TotalHealth: An Android Application to help you achieve Fitness Goals.

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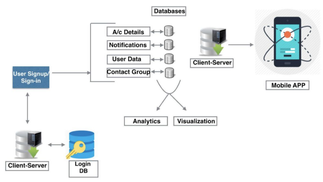
Introduction

Health has always been a prime concern for everyone. The gradual deterioration of health in an environment of rigorous professional wing is of critical concern The need of the hour is to encourage healthy lifestyle choices, maintain the calorie intake, and a workout routine. Chronic respiratory illnesses, and diabetes, are the primarily causes of death in the world. The mortality rate from chronic diseases is of about 68% of the world's population[1]. Health concerns have led to the rise of applications that focus on systematic improvement of physical and mental health.Hence ,the prime objective of this project is to develop an android based application to acquaint users with regard to tracking their calorie intake and burn-out along with maintaining their nutrient needs. Some of the features that this application should includes are customized diet plans, workout programs uniquely designed for the user, daily activity tracking, community based aspect and a simple user interface design.

Methodology

Method Outline

In this project, we propose an Android based Application to monitor fitness and routine of an individual using Machine Learning Algorithm i.e. Weighted Majority Algorithm. The key feature of our application is to provide the user with an estimate of the number of days to reach their goal. The application provides vivid feature of customizing their goal, along with monitoring their diet with standards on par with USDA. The current state of art provides application to monitor workout routine, but lacks the provision to provide an estimate to proffer the duration for destination goal along the lines of BMI and WHR analysis.



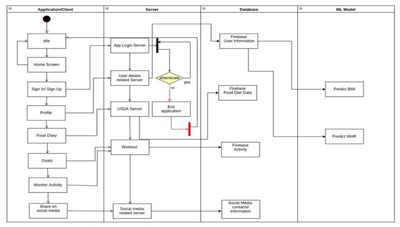
System Architecture Overview

Our key contribution to this development of application is as follows (i) Developed an application with customized goal/target along with dietary monitory. (ii) Geolocation based sensor that will track the user's steps towards goal (iii) BMI and WHR based calculations along with estimation to duration (in days) to reach the target or goal. This project works on the style of Client-Server Architecture, and Android SDK using the Page Object Model with development aspects.

Methodology

The major components of the proposed system are as follows:

1. Application/Client: The application presents an abstract to the user, and comprises of all the web pages, defined in the server for user interactivity and functionality.
2. Server: The server provides a function definition and all the links to API being called in the application. We use Google API for geolocation access and to provide user with motivational videos from YouTube.
3. Database: The database comprises of fragments relating to user information, calorific data of food intake, continual activities input, and social media contact information all using Firebase.
4. Machine Learning Model: The Weighted Majority Algorithm suggests the User about the estimation of duration to reach goal.



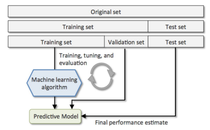
System Components and Flow

The Local Server is essentially responsible for drawing the previous state of the application and displaying the data in cache to the user. The goals are customizable and will be updated only upon request. Google API and RESTful services are used to provide the user with interface from Google/Facebook Login, video tutorials from YouTube. Also, the calculation of BMI and WHR are performed by the server that yields a static value call from different classes for the purpose of communication between interfaces[3].

Process

The process of implementation revolved around gathering requirements, settling up SDK for building Total Health, and deployment. The most critical requirements are (i) Setting up the user goals/target (ii) Managing continuous user input (iii) Database Integration, and (iv) Training the Algorithm with Data Sets for Weighted Majority Algorithm.

The Data Sets are an important part to train the Algorithm. The data-set used in Total Health is from Kaggle[2] to make the application have intelligence of its own by applying operations to data like cleansing, formatting, feature extraction, and visualization.



Machine Learning and Data Set Integration

Technology Descriptions

This section covers the different technologies that we have included in developing the application Total Health.

Client Technologies :

Machine Learning Technologies:

Database and Server Technologies:

Firebase

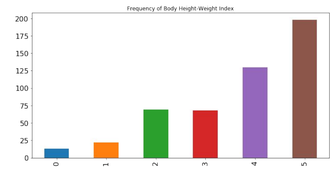
Analysis and Results

Comparing the performance of the classification model for the data set:

Classification Model	% of correct predictions	Mean	Standard Deviation
(1)K-NN Classification	85%	0.8228994082107048	0.04274651325985314
(2)Naive Bayes	67%	0.7154329627628728	0.06052155443975069
(3)Random Forest	89%	0.8479215672668818	0.04255105534539179
(4)XGB Classifier	82%	0.8490967902617454	0.047523062588980536

On comparing all the models performance from it's confusion matrix and through k-fold cross validation method we shall select the most suited model i.e, Random Forest, which has the highest accuracy of 89% for the prediction of the data.

Analysing the datasets using a bar plot and finding the frequency of body height-weight index :



The reference index used in the above plot describes people who are 0 - Extremely Weak, 1 - Weak, 2 - Normal, 3 - Overweight, 4 - Obesity, 5 - Extreme Obesity.

Preparing and splitting data as 80% training data and 20% testing data.

Summary/Conclusions

This application has been developed with the view of tracking the record of personal fitness of the user. The application has been designed with a view of modularity, scalability and lightweight. The code designing has been done in Android Studio with Java as the programming language. The application compares this feed with the USDA data and informs the user about his daily calorie intake. Thus, by keeping a track of the activities and the calorie intake the application helps the user to achieve desired fitness.

Key References

[1] Rebolledo-Nandi, Z., et al. "Design of a versatile low cost mobile healthcare monitoring system using an android application." Health Care Exchanges (PAHCE), 2015 Pan American. IEEE, 2015.

[2]Kaggle.com. (2019). *500 Person Gender-Height-Weight-Body Mass Index*. [online] Available at:https://www.kaggle.com/yersever/500-person-gender-height-weight-bodymassindex [Accessed 2 May 2019].

[3] Bajaj, Deepali, et al. "Android based nutritional intake tracking application for handheld systems." 2017 8th International Conference on Computing, Communication and Networking Technologies (ICCCNT). IEEE, 2017.

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