

# Location Plotting:



Welcome to this fun practical task. The objective of this task will be to plot real location data (GPS co-ordinate points) onto a map.

If you have an Android phone with Location tracking enabled, Google will already be periodically collecting your location history. In this task, we will plot this data onto a map so that you can analyse your movements. We have provided you with a random person's location data, but it is very easy for you to obtain your own location data (this is described at the end of this document).

The actual plotting of the data will be performed by a program written by James Snowdon (<https://github.com/snowdonjames/LatitudeHistoryPlotter>) However, in order for us to use his program, we need to convert the location data obtained from Google into the required format. We have given you this program, and named it "mapPlot.py." You are free to look at how it is implemented.

Specifically, we need to convert the location data from JSON (which Google uses) to KML (which the location plotting program requires).

## Task 1:

Install the Python Imaging Library (Pillow). This is needed to generate the maps. Have a look at "bareMap.png". This is the map onto which our data points will be plotted onto and joined together.

## Task 2:

Review the code in example.py to understand how JSON works. So now that you know how to parse (read and interpret) JSON files, we need to output as KML so that we can give the data to the plotting program. For a more detailed discussion on KML, refer to [https://developers.google.com/kml/documentation/kml\\_tut](https://developers.google.com/kml/documentation/kml_tut)

## Task 3:

You need to parse the JSON data file from Google, which we have provided as "LocationHistory.json" and convert it to KML. If you look at LocationHistory.json, you will see that there is an array of "data" items. Attributes which we are interested in are "timestampMS", "latitude", "longitude" and "accuracy."

Concretely, you need to output a file, "location.kml" which is of the following format:

```
<?xml version="1.0" encoding="UTF-8"?>
<kml xmlns="http://www.opengis.net/kml/2.2">
  <Document>
    <name>Location History</name>
```

...

*This block needs to be iterated for all the data items*

```

<Placemark>
<TimeStamp><when>the "timestampMS" value from the JSON data item</when></
TimeStamp>
<ExtendedData>
<Data name="accuracy">
<value> the "accuracy" value from the JSON data item </value>
</Data>
</ExtendedData><Point><coordinates>"longitude,latitude"</coordinates></Point>
</Placemark>

....

</Document>
</kml>

```

This is an example of the output of the first two entries. You will need to do this for all the entries in the JSON file.

```

<?xml version="1.0" encoding="UTF-8"?>
<kml xmlns="http://www.opengis.net/kml/2.2">
<Document>
<name>Location History</name>

<Placemark>
<TimeStamp><when>2013-07-26T22:34:56Z</when></TimeStamp>
<ExtendedData>
<Data name="accuracy">
<value>2149</value>
</Data>
</ExtendedData>
<Point><coordinates>-85.3245474,34.9482949</coordinates></Point>
</Placemark>

<Placemark>
<TimeStamp><when>2013-07-26T22:31:51Z</when></TimeStamp>
<ExtendedData>
<Data name="accuracy">
<value>2016</value>
</Data>
</ExtendedData>
<Point><coordinates>-85.3526902,34.9857898</coordinates></Point>
</Placemark>

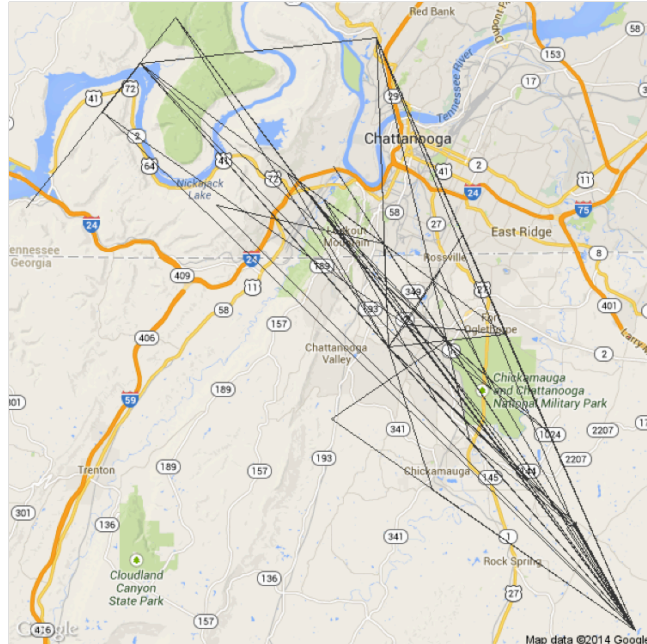
</Document>
</kml>

```

### Putting it all together:

Now that we have our data in KML form, we can plot the data!

Run the python program called "mapPlot.py" and you should get a map, which should look like the image below. If there are any errors, it means that your KML was not correctly formatted.



### Using your own data:

You can obtain your own location data from Google via <https://www.google.com/settings/takeout> You should get a KML file which you can feed into the program you just developed! You will need to look at the documentation for the plotting program (<https://github.com/snowdonjames/LatitudeHistoryPlotter>) to see what parameters you need to change.

