Chapter 14
Clinical Decision Support Systems:
Decision-Making System for Clinical Data

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ABSTRACT

Clinical data is increasing day-by-day mainly in hospitals by an ageing of the human population. Patients discharged from hospitals are readmitted due to health issues. As the number of patients increases, there are a smaller number of hospitals and an increase in healthcare costs. This results in ineffective decision making that minimizes the healthcare. Machine learning techniques score better for solving this kind of problem. The proposed work, minimum entropy feature selection with logistic regression (MELR), is performing better for the readmission rates. Decision cannot be based on the clinical knowledge and personal data about the patient. It must be precise in choosing the future patient outcomes. This chapter produces promising results for clinical data.

INTRODUCTION

Machine learning is involved to organize the data by making data fit into the model which predict the future outcomes. It helps to construct the model from the historical data available providing an efficient solution for the given problem. In last few years, various machine learning techniques, hybrid the two machine learning techniques to innovate new model to classify the data. Clinical data from hospitals and government health care sectors EHR (Electronic Heath Record) are maintained physically without any significant progress. These machine learning algorithm concepts integrate the future outcomes with

DOI: 10.4018/978-1-7998-2742-9.ch014

current historical data. As clinical data is increasing due to huge growth of population necessary model are required. Development of these algorithms is the foundation of machine learning concepts.

Traditional Strategy will lead to wide fluctuations in clinical data. Rather than collecting the diabetic data from mortality this study suggest that collecting the information about diabetic data from hospitals. This data help us to maintain level of blood glucose level. A model is recommended which makes the base for the diabetic patient to compare with the historical data to improve the healthcare. Now, the temporary analysis of this data states to reduce the readmission of diabetic patient.

Several machine learning algorithms executed to solve many problems. In analyzing the historical data feature selection is important to development the improvement of the model. This chapter paves a way to feature selection and machine learning techniques. The basic feature selection are carried out in previous paper that (Xing Yifan & Jai Sharma, 2016) does not give relevant solution to the problem. Some other best methods are needed to select the relevant features and reject the irrelevant features.

Entropy is the measure of uncertainty based on the target variable (Vimalkumar & Kalpesh, 2014). It shows the number of possible values (Lacson, R. C & Bowen Baker, 2019) to the target variable. In machine learning it also used to identify the maximum relation to the target variable. This chapter selects the features that are minimum uncertainty to the target variable. Finding the relevant features improves the accuracy of machine learning techniques.

The main objective of this paper is aimed to show the most significant features in dataset from the clinical data. The relevant features help to improve the accuracy level of the classification algorithms. The empirical results show that proposed works achieves remarkable dimensionality reduction from 50 features to 11 features for classification algorithms.

The chapter is organized as follows: The following sections describe the background study basic concepts of entropy-based feature selection are explained. The next section describes the proposed work of the chapter and finally concludes the paper

BACKGROUND STUDY:

In recent few decades, machine learning techniques are used in wide range to predict the disease based on the historical data. Many proposed algorithms are developed and studied from the researchers. In this section a few important works that are closely to the proposed work are discussed.

The prediction of readmission using big data tools based the drugs that are taken to the patient (Satish Boregowda, Rod Handy, 2016) .The care must be taken to the patient even after the discharge. The values of the patients are determined (Mingle Damian, 2017) by HbA1C results it is an important feature to control the glucose in in blood. Entropy is one of the important feature to select the (Yun Zheng, Chee Keong Kwoh, 2011) high dimensional features. High entropy alloy integrating with machine learning is doing better (Ziqing Zhou &Yeju Zhou, 2019). In this work the maximum entropy is used to optimize the objective solution of the proposed work (Rui Zhao & Xudong Sun, 2019). It also proposed three works based on the entropy. First, work is based on the weighted entropy second work is lower bound for optimization (Jayanthi, N & B. Vijaya Babu, 2017) and finally, prioritize framework on entropy. Differential entropy selecting the subset of features (Schulman & Chen, 2017) provides solution to the classification problem. The relevant features are selected it gives better accuracy. This entropy deals (Satish Boregowda & Rod Handy, 2016) nominal and real-valued data in the dataset. Neighborhood