part of an EMR has been shown to improve physician performance and patient outcomes.

There is no argument over the influence of IT in medicine and education. But there are still many grey areas which need to be improved before we could utilise IT to its full extent. Last but not the least, however advanced the technology gets, it can never replace the communication between the doctors and students require with the patient and the clinical judgments which make great doctors. So, in the pursuit of modern technologies, we should be careful that the doctor patient relationships do not get overlooked.

## 2. Is 'Physics' Key for Computer science and Medical Science

Many applications and principles of Physics is the basic key for computer science and medical science. It's basically a way of using our physics knowledge to develop tools and treatments that helps human live longer and healthier. And also physics of spinning computer disks, the amount of data can be stored and retrieved from spinning disk drives are considered by the speed at which they spin. Most of the computer disk drives of a given generation are roughly similar in this regard.

## 3. All Science Is Computer Science

Physics revolutionized medical practice. 'Physics is almost entirely computational now,' said Thomas B. Kepler, vice president for academic

affairs at the Santa Fe Institute, a multidisciplinary research centre in New Mexico. "Nobody would dream of doing these big accelerator experiments without a tremendous amount of computer power to analyze the data."

Maybe it wouldn't be an exaggeration. Whatever field he chose, he would eventually end up doing computer science.



#### 4. Computer Applications in Health Care

1. IT technology used in Administrative office for maintaining the Hospital records and files
2. Medical Laboratory. Computers used to analyze DNA – Blood – Urine • Used to test for disease and genetic disorders • Can run as many as 500 specimens per hour and analyses automatically.
3. Used to reveal heart problems – valve problems, – defects in the heart wall, congenital heart diseases etc.
4. Computerized Tomography (CT) • It's a computerized body scanner • Shows cross-section views • Allows us to see bone and body tissues • Helps us find tumours
5. Magnetic Resonance Imaging (MRI) • It's a body scanner that uses nuclear magnets instead of x-rays • Patient is placed in a large, circular magnet that measures the activity of hydrogen ions and converts it to a picture • Can see tumours, blood moving through veins
6. Ultrasonography • Uses high frequency sound waves • Body parts are viewed on a computer screen and printed on photo paper • Used during pregnancy
7. Telemedicine • Includes remote monitoring devices and videoconferencing
8. Human Genome Project • Computers play an important role in the Human Genome Project. • The goals of the Human Genome

Project are: – identify all the approximate 30,000 genes in human DNA, – determine the sequences of the 3 billion chemical base pairs that make up human DNA, – store this information in databases, – and improve tools for data analysis.

9. Computers in Biotech • IBM is working on a supercomputer called Blue Gene which may decipher some of the mystery behind how proteins work. • "Computational biology," or "bioinformatics," can collect information "without having to do the experiment" This could make it easier to design drugs because we can make a reasonable prediction of the structure with a computer.
10. Bioinformatics • Bioinformatics is the term coined for the new field that merges biology, computer science, and information technology to manage and analyze data, with the ultimate goal of understanding and modelling living systems.

Computers are the excellent means for storage of patient related data. Big hospitals employ computer systems to maintain patient status records. It is often necessary to keep complete records of the health status of patients. Doctors often require the information about a patient's family history. Physical elements already diagnosed diseases and prescribed medicines. This information can be effectively stored in computer data base.

Creating discipline at the intersection of information science, computer science and health science. It deals with the resources, devices and methods required in to optimize the acquisition, storage, retrieval and use of information in health.

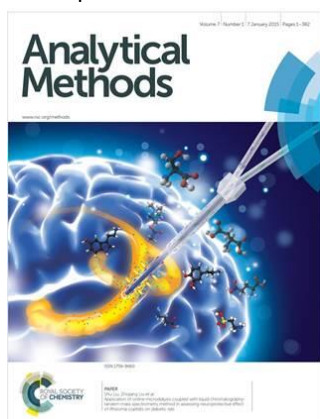
#### 5. Combination of clinical and biological data in clinical practice using bioinformatics

The aim of our work is to describe essential aspects of Medical Informatics, Bioinformatics and Biomedical Informatics that are used in biomedical research and clinical practice. When Bioinformatics and Biomedical Informatics approach to medical investigation and practice are applied, a new discipline, called Clinical Bioinformatics

#### 6. Scope

Analytical Methods does not require that systems are fully validated, however it should be

demonstrated that methods and technology reported in the journal are sufficiently robust and fit for purpose for application in the future. Developments are encouraged within the fields of healthcare, pharmaceuticals and biomedical diagnostics, radiotherapy environmental and forensic analysis, heritage science, agricultural science and food products, industrial process development and product validation.



## 7. Conclusion

It is observed through the above research article medical science is so intervened with computers that no physician can imagine practicing medicine without the aid of computers.

The computer science has immensely augmented the skills of the doctors so that the diagnosis is accurate and timely and the decision in treatment modalities became easy and rational.

When the entire physician's follow the protocol uniformly is Standard Operating Procedure (SOP) and essential drug delivery the morbidity and mortality shall be drastically reduced.

It is also imperative that computers are playing pivotal role in Radio imaging and Radio diagnosis .For the incurable cancers with the help of computers it has evolved precision delivery of radiation emission without damaging the adjacent organs.

Computers with the application of physics are playing a decisive role in the modern medicine.

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- [7]. George Johnson, *New York Times*, March 25, 2001 Physics, biology, chemistry, neuroscience, genetics, even sociology and anthropology depend heavily on computers. Increasingly, experiments are done "in silica", that is, by developing and experimenting with models of real systems rather than the systems themselves.

## A Brief Bio of Authors

**Prof. K.Gopi Krishna** did Ph.D in SathyaBama University and He has 08 years of teaching experience, He Received JNTU-K Best Teacher Award and National Award from the Institute Of Engineering and Technology. Presently He is working as a Professor at Simhadhri Engineering College, Visakhapatnam

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