

Chapter 80

Attacks and Countermeasures

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ABSTRACT

Information technology has benefitted the society enormously in all spheres of life. Medical sciences have not been left untouched, rather it is using information technology extensively for storing, retrieving, transmitting, and manipulating data. There are various simulators and software designed using virtual reality explicitly to train the medical students like computer-assisted learning (CAL). Biomedical science is a discipline that connects information science, computer science, and healthcare. Biomedical science is critically analyzing, understanding, and knowing the human body. Real-time monitoring can help studying and analyzing the chronic diseases and managing it before the adverse events. Information technology has been proven as a boon in all areas, but it has certain limitations, making it vulnerable to attacks. Information security is a matter of great concern, especially when the data is traveling through the internet, which is an insecure channel. This chapter focuses on varied attacks and their countermeasures.

INTRODUCTION

Living in 21st century with so much technological advancement in all domains is a boon. “What we used to dream is now a reality”; because of technological growth. We cannot just see a photograph of a person but we can actually do video calling with a person sitting miles apart. The technology has not just reduced the distance and speedier the task but it has actually helped the humankind to take proper decisions based on the past history (archival data) and current data. The technology if used properly can be of great help and can ensure the success. Unfortunately some people for their fun and wrong intentions misuse the technology by breaching the security. There are several attacks which eventually have taken place to fetch the information illegally. The crimes are increasing like the recent DDOS attack on Dyn’s cyber security despite of all mechanisms has brought down nearly 100,000 DVRs, security cameras, thermostats, coffee makers, webcams, refrigerators, and other internet of things devices in homes across the world. WannaCry- cryptoworm; is a powerful ransom ware attack which has attacked more than 200000 systems using Microsoft windows. It encrypted the information and then seeks for ransom amount in lieu to release the key for decrypting the information.

DOI: 10.4018/978-1-7998-5351-0.ch080

Attacks and Countermeasures

This chapter begins with a brief introduction about biomedical sciences, information technology, benefits of information technology in bio medical sciences. The chapter further highlights about the various attacks like Active and Passive attacks. It also shed some light on the recent crimes followed by counter measures.

MAIN FOCUS OF THE CHAPTER

Biomedical Sciences

Health informatics also called Health Information Systems; the concept was given by Gustav Wagner, 1949 in Germany. Earlier the patient and hospitals used to maintain the records or test reports even after several years. The approach has changed enormously after information technology has come into picture, the patients' records, test reports; treatment details etc. are captured, stored, analyzed, and retrieved as and when required from the database. The patients' demography and insurance details are shared conveniently to the insurance company to clear the dues. The doctors can discuss the case live with a team of expert doctors from all over the world before commencing the treatment. It has numerous advantages to use information technology in amalgamation with health care sector.

Going through the past and observing the statistics it has been assumed that a professional doctor can detect and give treatment, can assess new methods, can improve guidelines to practice, and based on the initial training received during the academic education and ongoing practice experience. According to David Eddy, a well-known quality expert, (Goldberg, 1988; Greiner, 2003) *complexity of modern medicine exceeds the inherent limitations of the unaided human mind* (Millenson, 1997). As per David (Goldberg, 1988; Greiner 2003) no practitioner needs to absorb the results of 10,000 clinical trials span over years, areas of specialty, etc. Therefore, there is a need for biomedical informatics according to (Berman, 2007) it deals with both biology and computer science. There is a need for such an intellectual fusion of biomedicine and information technology which will help to store, retrieve, analyze, and interpret the data. The Recent example of storing, retrieving, analyzing and interpreting is Google. Google has designed an Algorithm to check the status of heart by just scanning the retina of the person. Google has tried and tested on more than three lakh people and this algorithm is built using Artificial Intelligence.

Biomedical Sciences is the study of the human body, it is the way to critically analyze, understand and know the structure and function in health and disease. Biomedical science focuses on the application of medical science; the scientist is expert in biology in context with medicines and information technology. The scientists involved in the study of biomedical require an understanding of microbiology, pharmacology cell, medical biochemistry and molecular biology, anatomy, physiology, infectious diseases and neuroscience. The scientists need to know how a disease manifest in human body, understand and analyze the problem and should know how to predict and describe. For health care it is essential to improve knowledge, interventions, or technology.

Over a decade or more the bioinformatics discipline has been explored extensively to get ahead with advancements in molecular biology and genomics research. To attain thoroughness in complex biological processes researchers are using bioinformatics, for instance, studying DNA sequences or demonstrating protein structures etc.

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