

Ideas for MSc projects at the University of Applied Sciences Western Switzerland

1. Traffic modeling using antenna data from a mobile operator

Mobile operators keep track of when a mobile device has been connected to an antenna. Moreover the position and footprint of a mobile antenna is known. With this data it becomes possible to determine an approximate position for a mobile device at a given time. The idea of this project is to identify ways to model this data and to extract the probable path of a mobile device.

2. Projects related to sMapShot

smapshot is a web virtual globe for the crowdsourced 3D georeferencing and visualisation of archive images (oblique and vertical) :

<https://smapshot.heig-vd.ch/>

Today the platform contains more than 80'000 georeferenced images covering the whole of Switzerland.

2.1 3D evolution maps

smapshot is a unique database of georeferenced historical images in 3D. Some famous areas (e.g. the Matterhorn or the Aletsch glacier) are densely covered with photographs. Hence, several 3D models showing the evolution of the area can be computed. These models can be used to study the evolution of the landscape and can be published in smapshot.

2.2 Semi-automatic georeferencing

Most collections of historical images have overlap. Namely, there are several images taken at the same time and looking at the same location. Image matching algorithms are able to find similar points in the images. Hence, once that an image is georeferenced by the crowd, other images covering the same area can be automatically georeferenced in 3D.

2.3 Mobile App

The goal is to implement a mobile app for the visualisation of georeferenced archive images. The mobile app can show the past state of the landscape (historical images textured on the landscape model) or the location of the user in the pictures.

2.4 Feature extraction from oblique historical images

The idea of this project is to automatically detect features (e.g. infrastructure, land cover, etc) in oblique 3D photos using remote sensing and machine learning techniques. Since the date when a photo has been taken is known, it becomes possible to determine when a feature has existed. This data can be useful for land planners and historians.

3. 3D semiology

2D Maps are an abstract representation of the reality. We are used to using maps without too much effort. Indeed, the codes established by cartographers have allowed a certain uniformity in the reproduction of the real world allowing us to create a shared cognition regarding the use of maps. These codes (colours, symbols, scales, toponyms, orientation, etc.) allow us to better understand the meaning of the information presented and to project ourselves effectively into this abstraction.

The use of 3D strongly impacts these codes. The idea of this project is to identify the elements allowing users to use, project and orient themselves in a 3D map (virtual globe). The research questions we would like to address are:

What degree of abstraction (e.g. Level of detail, LOD) of the reality is necessary for which type of task?

What are the elements allowing for an optimal orientation in the scene? e.g. toponyms / overview map / address bar...

Which perspective is best suited for displaying 3D data?

How to highlight remarkable elements? Color, transparency, animation...

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