MSc. Computer Science for Communication Networks

Computing Project

Google Maps for Geo-localized Data

Specifications

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Specifications

X is a geolocation-based smartphone application that allows to obtain information about roads condition. The final goal of the software is to display valuable information about the roads based on the data captured.

Nevertheless, the information collected is stored using a static XML file that organize the information but does not provide a mechanism to graphically visualize it. Thereby, the purpose is to treat the data obtained by the application and represent it on a simple web application using Google Maps.

0.1 Event Types

Roads condition is described by 2 types of events: potholes presence and quality description, both are described below.

Pavement Quality

Quality description of the road events are extended episodes that are captured during an undefined period of time. Irregularities on the pavement produce particular movements on the car (consequently on smartphones) that are captured during the displacement and that allow to determine the quality of the roads. Quality description of the road events are identified on the XML file by the element tag <type 1>.

Potholes

Holes formed on pavement are known as potholes. They are very specific, high-intensity, independent events. This kind of event is identified on the XML file by the element tag <type 2>.

0.2 Event Description

Both types of event are described on the XML data file using the corresponding tag by the following elements:

<ACCELERATION_LIST>

Represents the series of accelerations on the movements captured by the application. Each acceleration element (<ACCELERATION>) includes capture time, actual magnitude on the 3 axis (X, Y, Z) and accuracy. This attribute is essential for computing the intensity of the event.

<POSITION_LIST>

Represents the series of locations related to the event. Each position element (<POSITION>) It includes capture time, coordinates (longitude and latitude) and accuracy. This attribute is crucial for the event representation on the map.

0.3 Event Representation

Events that describe roads condition are displayed on a web application using Google Maps. In order to achieve that, the data source XML file is transformed into a KML file [1], which is a format used to specify geographic information on Google Maps. Also, each event is associated to a color to represent its intensity.

Pavement Quality

They are represented on the map as paths. Therefore, each element on the position list is included on the representation. To compute the intensity of the event, a range on the accelerations spectrum is obtained. The less the changes on the spectrum, the better the quality of the road is.

Potholes

They are represented on the map as pin marks. Therefore, only the first element of the position list is included on the representation. The intensity of the event is

computed based on the difference between the highest pick on the acceleration list and the gravity. The higher the difference, the higher the intensity of the event.

Considerations

On the file, many events that are located on the same position (or very closed given the accuracy matter) may be found. All of them are presented on the map. Events fusion is yet to be implemented and it is out of the scope of this project.

The transformation of the data is generated from a static XML sample file. It means that the map is not updated on real-time and it may not contain real values.

The map generated including the appropriate representation of the events can be visualized on a web browser.

Bibliography

[1] Google. KML Documentation. https://developers.google.com/kml/documentation/.