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Review on Application of Data Mining for Health Care Management

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Abstract- In this paper, the authors present a critical review of the various research currently being undergoing in applications of data mining for healthcare management. The applications included in this paper are infection control surveillance, diagnosis and treatment of various diseases, healthcare resource management, fraud and anomaly detection, healthcare administration, hospital management and public health.

Keywords: crisp-dm; classification, data mining surveillance system; diagnosis; fraud detection; length of stay; public health.

I. INTRODUCTION

Data mining is defined as the process of automatically discovering useful information in large data repositories. It can also be termed as the process that involves data selection, exploration and building models using vast data stores to find unknown patterns. In healthcare management, data mining techniques are increasingly being used due to its inherent characteristic of finding hidden patterns. Due to modernization in record keeping, a huge amount of raw data is generated by healthcare organization. These data are very complex, huge and difficult to be analyzed by traditional tools and methods. Data mining techniques and methods helps the decision makers in discovering interesting patterns in voluminous data (big data). Data mining application in healthcare management cover all the constituents of healthcare sector like healthcare providers, planners, managers, insurance providers etc.

II. DATA MINING PROCESS

Cross-Industry Standard Process for Data Mining or CRISP-DM methodology provides a framework for data mining project to be applied on various domains.

The life cycle of CRISP-DM model consists of six phases which are as follows:

A. Business Understanding: This phase includes determining business objectives, assessing the current scenario, data mining goals, and developing a project plan.

B. Data Understanding: This step includes data collection, along with their description and further exploration, and the data quality verification.

C. Data Preparation: After identifying the available data resources, they are further selected, cleaned, made into the desired form, and also being formatted.

D. Modeling: To carry out initial analysis various data mining software tools like visualization, generalized rule induction, cluster analysis are used to generate basic idea regarding usefulness of particular techniques on the available data.

E. Evaluation: The Models obtained are being evaluated in the context of established business objectives. The results obtained by model evaluation provide a deeper insight into business operations of an organization.

F. Deployment: This is the final stage the model prepared is delivered and installed correctly.

III. EMERGING APPLICATIONS

A. *Infection Control Surveillance:*

There is a huge impact of nosocomial infections and antimicrobial resistance on the rate of morbidity and mortality of inpatients and also their cost of care. A Syndrome systems based on data mining is quite helpful in early warning of the spread of SARS virus globally.

B. *Diagnosis and Treatment:*

It helps in carrying out the course of action against a particular disease depending upon the causes and symptoms. Data mining could also be more useful in drug delivery in case there is insufficient evidence favoring a particular treatment option.

C. *Healthcare Resource Management :*

The data mining helps in planning and implementation of healthcare resource management activities like identifying and tracking chronic diseases states and high risk patients and reducing the number of inpatients in hospital.

D. *Healthcare Administration:*

Data mining has been used quite extensively used in prevention and detection of fraud committed in medical insurance segment. The inherent ability of data mining in detecting anomalous behavior based on information of purchase, usage and other transactional behavior has made it a specialized tool in number of organizations to detect fraudulent claims, inappropriate prescriptions and other abnormal behavioral patterns.

E. *Hospital Management:*

Based on data mining the Administrators of health care organizations can make critical decisions on routine basis such as:

1. Amount of supplies
2. Number of staff
3. Vacant beds required
4. Preventive measures in case of an endemic outbreak.

F. *Public Health:*

Public health organizations collect significant volumes of data. Following fields in public health like blood management, medical procurement, disease management and control, and environmental health, use data mining tools to develop the system and dashboards to deliver information to end users.

IV. CONCLUSION AND FUTURE SCOPE

The main aim of any healthcare organization is to provide good care treatment to the patients and not to collect the data as per data mining process. So, it is very challenging to incorporate data mining and to find the interesting patterns and knowledge from the huge amount of healthcare data. Although, sharing healthcare dataset helps in devising new pattern generation but it also leads to privacy issue also. In healthcare management, the interpretability of results and their implementation play important role in universal acceptability. There should be extensive analysis of statistical tests as well as data mining models before being implemented. In India, there are three levels of healthcare network namely, Primary secondary, tertiary. It provides an opportunity for data miners to use the huge amount of data. The main task is to integrate data from different sources and then put to use by data miners to achieve the desired results.

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