Motivation
We are interested in combining GPS, gyroscope and video data to analyze road and track situations for cyclists and pedestrians. Our standard setting is a smart phone attached to a bicycle which records the GPS coordinates, videos, (online) local weather information and time. Within eight work packages, we will (a) use the GPS-data for integration in a map, (b) the local velocities and gyroscope data as well as variations in the sensor data will be used to identify interesting situations during a bicycle ride, and (c) video data will be used to understand the specific situation which causes a delay in the ride. The analyzed data can be used for map enhancement and path recommendation, but also for the identification of unclear road marks which is important for city planning and accident avoidance. This project is part of the DFG priority program 1894 VGIScience.

Challenges & Highlights
The main goal of this project is to enhance map data with semantic information by using volunteered sensor data. The key idea is the characterization of points of interest (POIs) by analyzing and clustering GPS tracks. These so-called hot spots are used to control the amount of recorded video data; only for these POIs, video data is recorded and analyzed. Video analysis will require the detection and classification of traffic lights/signs, people, road perspective and other scene parts. Additionally, 3D reconstruction and scene parsing will help to understand the characteristics of the hot spot. Finally, the enriched knowledge can be used in track recommendation for pedestrians and cyclists. Another application is city planning by identifying dangerous spots. A free mobile app, a scene parsing system and a recommendation system are three additional outputs from the envisaged project.

Potential applications & future issues
Besides collecting experience with real-time and eventtriggered data with a focus on a human-centered application, the foundations can easily be extended towards traffic management after hazards, quality control of topographic datasets or environmental and health-related data analysis using additional sensor information.

Project abstract:
During the past years, the availability of spatial data has grown rapidly. This development is characterized by the involvement of a large number of individuals, who use smart phones and mobile devices to generate and provide volunteered geographic information (VGI). Whereas GPS and gyroscope data (e.g., in fitness straps) are common, the demanding challenges for video analysis and the huge amount of data collected with videos make methods based on video analysis very difficult. On the other hand, only videos allow for a comprehensive scene interpretation.

Project duration:
13.12.2018

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1

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Members:
rosenhahn

Project manager:
Pro. Dr.-Ing. Bodo Rosenhahn

Project research areas:
Future Internet

Project type:
DFG

URL:
https://vgiscience.org/
Research Area:
Next Generation Internet

Status of the Project: