Introduction

- Smart phones are growing tremendously. People use these smartphones to perform various tasks which makes their life easy.
- Sensors available in the smartphones such as gyroscope, accelerometer, GPS etc., can be used to track even a small movement of a user.
- Many devices available which help people to track the activity they are doing such as, number of steps taken by the user, calories burnt etc.
- These devices are proved to work best, but they do have drawbacks such as they are huge, position specific etc.,

Goal

The goal for this project is to develop an android application that tracks and notifies the following to the user:
- Detect simple activities performed by the user like sitting, standing and walking.
- Use only accelerometer sensor to detect activities.
- Duration of each activity performed.
- Quickly identify the change in activity and notify the user.

Application Screenshot

![Application Screenshot](image)

*Kindly ask for demo

Approach

System Design

Step 1: Collect data.
Step 2: Collected data sent to server.
Step 3: Pre-process raw data.
Step 4: Classification.
Step 5: Classification Result.
Step 6: Result sent back to mobile phone.

- Chose four widely used classification algorithms suggested by previous researchers [1], [2], [3] and [4]:
  - J48
  - Naive Bayes
  - Random Forest
  - K-NN
- Data from only accelerometer sensor is collected to detect human activities.
- Divided the collected data into samples of 150 instance and extracted four features from raw data.
- These four features are proved to be enough to predict activities [3] and [4]. They are:
  - Minimum Amplitude
  - Max Amplitude
  - Fundamental Frequency
  - Average acceleration

Experiment Details

Mobile Phone Placement on Participants

- Shirt pocket
- Pant Pocket
- Hand

Activities Performed:

- Walking
- Standing
- Sitting

Participant Details

<table>
<thead>
<tr>
<th>Participant</th>
<th>Height</th>
<th>Age</th>
<th>Body Type</th>
<th>Outfit</th>
</tr>
</thead>
<tbody>
<tr>
<td>One (Male)</td>
<td>5'11</td>
<td>23</td>
<td>Normal</td>
<td>Causals</td>
</tr>
<tr>
<td>Two (Male)</td>
<td>5'10</td>
<td>24</td>
<td>Thin</td>
<td>Causals</td>
</tr>
<tr>
<td>Three (Male)</td>
<td>6’</td>
<td>25</td>
<td>Normal</td>
<td>Tracksuit</td>
</tr>
<tr>
<td>Four (Male)</td>
<td>6’2</td>
<td>25</td>
<td>Thin</td>
<td>Formals</td>
</tr>
<tr>
<td>Five (Male)</td>
<td>6’2</td>
<td>24</td>
<td>Obese</td>
<td>Causals</td>
</tr>
</tbody>
</table>

Experiment Mobile phone specification

<table>
<thead>
<tr>
<th>Model</th>
<th>OS Version</th>
<th>ROM</th>
<th>RAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTC One</td>
<td>4.2</td>
<td>32 GB</td>
<td>2 GB</td>
</tr>
<tr>
<td>Nexus 5</td>
<td>4.4</td>
<td>32 GB</td>
<td>2 GB</td>
</tr>
<tr>
<td>Samsung galaxy S6</td>
<td>5.0</td>
<td>32 GB</td>
<td>3 GB</td>
</tr>
<tr>
<td>Samsung note</td>
<td>4.4</td>
<td>32 GB</td>
<td>3 GB</td>
</tr>
</tbody>
</table>

Data collection process

- Each participant had different walking, sitting and standing style.
- Data for sitting, standing and walking activities were collected by placing the phone inside participants pant pocket and shirt pocket. Participants were also asked to hold their mobile device in their hand while walking.
- Each activity was asked to perform for a minimum of 2 minutes and repeated thrice for each activity.

References

1. Akram Bayat, Marc Pomplun, Duc A. Tran Gaelano, A Study on Human Activity Recognition Using Accelerometer Data from Smartphones, MobiSPC, 2014.
3. Savvik Das, LaToya Green, Beatrice Perez, Michael Murphy, Detecting User Activities using the Accelerometer on Android Smartphones, July 2010.