Research Analysis for Patient Heart Rate Performance using Algorithm Design Techniques

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Abstract- ***The provision of high-quality healthcare to patients is the primary goal of higher education institutions in medicine. The identification of factors influencing academic performance and subsequent attempts to address these factors' weaknesses are two ways to achieve the highest level of quality. Finding patterns in the data (student and course records) that could be used to predict students' performance is the specific goal of the proposed research project. A sample of 150 students from the University of Port Harcourt Teaching Hospital participated in the study. The statistical package for social sciences (SPSS) and the data mining tool Clementine were used to collect and organize the data. The task of creating a reliable student performance prediction model is difficult. To determine which of the known factors can provide an early indicator of expected performance, data mining-based models were used. In order to lower error rates, this paper uses both feature reduction and classification techniques. The findings of the experiment show a strong correlation between the success rate of hospitals and the inclusion of both practical work and medications. On the other hand, the quantity of assignments given has a detrimental effect on course academic performance. The majority of the factors that affect a student's academic performance, aside from grades on the final and midterm exams, are the students' attendance in class.***

Indexed Terms- ***Decision tree, prediction, heart rate performance, and healthcare data mining***

I. INTRODUCTION

The performance of the patient's heart rate is influenced by a variety of variables, including personal, socioeconomic, and environmental factors. Understanding these factors and how they affect a patient's heart function can aid in managing their impact. Healthcare mining research has received a lot of attention recently. The term "Healthcare Data Mining" describes methods, apparatus, and academic work used to automatically derive meaning from sizable databases of data produced by or pertaining to human learning processes in the healthcare environment. The volume of data in healthcare data bases makes it more difficult to predict a patient's heart rate performance. There has been extensive research on the subject of explaining and predicting patient performance. In healthcare settings, the capacity to predict patient performance is crucial. All medical institutions have as a long-term objective increasing patient diagnosis success. Medical facilities could make extra efforts to set up appropriate support for patients who performed poorly in order to improve their health and help them survive if they could predict patients' heart rate performance early on before their final exam. On the other hand, figuring out the factors that influence the success rate of a diagnosis can help to advance healthcare. Researchers have a unique opportunity to study how heart conditions improve and what methods of prediction are successful thanks to newly developed web-based healthcare technologies and the application of quality standards. The main goal of the paper is to identify the variables that influence both the success rate of medical diagnoses and the heart rate performance of the patient. These variables will then be used as early predictors of expected success rate and for treating heart conditions. The order of the subsequence sections is as follows: What was accomplished in the field of healthcare mining is described in section II. The proposed predictive model and the data set are described in Section III. Then, the sections that follow focus on the analysis and outcomes. Last but not least, conclusion is successfully used in many contexts that seek to derive knowledge from the data. A model is developed to identify new knowledge information using data mining techniques. Association, classification, clustering, prediction, sequential patterns, and decision trees are just a few of the important data

mining techniques that have been developed and are currently in use.

The primary methods employed in the field are described in the paragraphs that follow.

II. CLASSIFICATION

A well-known machine learning-based data mining method is classification. In essence, classification is the process of assigning each piece of information in a set of data to one of a predetermined number of classes or groups. Mathematical methods like decision trees, linear programming, neural networks, and statistics are used in the classification method. In classification, we create computer programs that can figure out how to divide up the data into different groups.

III. CLUSTERING

A data mining technique called clustering uses an automatic method to create a meaningful or practical cluster of objects with related characteristics. While in classification techniques, objects are assigned to predefined classes, the clustering technique defines the classes and places objects in each class. We can use book management in the library as an example to help make the concept more clear. We can group together books that have certain types of similarities by using the clustering technique.

IV. HEALTH PREDICTIVE MODEL

The work is divided into two sections: the first section deals with factors that influence a patient's heart rate performance; the second section deals with determining how to predict a patient's heart conditions. The predictive model has two main stages:

V. DATA COLLECTION AND PREPARATION PHASE

The community college, computer science, and business administration departments at Najran University provided the data set for this study. The data is made up of 150 Records taken from student results for the academic years 2014–2015 and 2015–2016, and a total of 108 Records representing courses taught over the course of two semesters. The following 12 attributes were chosen for each course: course id, credit hours, practical work (if any), assignments, number of assignments, midterm exam questions, education type, level, study field, and success rate. Additionally, 7 attributes were chosen and recorded for each student. The choice of attributes was made based on how well they could predict the future. To make the analysis process easier, the domain values for some of the chosen variables were defined for the current investigation. To identify the characteristic(s) that clearly affect success rate, course and student attributes are correlated separately. The correlation results for the course's features show a connection between the success rate, practical sessions, and homework assignments. That indicates that a course's success rate will be higher if it has a practical component than if it only has a theoretical component. Additionally, a course that has assignments has a higher success rate than other courses. The quantity of assignments, on the other hand, is negatively correlated with will. Exam scores are most strongly correlated with success rate, followed by mid-grades, attendance, lab work, and finally student performance on assignments, according to student correlation results. Patient Datasets for Heart Disease, Figure 3.34

Attribute	Description	Domain Value
Age	Age in years	20-34(-2), 35-50(-1), 51-60(0), 61-79(1), >79(2)
Chest pain	Chest pain type	Typical angina(1) Atypical angina(2) Non-anginal(3) Asymptotic(4)
BP	Blood pressure	Below 120 mm Hg- Low(-1), 120-139 mm Hg- Normal(0), Above 139 mm Hg- High(1)
Cholesterol	Cholesterol	Below 200 mg/DL-Low(-1),200-239 mg/DL- Normal(0), 240 mg/DL and above -High(1)
Diabetes	Blood sugar	Yes(1) No(0)
ECG	Resting ECG result	Normal(0) ST-T wave abnormality(1) LV hypertrophy(2)
Heart Rate	Maximum heart rate achieved	71 to 202
Physical	Exercise induced	Yes(1)

Fig 3.34 Heart Disease Patient Datasets

VI. DATA ANALYSIS PHASE

Two major steps make up our analysis. The first step is to choose the best mining technique to create the predictive models. Techniques for feature selection, clustering, and classification are all recommended. We take advantage of the results of earlier studies for classification. The two-step clustering technique and the C5.4 algorithm were chosen for the classification and clustering phases, respectively. The ability to divide data based on similarity without having to calculate the necessary number of clusters is the main reason for choosing two steps. In addition to the feature selection algorithm, this algorithm is used to guarantee appropriate attribute selection. The second step involves using the chosen techniques on the data, and the outcomes are then documented. Training and testing sets are created using both student and course data. Training set labels are assigned based on success rate. High and low were suggested as the two classes. The course's steps and the student prediction model are shown in Figure 1. 150 student records and 108 course records make up the total number of records fed to the classifier. Two sets of records—one for training and one for testing—are randomly divided. the data set that was used to build the mining model. the set of tests used to evaluate the model's precision. 40% of all data and records are training data. The results are listed in the section that follows. Results and analysis for estimating course completion rate Course records are fed into the feature selection and two-step clustering algorithms first. Based on stored data, a feature selection technique ranked the provided attributes and features, and then produced the most significant features in descending order. For courses, five features were considered neutral based on their values, and seven features were ranked according to importance. Six of the features for student data were rated as important, one as unimportant, and one as neutral. Note that the feature selection algorithm only labels something as important if the rank is close to or equal to 1, and if that's not the case, it's considered unimportant.

CONCLUSION

The study's main goal is to identify factors that have a significant impact on both student and course performance and to demonstrate the high potential of data mining applications for university management. This refers to the best use of data mining methods and techniques to thoroughly analyze the gathered historical data. The extraction of previously unidentified patterns and the discovery of relationships between various features are two common uses of data mining techniques. In this paper, a straightforward prediction based on data mining

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