Homework Assignment 2: Part A – Android App Development

Steps from Path with Map

Due: Dec 6, 2022 (Tue) 11:59pm

In this assignment, you will implement the Google map feature into an app which will display Steps walked during an exercise along a path.

We assume that your exercise data such as distance/pace of exercise, GPS of walk-through path etc. as well as information like gender and height are stored on Internet in a web server using JSON format. Your app should download the data and display the information.

Steps walked during exercise can be obtained by different formula. In this assignment, we use the formula came from ACSM's Health & Fitness Journal as below[1]:

For men:

Steps per mile = 1916 + 63.4×**pace**$_{(min/miles)}$ – 14.1×**height**$_{(in)}$

For women:

Steps per mile = 1949 + 63.4×**pace**$_{(min/miles)}$ – 14.1×**height**$_{(in)}$

Google Maps API provides enormous support to developers so that they can embed a map view in their app easily, but at the same time showing great map features to the user. Adding map view to your own program is in fact quite easy. But to do this, you need to go through several steps.

1. Register for your use of Map API in Google and obtain the key. You should follow the procedure listed here: https://developers.google.com/maps/documentation/android-api/start
2. Note the library being added for the use of Map, as well as permissions needed in this assignment.

Requirements

We assume in this exercise that the app will collect a set of data from Internet server in JSON format. The data contains walking distance, gender, height, walking pace, and an array of GPS point covers the walking.

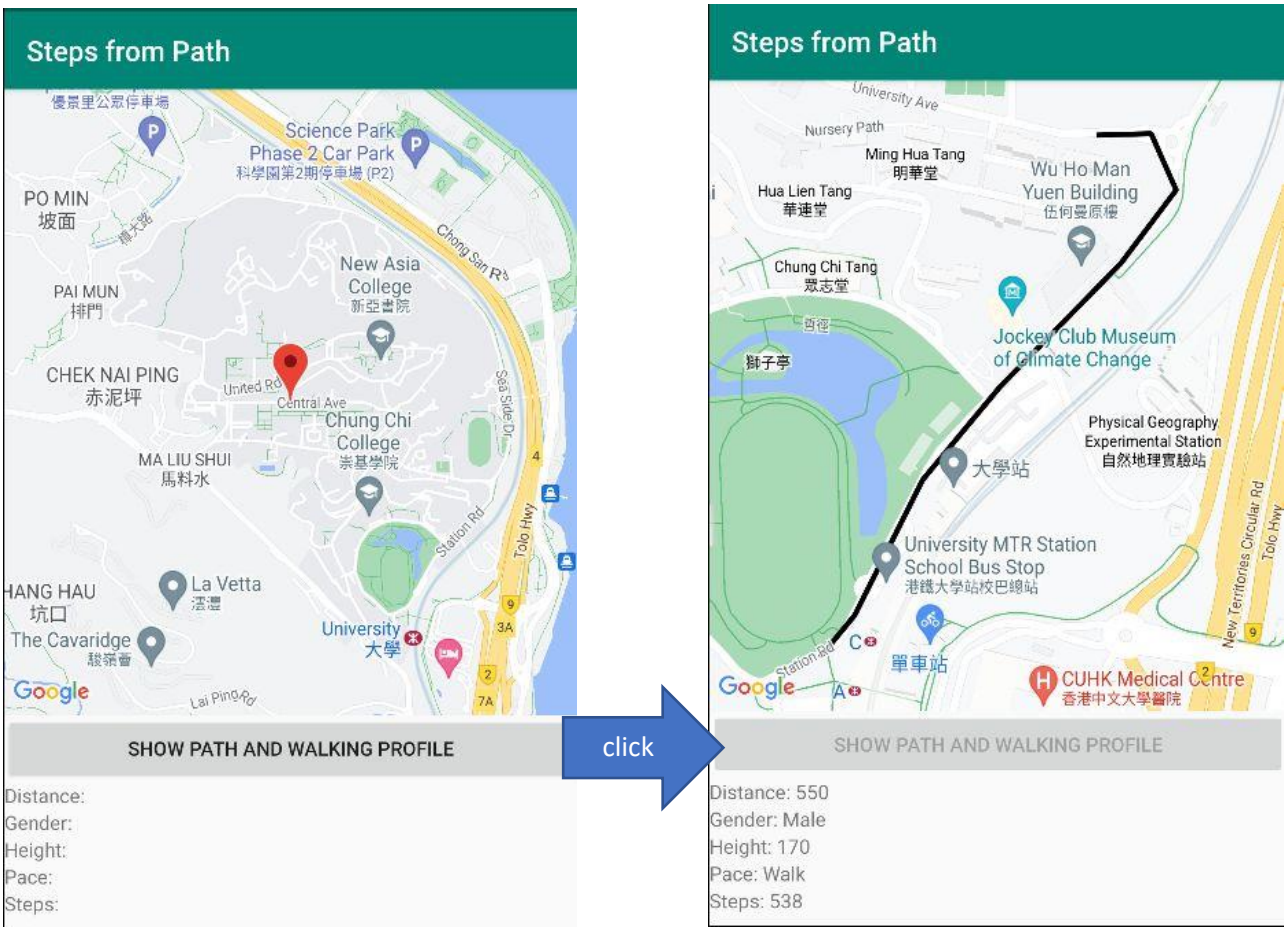
It is recommended you open a new project to try the Google Map Android API v2 tutorial to understand the properties of Google map. Once you have the confident in working on the map, you may proceed to work as follows:

1. Download a Starter Project (**StepsFromPath-Starter**) from Blackboard.
2. Get your Map key (it starts with "AIza") ready, replace the "**google_maps_key**" string in **google_maps.api.xml (debug)**. After this step, you should see an embed map in your app showing our CUHK campus with one single marker.
3. The app got only one single screen, initially showing the map on top. Create extra UI widgets: a **Button** below for getting the walking profile, as well as other **TextView**s for displaying information at the bottom.

4. For simplicity, a default link is stated inside **MapsActivity.java** for getting the JSON content. Your app should go and get the content by clicking a Button below the map.
5. The data from the web server consists of following fields:
   gender: string ("Male" or "Female"), **height**: int (in cm), **distance**: int (meters), **pace**: string ("Walk", of a pace of 9min/miles) or "Jog", of a pace of 12min/miles), **Lat**: double array, **Lng**: double array; an example is as follows:


```
{"distance":550,"gender":"Male","height":170,"pace":"Walk",
"Lat":[ 22.413970,22.414264,22.414762,22.415210,22.415856,22.416148,22.416721,22.417233,22.41762
6,22.417617],"Lng":[114.209694,114.209956,114.210219,114.210469,114.211049,114.211356,114.211963
,114.212380,114.212191,114.211784] }
```


6. The app should then construct the path, display basic information, do steps calculations (You may assume 1 mile = 1069m while 1 inch = 2.54cm in the unit conversion), and show the result; the **Button** should be disabled after the click.
7. Your program should draw the path with default **black** in color on the map. Your app should then position the camera in the map view that showing the whole path with a padding of 100 pixels. (Hints: Arrays.sort() should be useful for computing the bounding Lat-Lng pairs)
8. Steps walked should be displayed as **integer**.



You should construct your app layout like above in that Distance, Gender, Height and Pace are displayed together with calculated Steps. We will check your app by different data sets.

References

1. ONE-MILE STEP COUNT AT WALKING AND RUNNING SPEEDS, ACSM's Health & Fitness Journal: January 2008 - Volume 12 - Issue 1 - p 14-19 (https://journals.lww.com/acsm-healthfitness/Fulltext/2008/01000/ONE_MILE_STEP_COUNT_AT_WALKING_AND_RUNNING_SPEEDS.7.aspx)
2. To do JSON parsing in Android, you may check this link: https://stackoverflow.com/questions/2591098/how-to-parse-json-in-java
3. To draw a line in GoogleMap, please check out the following tutorial https://github.com/googlemaps/android-samples/tree/master/tutorials/java/Polygons
4. Setting the bounds of the GoogleMap https://developers.google.com/maps/documentation/android-sdk/views#setting_boundaries
5. Sorting an array via java.util.Arrays https://www.geeksforgeeks.org/arrays-sort-in-java-with-examples/

Submission

You should pack all your program and related files e.g., string file, Gradle settings etc. into a file named **bmeg3130_asg2_partA**.zip (or rar file) and submitted it into our assignment collection slot in Blackboard system before the deadline, **Dec 6, 2022 11:59pm**.

Late submissions will risk a mark deduction from 10% to 30% if they are being done within 48 hours after the deadline. Submission later than **Dec 8, 2022 11:59pm** won't be considered.

Possible Extension

You may consider setting up a web server via **Anaconda** and **Flask** (as instructed in tutorial) and publish a JSON walking path via Python to the localhost of the machine, i.e. http://10.0.2.2:5000/me. This implementation would be useful for your course project as you may want to publish other form of data from a server for your client app to read and display.