Manual

Make the Road by Walking

Tool for monitoring traffic and visualizing desire paths

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Introduction and description of the tool's functionality

Traffic counts are quite laborious to perform, so they are usually only done once every few years. They are also usually performed punctually at singular locations and often focus only on motorized vehicles while ignoring pedestrians and bicycle traffic. In order to provide a more complete picture, 'Make the Road by Walking' utilizes widespread mobile devices such as smartphones and their ability to monitor their current geolocation via GPS.

The tool enables you to set up a server and distribute an app to voluntary participants. The participants need to complete a simple registration process and provide a valid email address. On a voluntary basis they are also asked to enter their gender and year of birth. Their mobile devices will then monitor their geolocation and whenever the device is moving, the location along with the speed, bearing and current time is saved locally in approximately one-second-intervals. If there are at least a hundred of these datasets saved and a WiFi connection is available, the values are automatically transferred to the server. The transfer can also be triggered manually.

Obviously many people will have reservations to disclose their whereabouts. It should be emphasized, that the app does not collect data in the background, but only when the participants deliberately start it. Also it is possible to restrict the app only to monitor locations within a predefined area. For example an architect interested in the movements of a condominium's inhabitants within its immediate vicinity, could set up the system to monitor only a 400 meter radius around the building and ask the inhabitants to run the app.
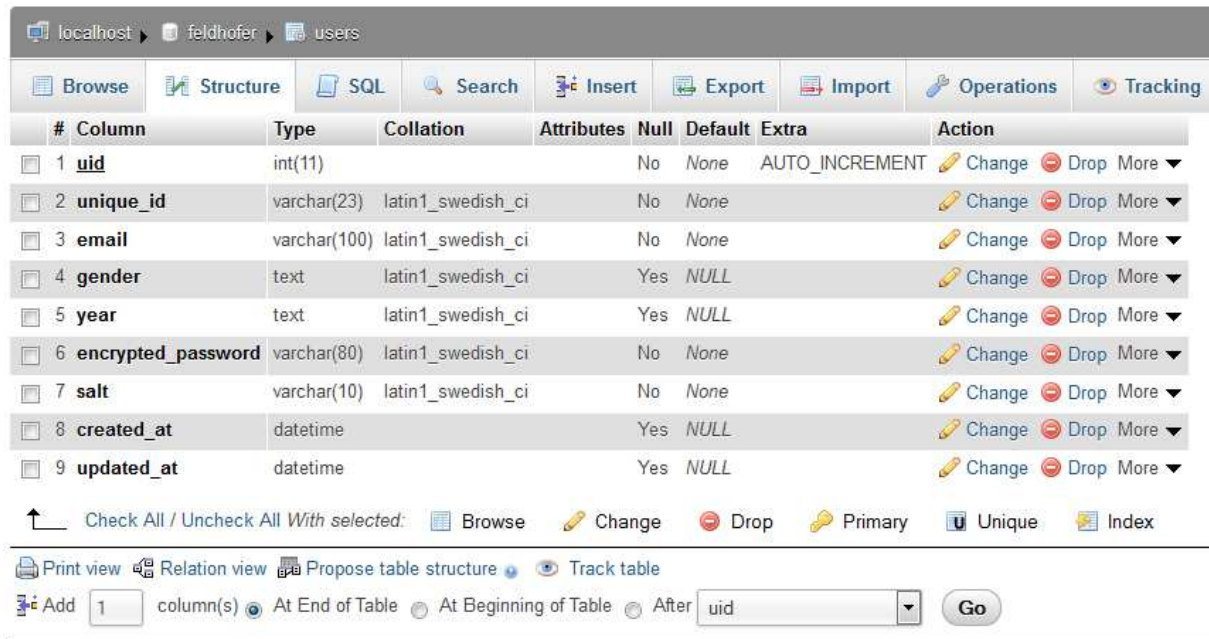
System Requirements

The Server needs to run PHP and MySQL in version 4.1.13 or higher.

The Participant's mobile devices need to run Android version 2.2 ('Froyo') or higher and need to have a GPS-Receiver. In order to send the values to the server, a connection to the internet – preferably via WiFi – is needed.

Setup Process

Setting up the server

Log in to PHPMyAdmin and either use an existing database or create a new database with a name of your choice. In that database create a new table called 'users', that has the following structure:

The easiest way to create this table is to run the following SQL query:

```
create table users(
    uid int(11) primary key auto_increment,
    unique_id varchar(23) not null unique,
    email varchar(100) not null unique,
    gender text,
    year text,
    encrypted_password varchar(80) not null,
    salt varchar(10) not null,
    created_at datetime,
    updated_at datetime null
```

Download the directory ‚server files' and without changing its file structure copy it to your server's public directory (most likely called 'web') or to one of its subdirectories. The file '/android_login_api/include/Config.pdf' needs to be modified. Enter the database name, server name (most likely 'localhost') and your username and password to access the database.

Installing the app on the participants' mobile devices

In order to distribute the app, you need to create an apk file. Install Android Studio (https://developer.android.com/sdk) and import the Android Studio project. You then need to modify the file 'app/java/mtrbw/app/ AppConfig.java': enter the internet address that you uploaded the login api files to. If you want to record locations only within a predefined area, this is also where you choose this option by setting the boolean 'limitedArea' to true. The area to monitor is defined by giving the latitude and longitude of a center point and a radius around it. Of course you can also do further changes to the app. When you are done, create the apk file by clicking 'Build>Generate Signed APK…' and following the further instructions. You can then distribute the app, by sending the apk file to the participants by email, making it available to them by placing it on your website or even distribute it via the Play Store (in the latter case an Android developer license is needed).

Displaying and evaluating the results

The collected data are displayed as a heatmap using Google Maps API v3. The heatmap format makes it easy to recognize desire paths particularly of pedestrians and cyclists and will automatically smooth out GPS inaccuracies once there are enough data collected. The map can be viewed using a browser and is to be found by entering your server's public internet address or the subdirectory that you installed the server files to:
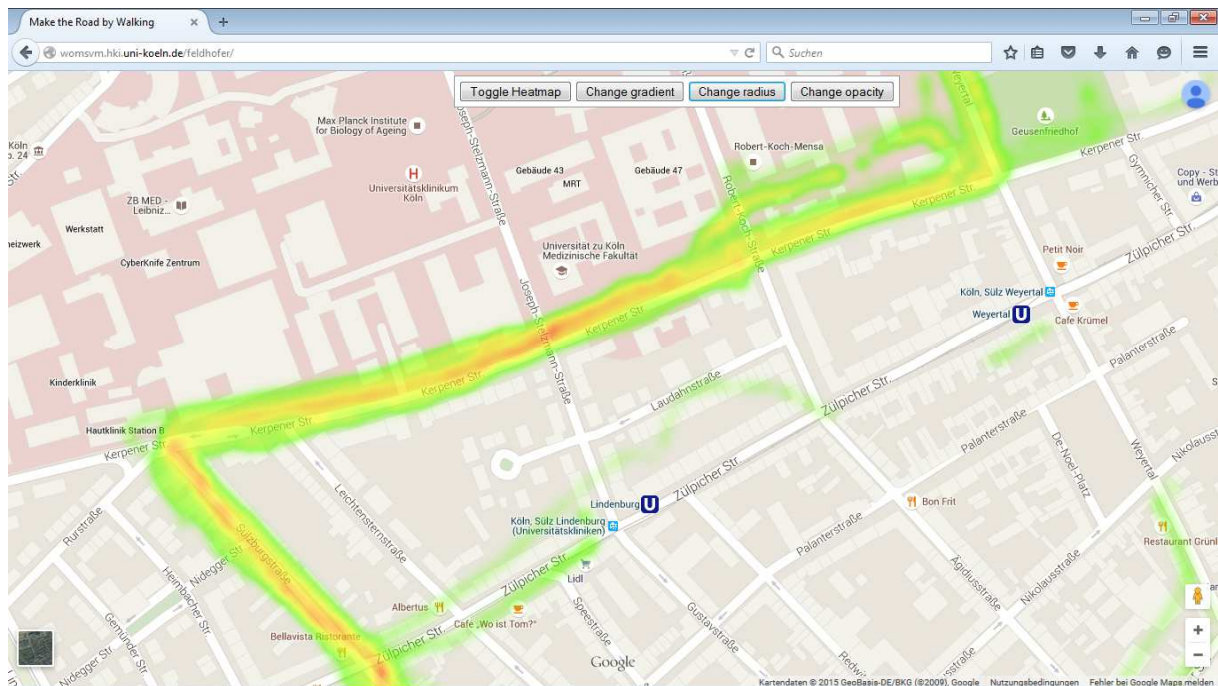
An option to filter the data e.g. by gender, age, speed, time of day etc. is not implemented, but could easily be added.

Acknowledgements

Login and Registration is based on a Tutorial by Ravi Tamada: http://www.androidhive.info/2012/01/android-login-and-registration-with-php-mysql-and-sqlite/

The Heatmap Visualization is based on a Tutorial by Jørgen Nicolaisen: http://tips4php.net/2010/10/use-php-mysql-and-google-map-api-v3-for-displaying-data-on-map/