How Can Data Mining Improve Health Care?

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Abstract: Building health care systems related- symptoms differ than estimated illness, can have a substantial impact on health. It is important for the clinician to recognize when symptoms/ illness are related to the patient's workplace, environment and even considered culture, these should be treated as occupational/ environmental or cultural illnesses. Evidence-based medicine is a powerful tool to help minimize treatment variation, readmission and unexpected costs. However the best-practice guidelines contribute further to the goal of standardized patient outcomes and controlling costs. We discuss data mining intelligent technology to improve health care systems in a way saving time, effort and money and improve overall medical care systems.

Keywords: Data mining, Health Care, Medical Cost, Medical Quality, Decision Tree, Naïve Bayes, Rapid I.

1 Introduction

Since 2001 in different USA states, when the Joint Commission, the Centers for Medicare and Medicaid Services (CMS) and the American Hospital Association, data mining decision algorithms established quality of health care opportunities [1, 2]. After application of data mining analytic systems, health plans worldwide especially in industrial countries have been improved significantly, reporting their performance on measures of quality of care, eventually to health care purchasers who sought better information about the quality of care they were purchasing [3, 4]. Performance measurement and reporting has now become common place in most health care settings [5]. Along all these very big data obtained from hospitals, machine learning can estimate/ evaluate the planning system for the health care quality in the near and far future in developing countries, here we will shed light the importance of such data mining machine learning in Egyptian society.

Every day medicine going to change by new diseases discoveries, a typical disease presentation, updated guidelines and new investigation modalities. For example health care providers are susceptible to nosocomial exposure from hospitalized patients, to predict tools of prevention, time of suggested transmission and appropriate preventive therapy may save lives. This risk is even greater in certain regions of the world where admission rates for TB are extremely high, furthermore health care workers are usually exposed to numerous allergens, disinfectants and irritants; a common example is allergy to natural rubber latex received significant medical attention as glove use became more widely adopted in the 1990s to avoid blood borne pathogen exposure. Latex glove use has since declined, but numerous other allergens are present in the health care environment, such as pharmaceuticals (eg, psyllium, antibiotics, chemotherapeutics, aerosolized medications), disinfectants and sterilants (eg, formaldehyde glutaraldehyde), and other cleaning products [6–10].

Many of the disinfectants, sterilants, and cleaning products are also strong irritants. Important indoor pollutants changed medical approaches diagnose and therapy include secondhand smoke, molds and other allergens, volatile organic compounds, particulate matter and other specific gases, cleaning and personal care products, and emissions from cooking and heating. Infectious agents present another type of exposure. Additionally secondhand smoke; because many terms are used for the involuntary inhalation of tobacco smoke by nonsmokers, including secondhand smoke (SHS) exposure, environmental tobacco smoke exposure, and passive smoking. SHS exposure is associated with increased risk for respiratory symptoms, cardiovascular events, and lung cancer [11–16] Psychosomatic disorders related- cardiac, neurological and gastrointestinal diseases are widely common. From all these very big data

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physician may got lost establishing the correct diagnosis, appropriate investigations and therapy with such complicated situations having multidisciplinary information! the situation require data mining analysis will help not only the clinician , but insurance medical facilities, patients and country presenting better medical quality with significant cost consideration.

In this paper we discuss the validity of data mining technology improving health care systems.

The organization of the following sections as follows: In section 2, we discuss the utility of data mining saving cost, in section 3 we present best modality of data mining programs in applied medicine, however in section 4 we give an applicable example

2 Application of Medical data mining

Data mining holds great potential for the healthcare industry to enable health systems to systematically use data and analytics to identify inefficiencies and best practices that improve care and reduce costs. Some experts believe the opportunities to improve care and reduce costs concurrently could apply to as much as 30% of overall healthcare spending. This could be a win/win overall. But due to the complexity of healthcare and a slower rate of technology adoption, our industry lags behind these others in implementing effective data mining and analytic strategies [17]. Algorithm (1) show the expected values of applying data mining technology in health care system will save the cost and impact medical quality significantly. Furthermore improving patients care can avoid financial and reimbursement penalties for hospitals.

Algorithm [1]: showing how much benefit of applying data mining in health care system
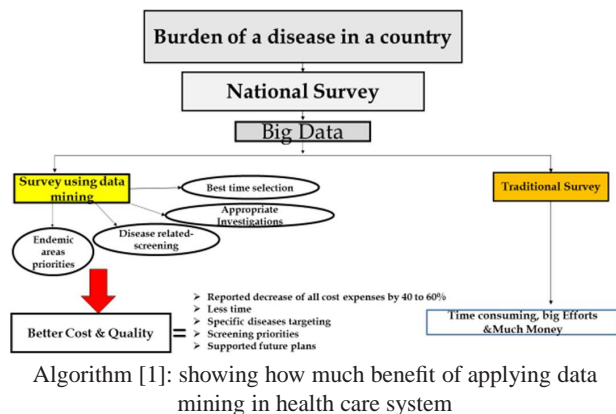
3 What are best data mining of machine learning modalities using in applied Medicine?

The corner stone thinking of predictive data mining in medicine is how can predictive analytic technologies be used efficiently to help controlling costs and improving patient care significantly?

For our knowledge and published medical experience, the decision tree; one of data mining computing algorithm, tries to mimic the human brain, connecting attributes to each other, aims to compare these information-related attributes to one another, finally looks for the strongest connections. The network could apply the suitable required model to score the applicable data in order to make predictions in the applied medicine. Using naïve bayes application for an algorithm will be created by decision tree will give a significant specificity impact for the results created by one of bioinformatics technology system [18]. Choosing the correct label is important for such application; (Figure 1). Additionally IT Engineer has applicable, simple and easy to understand in clinical medicine to make simple decision cut-off being applicable in clinical medicine.
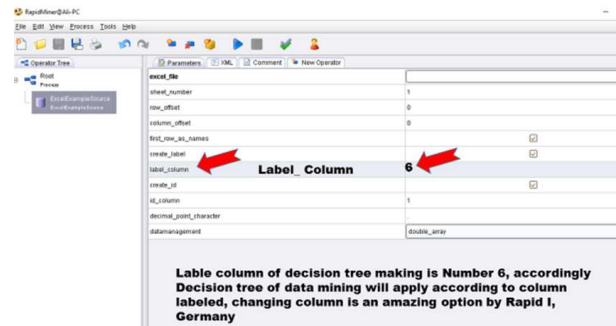

Fig. 1: Arrow indicate the label column where decision tree will make decision analysis.

Decision tree will show the cut-off values and curves will be created by nave bayes showing the application in curves, bars or graphs; Figure (2,3)

4 An Applicable Example

Screening esophageal abnormalities by upper endoscopy is the routine medical investigation worldwide, however according to Evidence based-medicine UpToDate of a paper published in the American Journal of the Medical Sciences, Texas, USA, esophageal varices; one of the most important complications of liver cirrhosis can be screened easily by conventional ultrasound, authors used
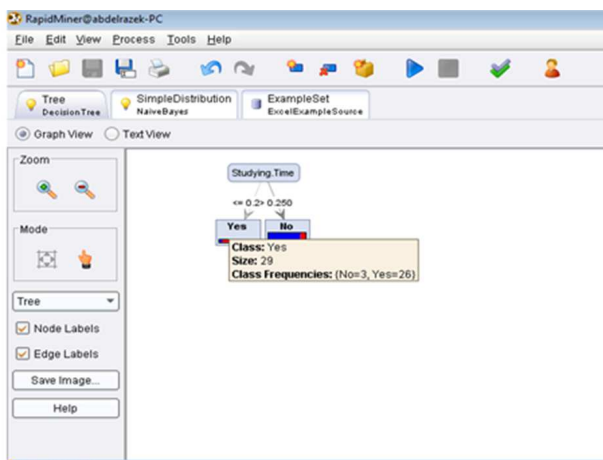
Fig. 2: Decision tree for significant hours of studying in a study, Cut-off decision was applicable at 0.250.
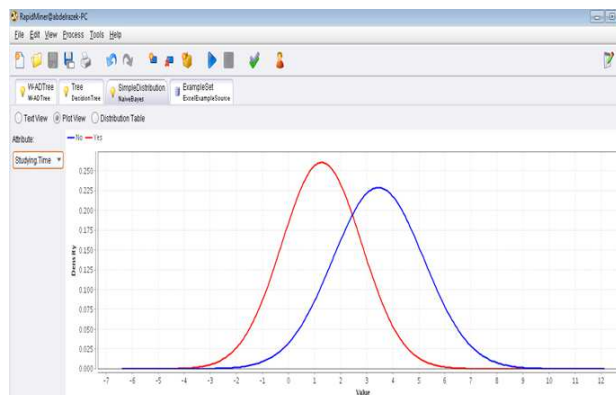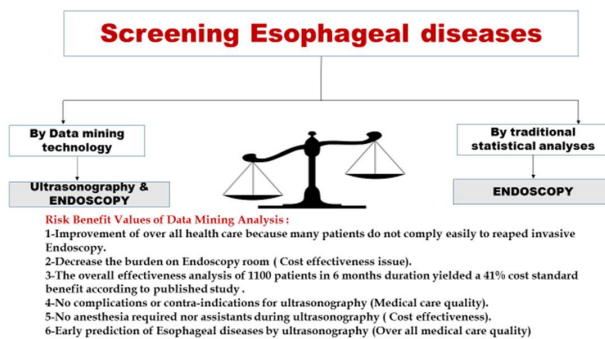

Fig. 3: of the studuing time related- decision treee algorith. Yes; Red Curve, No;Blue curve.

Algorithm [2]: showing the comparative analysis of traditional endoscopic screening and utility of ultrasound.

data mining computing analysis of Rapid I, version 4.6, Germany for such analysis [19, 20], additionally when compared in another study the medical quality care was improved and the cost decreased significantly. The overall effectiveness analysis of 1100 patients yielded a 41% cost standard benefit calculated to be $114 760 in a 6-month duration [21]. Algorithm (2) showing how health care quality have been improved significantly according to data mining analyses.

Such applications of data mining is very helpful in controlling endemic diseases [22–24] and to predict epidemics especially in developing countries where mortalities and co-morbidities affect the overall health system and economy of these countries.

5 Conclusion

In brief, new technologies Algorithms would be helpful in endemic areas to control diseases spreading and save health care workers such as Egypt. Data mining is the breakthrough in computational analysis over mathematical and statistical analyses in space, communication technology, labor, biology, industry, engineering and different computer sciences, recently in medicine, that the use of data mining in prediction medicine should discover the important factors related-disease conditions by extracting hidden factors that have been never identified by the usual statistical programs, impacting both cost and quality care systems not for patients only but also for health care providers especially in endemic countries .

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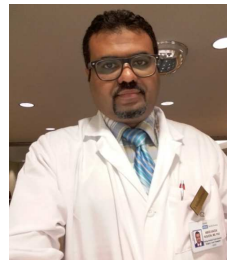
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