



Health Monitoring Using Artificial Intelligence

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ABSTRACT: -

A person's health is one of the most important factors in his or her ability to move forward in life. The goal of the health-care system is to improve the population in the most efficient way possible, given society's available resources and needs. Death rates are rising in the majority of countries due to a lack of timely medical instruments and treatments. By providing standard health care services, these health risks can be avoided. Our Health Monitoring System is a Web Application built with the Flask framework. We used Decision Tree Classification (Supervised Machine Learning technique) in this Health Monitoring System to predict results accurately. To train and evaluate our model, we used our own dataset. We would be able to predict the patient's health level and area of risk based on that evaluation.

Key Words: — Health Monitoring System, Decision tree algorithm, Flask, Risk level.

1. INTRODUCTION

Today's major issue is proper health monitoring. Patients suffer from serious health problems due to a lack of proper health monitoring systems. There are numerous devices available today that can monitor a patient's health via the internet. Health professionals are making full use of these devices to monitor the health of their patients. Machine learning is reshaping the healthcare industry, with hundreds of new healthcare technology companies springing up. In this paper, we will create a Health Monitoring System that records the patient's BMI, age, gender, body temperature, body pressure, pulse rate, whether or not they drink alcohol, and whether or not they smoke. With early risk predictions and appropriate individualised recommendations, this system can help people manage a healthy lifestyle.

To develop a system which is intelligent, automated, personalized, contextual, and behavioral recommendations to achieve personal wellness goals, which also addresses health related problems as a study case, we propose to (a) identify health risk factors, (b) perform data collection from controlled trials, (c) data analyses, and (d) perform a predictive analysis with machine learning algorithms for future health risk predictions and behavioral interventions. This system uses Decision tree classification algorithm which helps in achieving good accuracy and prediction of the patient's health risk level.

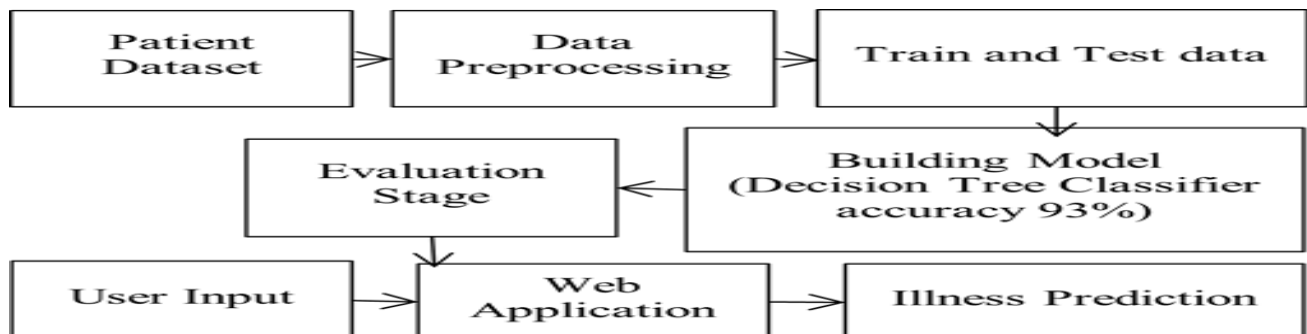


Fig. 1. Health Monitoring Flow Diagram

2. RELATED WORK

Many researchers have worked in various medical fields to develop a better Health Monitoring System that will assist people in staying healthy. This public health issue has been present in almost every other country for the last ten to fifteen years. Obesity and overweight continue to be major public health issues all over the world. It has a low prevalence among pre-school students and women of childbearing age. However, it is rapidly increasing among school students and has a high prevalence among adults, particularly among girls and women with less education or schooling. Several projects on obesity-related risk prediction using machine learning and deep learning approaches to generate useful regression and classification models have been conducted by various research groups.

Kumar et al. used ensemble machine learning for obesity prediction based on the key determinants-age, height, weight, and BMI. This model utilized Random Forest (RF), generalized linear model, and partial least square, with a prediction accuracy of 89.68%. Grabner done a study on National Health and Nutrition Examination Survey (NHANES), National Health Interview Survey (NHIS), and Behavioural Risk Factor Surveillance System (BRFSS) datasets from the 1970s to 2008 to analyse the trend of BMI in the USA over time and across race, gender, socioeconomic background, and status (SES). It was observed that SES–BMI gradients were steadily more significant for women than for men. Seyla studied how to classify obesity from dietary and physical activity patterns using machine learning classification algorithms and, as a result, support vector machine (SVM) outperformed other classifiers. Similarly, Zheng, Meghana, Bassam, Singh, Golino were used so many Machine Learning techniques to predict obesity incidence at the country level, based on countrywide sales of a small subset of food and beverage classes, if increased blood pressure by body mass index (BMI), waist (WC) and hip circumference (HC), and waist hip ratio (WHR), physical activity to balance calories intake and consumption, and classified the various risk and consequences. Many authors agrees that Machine learning are natural extensions to conventional statistical methods. It has become an essential tool for the modern healthcare system. The best rational methods must be utilized to ensure that the result is robust and valid. It is true in healthcare because these algorithms can affect the million lives of people.

3. TRADITIONAL SYSTEM

In the traditional system, the patient needs a particular treatment to get him cured or his state will be more in danger and he can even die. Unfortunately, there are many false reports triggered by the current monitoring systems. In fact, the monitoring system can trigger an alarm that does not indicate a real critical state. But in some cases, they are due to a wrong setting of parameters, or a bad setting of monitoring devices. Besides, the monitoring systems do not consider the relation between the measured parameters. It separately measures each parameter which can lead to false reports. Hence, false reports present a real danger for the patient life. They do not report the real state of patients which can make the monitoring task more complicate. Furthermore, the working condition of the medical staff become more difficult and make patients under more pressure.

4. PROPOSED METHOD

4.1. Dataset Collection

The first step is to create a dataset that will hold the training data for the model. Here, we have created our own dataset which includes parameters such as gender, age, BMI, body temperature, body pressure, pulse rate, alcohol consumer or not, smoker or not, sleep hours and health level which is in the scale 0,1 and 2. If any of the parameters contains null values, those values are dropped from the dataset and perform data preprocessing.

4.2. Dataset Preprocessing



Fig. 2. Data Preprocessing Levels

The collected data are categorized among two groups continuous and categorical. We have used Decision Tree Classifier for training and testing the model. Several selected datasets are small, some are noisy, and the remaining contains a good volume of data to train the model. Data mining was included to filter the data samples from each of the datasets and to discard samples containing outliers. Data mining involves pattern discovery, the calculation of feature association (and correlation), feature selection, classification, clustering, and outlier analysis. After creating the datasets, pre-processed it by Data Visualization (boxplot) for checking the outliers then the categorical columns are encoded using Label Encoding technique.

4.3. Training and Testing

Training and Testing includes splitting dataset for training and testing (80/20). The model is implemented using Decision Tree Algorithm (classifier). Decision Tree Classification is also called CART (Classification and Regression Algorithm) which builds regression or classification models in the form of a tree structure. It breaks down a dataset into smaller subsets and it performs a prediction.



Fig. 3. Model Building Menu Items

4.4. Model Evaluation

After the prediction process, the model is evaluated with the help of classification accuracy metric. Accuracy metric is the fraction of predictions in our model by total number of predictions. When the dataset is tested and predicted, it shows the best solution in the accuracy score of our model has 93%.

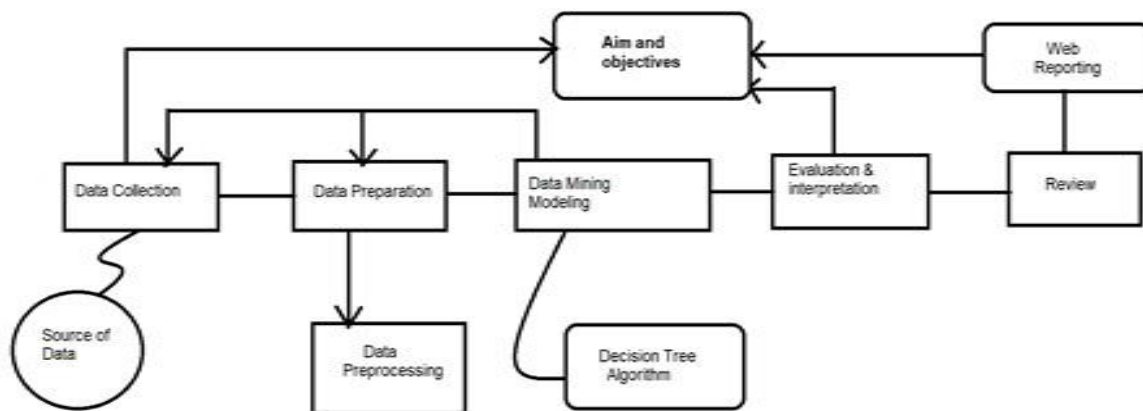


Fig. 4. Flow Chart for Proposed System

After evaluation, we have created a web application using Flask framework where anyone can enter their health details as parameters and get their health risk level in the rate scale of 0, 1 and 2.

5. APPLICATION

Early detection of cardiovascular diseases and chronic diseases, as well as Clinical Decision Support System (CDSS) that can assist physicians, nurses, patients, and other caregivers in making better decisions, are applications of health monitoring using machine learning. Ordinary people can also use this system to determine whether they have a serious health problem and seek treatment by contacting nearby hospitals. Machine learning is reshaping the healthcare industry, with hundreds of new healthcare technology companies .

6. CONCLUSION

AI is present everywhere. It can have a special role in monitoring health of Human beings. Today's major issue is proper health monitoring. Patients suffer from serious health problems due to a lack of proper health monitoring systems.

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