MID-PROJECT REVIEW

HEART-FIT

GROUP 3

The proposed application, Heart-Fit, is a health application, which takes in a user's workout goal and accelerometer data, and returns real-time messages to increase or decrease workout intensity, so that the user can meet their desired goals. Heart-Fit, we believe, will appeal to a large user base. Doctors may advise patients to stick to moderate or light exercise when recovering from injuries, dealing with chronic illness, or incorporating movement during pregnancy or old age. On the other hand, many avid workout enthusiasts may want to increase their workout intensity; including, athletes training to hit certain goals, marathoners, or those looking to lose weight and improve overall fitness. Heart-Fit will track the user's accelerometer data from a wearable or mobile device during their workout session to determine if the user's workout falls within a light, moderate, or vigorous workout classification, show visualizations of workout data, and send messages to slow down or put in more effort accordingly.

Our project timeline includes four steps: data collection, creation of classifier, testing classifier, and output of application. We first created a categorization for acceptable light, moderate, and vigorous workout activities. Activities such as stretching and walking are considered light movement; jogging and stair-climbing as moderate; running and jumping-jacks as vigorous. For consistency purposes, we decided to have one member gather data. The data was collected via the Sensor Logger application on a mobile device, with the user holding the device vertically in the palm of their hand while conducting all six exercises. We have collected three recordings for each workout activity for about 60 to 90 seconds each (eighteen recordings

in total). We first collected data on walking, jogging, and running at 1.0 mile per hour, 4.0 miles per hour, and 7.0 miles per hour, respectively, with an incline of 0. Next, we collected data by repeatedly going up two flights of stairs. Lastly, we collected data doing jumping jacks, and stretching, holding the phone by the wrist of the right hand at all times.

When initially looking through the accelerometer data we found that there is progression in high movement variability, especially shown in the magnitude data. However, there is high variability in the type of graph for a single intensity classification. For example, although both running and jumping jacks are associated with vigorous intensity, both graphs look very different from each other. Our next step is developing a classifier, and feeding our data through the algorithm in order to sort given data as light, moderate, or vigorous. We first need to remove noise from the readings, using a notch filter. Then, we plan to look through the acceleration force, number of steps, and dominant frequencies. Once we have a working prediction algorithm, we can use methods of data analytics, such as creating a confusion matrix, and calculating precision, recall, and accuracy, to get an idea of how well our classifier actually works. We will collect more training data as necessary, and continue to refine the classifier as needed.

We hope to complete our classifier by next week, and move on to collecting test data. Once the test data is also proved to be sorted with high precision and accuracy, we can implement visualizations such as trees, graphs, and histograms. We will also then work on the usability aspect: ask the user for workout intensity goal, list instructions for taking appropriate sensor readings, and create accurate, real-time pop-up messages regarding increasing or decreasing energy expenditure during the workout. I believe these aspects will take the remaining two-three weeks to complete. We plan to visit office hours as needed and put together

the various concepts we have been taught in this course. We hope to end with filtered accelerometer data, a working classifier, and a usable, helpful product at the end of this course.

THANK YOU

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