HEALTH TRACKER : A Fitness Application for Indoor Based Exercise Recognition and Comfort Analysis for Diabetic Patients

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Abstract **- Nowadays, more individuals are being diagnosed with diseases that are becoming chronic due to not following the proper diet, not doing proper exercise regularly, or not giving proper attention to the diseases because of busy schedules. Hence, we propose a system that aims at improving the health of the patients suffering from Diabetic by recommending them healthier diet and exercise plans by analyzing and monitoring health parameters and the values from their latest reports related to the disease. We considered patients suffering from either Diabetes. Our System can be essentially useful for the doctors to recommend diet and exercise based on their latest reports and personal health details. For this, we have broadly classified our system into 2 modules: 1. Health Monitoring, 2. Diet & Exercise Recommendation. In the Health Monitoring module, the system would suggest follow-up sessions until the reports come normal. For the Diet and Exercise Recommendation module, the algorithm that is used is KNN for classification which provides 97% accuracy.**

I.INTRODUCTION

In this project, we have modeled a health Monitoring system with Diet and Fitness recommendation. We are specific to Diabetes; Diabetes is most widely spread across the people which require proper health monitoring and treatment. The recommendation system will provide information based on user requirements and constraints. We divided our system into 2 modules 1. health Monitoring System 2. Diet & Exercise Recommendation. For Diet & Exercise Recommendation module, the KNN classifier is used. It has additional features like pre pruning, handling continuous attributes and missing values, and rule induction which helps in the accuracy of the model than a decision tree classifier.

A Personalized healthcare recommendation system consist of diet and exercise mainly considering user's profile and accordingly the food items are suggested. The food item varies for diabetes diseases. But the purpose of our diet and fitness recommendation is to make sure that it is adaptable and practical to users.

In recent year, Monitoring blood sugar helps to determine if you are meeting your glucose targets which helps to reduce the unpleasant symptoms of high and low blood sugar and avoid long-term diabetes complications.

II.EXISTING SYSTEM

Health care recommendation system was built using ontology framework for food and exercise recommendation. Decision tree algorithm was used for getting user's information from the dataset. Four different algorithms (k- nearest neighbors, Support vector machine, Random Forest, AdaBoost) were used and among this Random Forest gave more accuracy and score than other three, i.e. 60 to 70 % for health monitoring that checked the patient's ECGs suffering from LQTS genetic disorder and identified patients with a high risk of cardiac events. Data analysis was done using different machine learning models like Random Forest, Support vector Machine, and Deep learning for remote health monitoring for Elderly People.

The system extracts the features from UCI chronic kidney data set which was responsible for chronic kidney disease, After that, ML automated the classification of different stages in the CKD with respect to its severity. A web-based diet recommendation system using Health Calabria Food Database claims to improve the health of people affected due to chronic disease. Recommendation system was built for amateur as well as professional runner, which gives recommendation to the users by

suggesting their diet and workout that will suit them, based on the inputs they provide on the system using Social Semantic Web.

A. Disadvantages of Existing System:

All the existing approaches is implemented as desktop/web application, which is not supports for the mobile.

It consumes more time to train the model and Most of the system gives less accuracy in recommendation of exercises.

III.PROPOSED SYSTEM

We propose a machine learning approach based on KNN to recommend the exercise for the diabetic patients, which supports for android application.

In recent year, Monitoring blood sugar helps to determine if you are meeting your glucose targets which helps to reduce the unpleasant symptoms of high and low blood sugar and avoid long-term diabetes complications.

The aim of the project is to build a mobile application automatically recommend exercise for diabetic patients, to monitor the diabetic patient's activity and to help diabetic patient to know the exercise

IV.SYSTEM ARCHITECTURE

The system "design" is defined as the process of applying various requirements and permits it physical realization. Various design features are followed to develop the system design specification describes the feature of the system, the opponent or elements of the system and their appearance to the end-users

Fig 1: System Architecture

In the above figure shows the proposed machine learning framework based KNN workout recommendation system. In the first step, data gathered from the user. To beat this trouble and provide data trends, collected data must go through a cleaning process. This process includes data transformation, metadata enrichment exploitation, exploration or removing unnecessary or invalid data that is not required to obtain data trends, then data validation. Then we are applying KNN algorithm to get the recommendation.

V.METHODOLOGY

K-nearest neighbors is a supervised machine learning algorithm. A supervised machine learning algorithm's goal is to learn a function such that f(x)=Y where X is the input, and Y is the output. KNN can be used for classification as well as regression. In this article, we will only talk about classification. Although for regression, there is just a minute change.

The properties of KNN is that it is a lazy learning algorithm and a non-parametric method. Lazy learning means the algorithm takes almost zero time to learn because it only stores the data of the training part. The stored data will then be used for the evaluation of a new query point.

In the training phase, the model will store the data points. In the testing phase, he distance from the query point to the points from the training phase is calculated to classify each point in the test dataset. Various distance can be calculated, but the most popular one is the Euclidean distance.

Euclidean distance between a query point(q) and a training data point(p) is defined as:

$$d(\mathbf{p},\mathbf{q}) = d(\mathbf{q},\mathbf{p}) = \sqrt{(q_1 - p_1)^2 + (q_2 - p_2)^2 + \cdots + (q_n - p_n)^2}$$

$$= \sqrt{\sum_{i=1}^{n} (q_i - p_i)^2}.$$

A) Limitation of KNN

Time complexity and space complexity is enormous, which is a major disadvantage of KNN. Time complexity refers to the time model takes to evaluate the class of the query point. Space complexity refers to the total memory used by the algorithm. If we have n data points in training and each point is of m dimension. Then time complexity is of order O(nm), which will be huge if we have higher dimension data.

Therefore, KNN is not suitable for high dimensional data.

B) Real-world application of KNN

1) KNN can search for semantically similar documents. Each document is considered as a vector. If documents are close to each other, that means the documents contain identical topics.

2) KNN can be effectively used in detecting outliers. One example Credit card fraud detection.

V. SYSTEM TESTING

The Purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, sub-assemblies, assemblies and a finished product. It is the process of exercising software with the intent of ensuring that the software system meets its requirements and user expectation and does not fail in an unacceptable manner.

A) Types of testing

1. Unit Testing:

Unit testing involves the design of test cases that validate that the internal program logic is functioning properly, and that program inputs produce valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application . It is done after the completion of an individual unit before integration.

2. Integration testing:

Software integration testing is the incremental integration testing of two or more integrated software components on a single platform to produce failures caused by interface defects.

3. Functional test:

It provides systematic demonstration the functions tested are available as specified by the business and technical requirements, system documentation, and user manuals. Organization and preparation tests are focused on requirements, key functions, or special test cases.

4. System Test:

System testing ensures that the entire integrated software system meets requirements. It tests a configuration to ensure known and predictable results. An example of system testing is the configuration-oriented system integration test. System testing is based on process description and flows, emphasizing process links and integration points.

5. White Box Testing:

It is a testing in which the software tester has knowledge of the inner workings, structure and language of the software, or at least its purpose. It is used to test areas that cannot be reached from a black box level.

6. Black Box Testing:

It tests the software without any knowledge of the inner workings, structure or language of the module being tested. Black box tests, as most other kind of tests, must be written from a definitive source document, such as specification or requirements document. It is a testing in which the software under test is treated, as a black box. You cannot “see” into it. The test provides inputs and responds to outputs without considering how the software works.

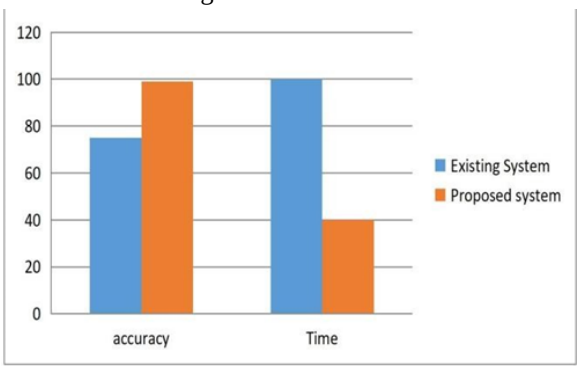

Fig 2:Performance Evaluation

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