

ACTFIT(Health Analysis Based on Activity Recognition)

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Abstract— This document will be used in development of application which will keep track of the user’s physical activities and collect physical information like calories burnt, steps walked etc. also to use the application as a personalized health trainer and provide fitness guidelines to user. Activity Recognition using smart phone sensor is the progressive development in the mobile phone technology. With improvement in the sensors and lowered cost of smart phones, the application will come useful to many users globally.

Key words: Smartphone, Activity Recognition, Contextual App, Health Trainer

I. INTRODUCTION

Mobile applications are software programs that run on Smartphone and other mobile communication devices and they can also be accessories that attach to a Smartphone or other mobile communication devices, or a combination of accessories and software.

Mobile medical applications are medical devices that are mobile apps, meet the definition of a medical device and are an accessory to a regulated medical device or transform a mobile platform into a regulated medical device.

Our contribution is the application that would calculate energy consumption, collect health information like weight, height etc. and give alert and statistics of health conditions plus fitness tips what user needs to do for maintaining his health using tools available in an android enabled mobile device.

Consumers can use both mobile medical applications and mobile applications to manage their own health and wellness such as to monitor their caloric intake for healthy weight maintenance.

II. EXISTING SYSTEM

Many existing Health equipment like pedometer -that counts each step a person takes by detecting the motion of the person's hips, physical device like treadmill etc. is not feasible to handle [2]. The health industry is responding to the increasing popularity and availability of technological innovations, such as tablets and Smart phones [1]. Health and wellbeing applications are estimated to make up approximately 30% of new smart phone apps currently being developed. Healthcare professionals, mobile or tablet apps also have enormous potential for training and professional development.

III. PURPOSE OF PROPOSED SYSTEM

First the application will collect certain basic information regarding health like Age, Sex, height and then other information like sugar level, blood pressure, eye no etc. and in response will decide on a approach for the person . The application will collect information using environmental sensors [3].The activity would be recognized by using algorithms that uses sensor values to predict the calories

consumed. Using periodic collection of data the application will provide regular insights into most of the physical activities and fitness guidance to the user.

IV. DATA FLOW

The application will start with login page where user will register. The registration page will appear only once and if the user logouts then page is redirected to login page once again. Age, height, weight and gender will be taken as input and BMI of user is calculated. The User can choose any of the Physical activity like Walking, Push-ups, skipping, free-hand squats etc. Walking activity calculates the number of steps and the total number of users and calculates the number of calories burned by user. If user selects the push-up activity then number of Push-ups done by user is displayed and calorie burned by user is calculated. Skipping activity calculates the number of skips done by user and calorie burned by user. In week log option, weekly log of activities performed by user is shown. User can log out and he/she will be redirected to the login page. User can clear history of activities. The User will get fitness tips for his daily schedule for maintaining his good health.

Finally after performing all the activities the user can share with his friends, his activities, using third party apps installed on the phone. User can discard the recorded activity to start afresh or leave the activity to go back to menu.

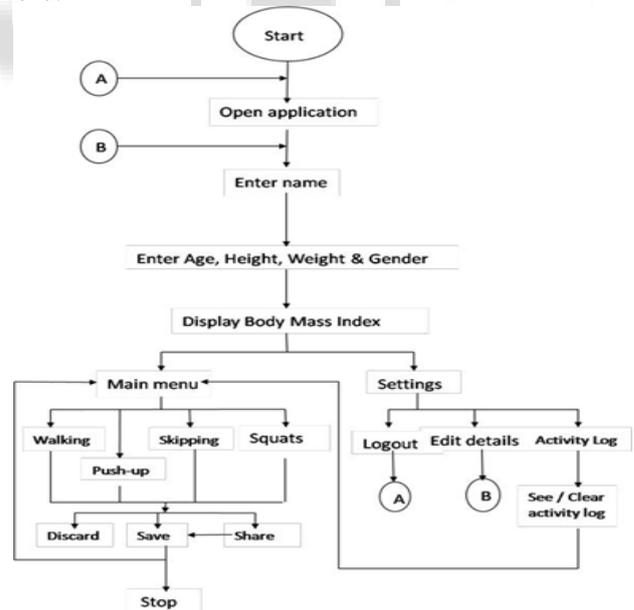


Fig. 1: ACTFIT version 1

V. DESIGN AND ANALYSIS

The description of the design of experiments which helps for performing activity recognition from smart phones is described in this section. By describing the set of activities and the data collection process for this work we start in the beginning. We then describe the features and finally the

machine learning algorithms that were used for performing the task.

A. Data Collection

The data collection was done by performing experiments by 4 undergraduate students of PVPP College of engineering from Mumbai University. Subjects work an Android 6.0 operating system-based Motorola Captivate™ smart phone that contained a tri-axial accelerometer and gyroscope. The location and orientation of the phone was not standardized and was left to the convenience of the subject. Each subject carried the phone while performing the different activities. The place where the mobile phone was placed varied from activity to activity. We created an application that stored the sensor data while the subject performed the activities. The application permitted us to control the sensor type from which the data was collected of the sensor. Subjects controlled the data that was being collected through the application (Figure 1) we created that executed on the phone.

The application also allows the subjects to input the age, sex and height of subject wearing the phone. The application also allows the subjects to input the activity that they are about to perform along with the ability to start, stop and reset recording the sensor data. Though, we collected this information, we did not use it the current study.

B. Activities

Activities were divided into two categories: accelerometer and proximal aided. Accelerometer aided activities used series of multiple accelerometer reading whereas Proximal activities consist of a proximity sensor. Subjects performed these activities in variable amounts and in various environments; the action, location, and length of performance was not controlled. The accelerometer aided activities included running, walking squats standing and walking. In addition, we also wanted to test the possibility of detecting the smart phone not being worn by the subject. Every subject also performed a set of proximal activities wearing the smart phone. The subjects repeated execution of these complex activities five times. The complex activities had definite starting and finishing points and lasted until the subject completed them. The Proximal activities consisted of: Push up: Subject performed push up Activity. We call this activity as phone not on person. While some of the simple activities also feature on the list of activities of other researchers, our list contains additional activities such as jogging, lying, skipping that not has been studied before.

C. Extraction of Features

The three axes of acceleration are dependent upon the orientation of the phone. Raw data is collected as a series of instances containing a timestamp, three values corresponding to acceleration along the x-axis, y-axis, and z-axis, and a second set of three orientation values representing azimuth, pitch, and roll. The sampling rate varies because of this but can reach a maximum of 80 Hz. The x-axis runs parallel to the width of the phone, the y-axis runs the length of the phone, and the z-axis runs perpendicular to the face of the phone. Rather than a set sampling rate, the accelerometer in this Android phone triggers an event whenever the accelerometer values change. The rate of events can be set to one of four thresholds:

fastest, game, normal, and UI, with fastest being the fastest sampling rate and UI being the slowest. The phone used for this experiment was set to fastest as shown in Figure 2.

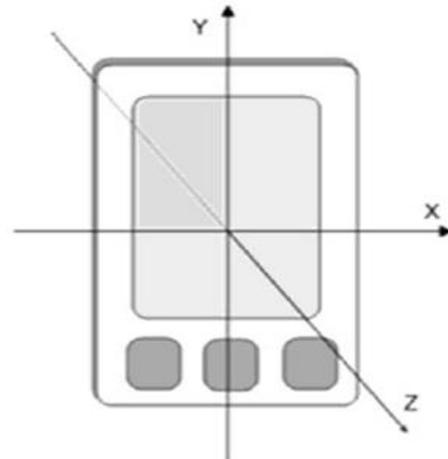


Fig. 2: Phone axis of X, Y and Z plane

VI. RESULTS

In a classroom with minimum external disturbance the activities were performed and the reading was obtained and with respect to the average of 5 repeated activity which were performed the result was calculated on. The results were collected from MOTO G 3 gen and the results were saved into a log on the laptop.

A. Activity-Jumps

Ideal	Practical
10	09
50	42
75	70

Table 1.

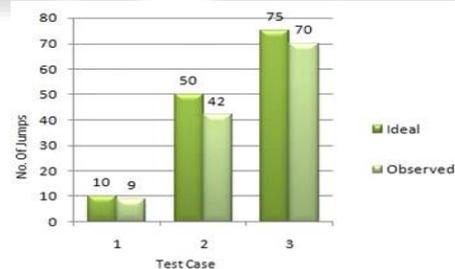


Fig. 3: Graph of Jumps – Ideal v/s Practical

B. Activity – Push Up

Ideal	Practical
11	11
51	48
76	71
101	94

Table 2.

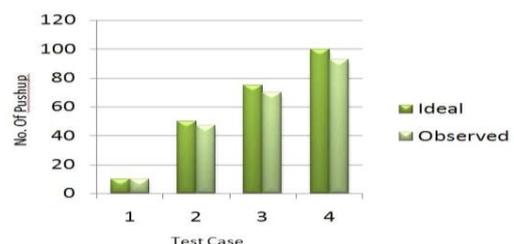


Fig. 4 – Graph of Pushups – Ideal v/s Practical

C. Activity- Walk

Ideal	Practical
26	21
51	43/41
76	53/60
101	80/77

Table 3

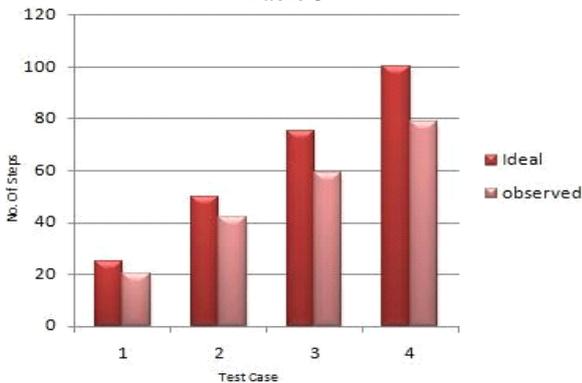


Fig. 5: Graph of Steps – Ideal v/s Practical

D. Activity- Squats

Ideal	Practical
11	11
21	21
31	30
41	38
51	49

Table 3.



Fig. 6: Graph of Squats – Ideal v/s Practical

VII. CONCLUSION

The widespread adoption and use of mobile technologies is opening new and innovative ways to improve health and health care delivery. Mobile applications (apps) can help people manage their own health and wellness, promote healthy living, and gain access to useful information when and where they need it. These tools are being adopted almost as quickly as they can be developed. These users include health care professionals, consumers, and patients.

Other benefits with Health apps are as follows:

- 1) To Help patients/users self-manage their disease or condition without providing specific treatment suggestions;
- 2) To Provide patients with simple tools to organize and track their health information;
- 3) To Provide easy access to information related to health conditions or treatments;

- 4) To Help patients document, show or communicate potential medical conditions to health care providers;
- 5) To Automate simple tasks for health care providers;
- 6) To Enable patients or providers to interact with Personal Health Records (PHR) or Electronic Health Record (EHR) systems.

Our Application will help adapt better lifestyle for the users especially those who are athletes, go to gym and are suffering from physical issues like obesity, cardiovascular diseases etc. The use of sophisticated algorithm and improved hardware tools can help achieve better and more accurate health information and very easily.

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