TuriBike

A bicycle service for Zürich

GIS & Geoinformatics Lab

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Content

1 Introduction

In the framework of the GIS & Geoinformatics Lab an Android app has been developed, which contains datasets from the Open data Zürich database. This database contains spatial data of Zürich, which is available under a Creative Commons license[1].

1.1 Vision and Goal

The main objective of the project is the development of a functional Android app, which enables users to discover the city of Zürich by bicycle. The user shall be guided through Zürich by using routing services and bicycle related layers from the Open data Zürich database. The top 10 attractions of the city of Zürich shall be implemented as a static layer as well. Since several different routes with different topologies can be chosen in the city of Zürich, the user shall define his/her own preference for the route.

The vision of the app is to provide a bicycle service for tourists.

1.2 Requirements

The requirements for this app are the inclusion of 4 data layers and at least one routing service. Furthermore, the map should provide the possibility to pan and zoom. A legend as well as the possibility to switch between different layers shall also be provided.

1.3 Work division

The division of the workload is of paramount importance in order that the app can be finished both within the deadline and effectively. The detailed division of the workload is visible in the Initial and intermediate schedule which is supplied as an Excel document. The workload has been divided as indicated below:

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[1] Open data Zürich Portal, 4.12.2015: https://data.stadt-zuerich.ch/

André: Open data Routing request, Profile activity, initial Base map (Google Maps), Top 10 Attractions database, Report, Presentation

Ariadni: Creation of the route task (calculation of the route from the current location of the user to the destination) in the MapsActivity, Pumpingstation activity, Rentbike activity and ParkBike activity, Locationing, Implementation of the Top 10 Attractions activity with the Google Maps API, initial & final Base map, implementation of the Top 10 Attractions implementation, Pumpingstation , Rentbike, as well as Bikepark activities, Report .

Chara: Plan and implementation of the Graphical User Interface (GUI) of whole app, final Base map, Creation of the route task (calculation of the route from the current location of the user to the destination) in the MapsActivity, Pumpingstation activity, Rentbike activity and ParkBike activity, implementation of the Top 10 Attractions implementation, Pumpingstation , Rentbike, as well as Bikepark activities, Presentation.

2   Schedule and first draft

At the beginning of the project a tentative schedule has been planned. This has been used as a reference for the current progress in the project. The tasks have been divided into small activities (being part of the whole Android app). Firstly, the Google Maps API has been used for the incorporation of the maps (Google maps), but then due to some problems (described in the Challenges section), the ArcGIS Runtime SDK has been applied (maps from Esri). The start page as well as the profile activity have been finished at the early stages of the projects, while the implementation of the other activities required much more time.

2.1   First idea of the app

The following functions have been defined for our app at the beginning of the project (shown are the functionalities and the Open data Zürich dataset which shall be used):

- Rent a bike:
    - Veloverleih-Standorte
    - Verfügbarkeit der Velos von Züri rollt
    - Routing Service Fussweg
- Point of interest:
    - Denkmalschutzobjekte
    - Velowegnetz
    - Routing Service Velowege
    - Zweiradabstellplätze
    - Velopumpstationen
- Get bike to nearest station:
    - Veloverleih-Standorte
    - Routing Service Velowege
    - Velowegnetz
- Save route as Image
- Save route as Favourite

After the definition of the user group the point of interest dataset of listed buildings (Denkmalschutzobjekte) has been removed as the targeted user is a tourist who visits the city of Zürich and wants to explore the attractions. Those are also part of this dataset but since quite many buildings are listed in Zürich the top attractions will not be distinguishable for the tourist (it might even confuse the user altogether and as a consequence the app will not be used).

2.2   Initial schedule

The project has been divided into weekly tasks. Two weeks of buffer have been introduced as well to be able to compensate any delays. The initial as well as the intermediate Schedule are provided as Excel sheets in addition to this report.

3   Implementation

The following figure indicates the structure of the application. More explicitly, the app consists of several activities as shown below. The Start page operates as a menu for the users, since it shows all the available options. First of all, users can select the Profile activity, in which they can opt for either the direct or the attractive route (represented by a Boolean variable), and then based on their preference the corresponding route is presented on the map of each of the other activities. For the other type of activities (rental stations, pumping stations, bike parking spots) that have been applied, it was firstly planned to request a WFS service, but they were only functional with a Feature service request from the ArcGIS Server. Last but not least, users can be transferred to Top 10 Attractions, which indicates the 15 attractions in Zurich.
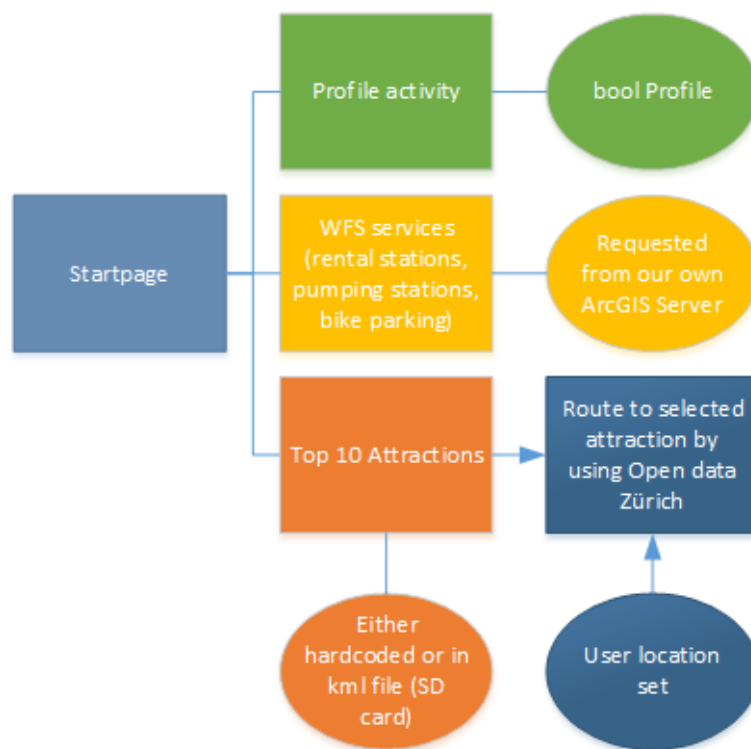

Figure 1: Structure of the app

A description of each activity, as well as of their implementation is provided in this chapter.

3.1   Start page

The start page is the gateway to the app and should therefore be clear and distinctive. The objects, which are outlined in white give access to different actions in the app. The layout of the start page is shown in the following figure:

Figure 2: Start page of the app

3.2   Profile activity

Since the routing service of the Open data Zürich dataset allows two different settings for the route (attractive and direct), this has been implemented as an option where the user can choose their preferred profile for the routing. The next figure presents the layout of the User profile activity:
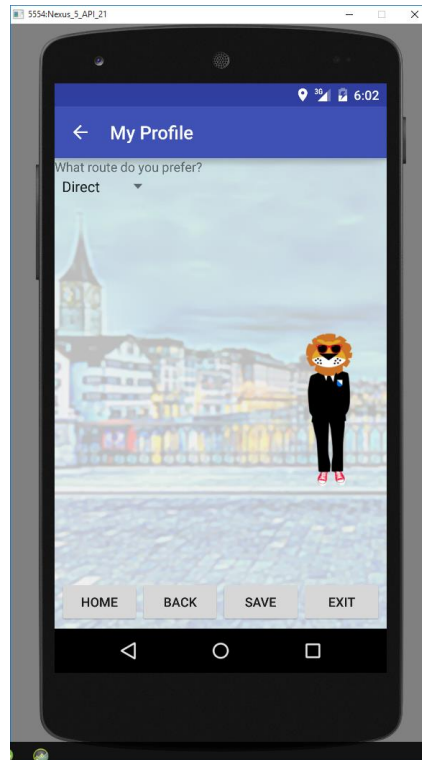

Figure 3: User profile activity

3.3   Map activity

At the beginning of the project a Google Maps activity has been used as base map. As described in the Challenges section this was proved to cause several problems, which at some point couldn't be solved. Therefore, the Google Maps has been exchanged with an ArcGIS Runtime SDK for Android base map towards the end of the project.

3.4   Top 10 Attractions

Since none of the available datasets at Open data Zürich contains information about the Top 10 Attractions of Zürich this layer has been created by using TripAdvisor[2] and local knowledge about the attractions. The dataset consists of 15 attractions which have been categorised into 3 different types:

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[2] TripAdvisor, Attractions Zürich, 4.12.2015: http://www.tripadvisor.de/Attractions-g188113-Activities-Zurich.html

Nature, Heritage site and Museum. The Top 10 Destination Activity enables users to select one of the attractions from the predefined list and afterwards based on this selection, the Map Activity is triggered. In this activity a map is presented indicating the 15 attractions in Zurich. In addition, the route is shown on the map from the current location of the user (it is indicated with a grey circle marker) to the selected attraction. Furthermore, users have the possibility to click on the black rectangle markers (representing the attractions) and get a short description about each attraction.

3.5   Routing activity

The app contains the preference-based cycle routing service, as stated above. Requests for both types of services have been sent. For the guidance of users to the selected destination, the built-in routing functionality of the ArcGIS Runtime SDK has been used. The following figure presents the offered routing service in the Map activity of 15 attractions in Zurich.
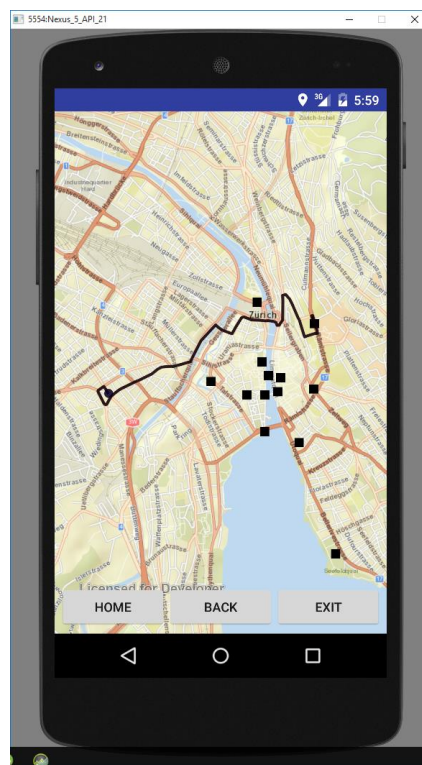

Figure 4: Routing service in 15 attractions activity

3.6   WFS activities

Possible requests for cyclists are bike parking spots, pumping stations and rental stations. This data is available from the dataset and is displayed as a static layer. Three activities have been created named BikeParking, PumpingStation and RentalStation respectively. The data from the Open data server had to be transferred to the ArcGIS Server Feature Service (http://egregis.maps.arcgis.com/home/content.html), since the ArcGIS Runtime SKD can only handle feature services and not WFS services. In these activities, firstly the feature service is requested and

then a feature layer is created including the features (pumping stations, bike parking spots and rental stations). These activities enable users to identify the closest pumping stations, bike parking spots and rental stations respectively based on their current location.
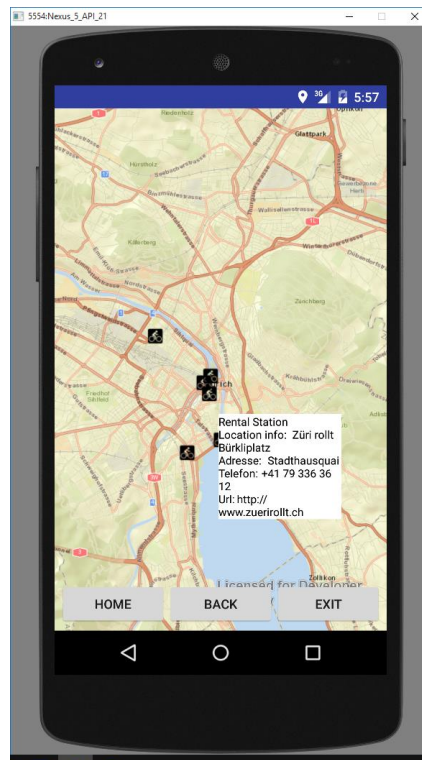

Figure 5: Pumping station activity

4   Challenges

During the implementation of the project several problems have been encountered, some of which were overcome while other not. This section describes the difficulties faced…..

4.1   Version handling with BitBucket

The version handling with Bitbucket proved to be quite difficult due to a wrong gitignore file, which has not been edited at the beginning of the project and therefore user specific data of the Android Studio project has been uploaded. This led to problems with the merging tool, which could not be solved (some files in the idea folder could not be merged). Due to these problems BitBucket has not been used afterwards. Instead the exchange of the project has been done manually.

The BitBucket issues led to major disruptions in our schedule, since a version of the app, which already contained the Top 10 Attractions together with the Google Maps routing could not be synchronised. Due to this error the working Open data routing service could not be added.

4.2   Implementation of WFS services

Regarding the implementation of the WFS services, there was an attempt to use Volley library for the request to the WFS services, but it was not successful. Furthermore, the Apache.HTTP library was also tested, but since it is an obsolete library, it was not functional.

4.3   Implementation of the picture marker symbols

In order to improve the Graphical User Interface of the app, an attempt was made to add picture marker symbols. However, the resolution was of poor quality and the size of the picture remained the same despite the changes. For this reason, simple marker symbols have been used, which were easier to handle.

5 Discussion and Outlook

Although the final version of the app is functional and works properly, it lacks some additional functionalities. Due to the aforementioned challenges and the time constraints, the final version of the app is not as planned. Regarding its further improvements, checkboxes could be added to each activity enabling users to see on the map the information included in the other layers (simultaneously pumping and rental stations, as well as bike parking spots and top 10 destinations) or even to edit the user profile settings. Moreover, there was not enough time to implement the offline Maps and Favourite activity.

All in all, this app was developed only in the framework of this course and for educational purposes (to enrich the students' knowledge in Android development). There is no intention to be upload on Google Play services or any other similar services.