Finding Impact of Precedence based Critical Attributes in Kidney Dialysis Data Set using Clustering Technique

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ABSTRACT

The influencing aspects for kidney dialysis such as creatinine, sodium, urea & potassium levels display a critical part in determining the persistence estimate of the patients as well as the need for undergoing kidney transplantation. Numerous efforts are been through to develop computerized choice making procedure for earlier persistence. This preliminary study finds the impact of significant parameters based on the precedence of parameters suggested by the doctors & using the k-Means algorithm. With this algorithm knowledge about the collaboration among several of those measured parameters and patient persistence. The clustering method finds critical parameter that assists in estimating the persistence period of the patients who is taking the dialysis treatment.

Keywords: CKD, Dialysis, Hemodialysis, K-means Clustering, Persistence

1. INTRODUCTION

The main function of Kidneys is removing the toxic wastes collected in the human body thus helping soft working of the human body parts. Functioning of the kidneys deteriorate with oldness. Certain cases, the kidney working lead to decline rapidly and reaches to a disorder called Chronic kidney Disease (CKD) (Shah et al., 2003)-(NIH Publication). CKD refers to the condition where the kidneys totally fail to eliminate toxic wastes and control the electrolytes which are very much essential for normal function of our cells and organs. The signs of the CKD include declined urine production, weight decrease, high-level blood pressure, tininess of breathing on

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physical exertion. The modalities for the CKD include the receive dialysis on a regular basis or receive kidney transplantation in order to stay alive. The kidney transplant works as a undying support for this ailment. If patient chooses not to have treatment, he will die sooner than if they choose dialysis.

Data mining approaches have been used in the past for identifying relevant factors in a data set of routinely collected dialysis parameters. These factors help in predicting the survival of an individual patient beyond the median survival time. In the USA, the average time of survival of a patient on dialysis is around three years (Shah et al., 2003) and this approach was aimed at finding the factors which will improve their survival for more than three years. Several attempts have been made to predict the survival rate of kidney failure patients (Shah et al., 2003)-(NIH Publication). This proposed research study is derived based on the preliminary work done in [8]. The research work investigates the importance of k-means clustering technique for recognizing kidney dialysis parameter contributed to survival prediction. The data collection process included collection of parameters such as the patient weight before and after dialysis, blood pressure in standing and sitting postures, blood flow rate, total dialysis time and clinical parameters such as levels of sodium, calcium, bicarbonates etc.

2. RELATED LITERATURE

The various method of Data mining have been used in the antiquity for finding significant futures in a data set of regularly accumulated dialysis parameters. These elements help in persisting the persistence of an individual patient beyond the average persistence time. In the USA, the average time of persistence of a patient on dialysis is around three years (Shah et al., 2003) and this approach was aimed at finding the factors which will improve their persistence for 3 years and above. Numerous efforts have been through to persist the persistence rate of kidney collapse patients (Shah et al., 2003)-(NIH Publication). This proposed research study is derived based on the preliminary work done in (Ravindra B.V. et al., 2014). The research work investigates the importance of k-means clustering technique (Ravindra B.V. et al., 2014) for recognizing Creatinine as the significant parameter in kidney dialysis parameter contributed to persistence prediction. In this paper the work is extended to three more parameters Urea, Sodium & Potassium. The data collection process included collection of parameters such as the patient creatinine, sodium, urea & potassium levels weight earlier & later dialysis, BP in stand-up and seated positions, blood flow rate, dialysis duration and other medical parameters such as levels of chloride, bicarbonates etc.

3. EXPERIMENTAL ANALYSIS

The medical data taken into account for study is obtained from Chennai Global Hospital as per the earlier study reported in (Shah et al., 2003) (NIH Publication). We had taken into account 230 records for this analysis. 12-15 kidney dialysis parameters from each record, the highest influencing parameters are only taken into account for the intended analysis. Centered on the Nephrologist advice, the precedence level is obtained. For example, the sign of high-ranking precedence shows the need for transplantation of kidney. Table 1 depicts the span of limits to be taken into account for conclusion rendering (Ravindra B.V. et. al., 2014). The WEKA tool version-3.7.9 is used for conducting the experiment.

Dataset is partitioned into training data set and testing data set. K-means clustering algorithm is applied to the clinical dataset, by following testing modes:
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