Master Project:

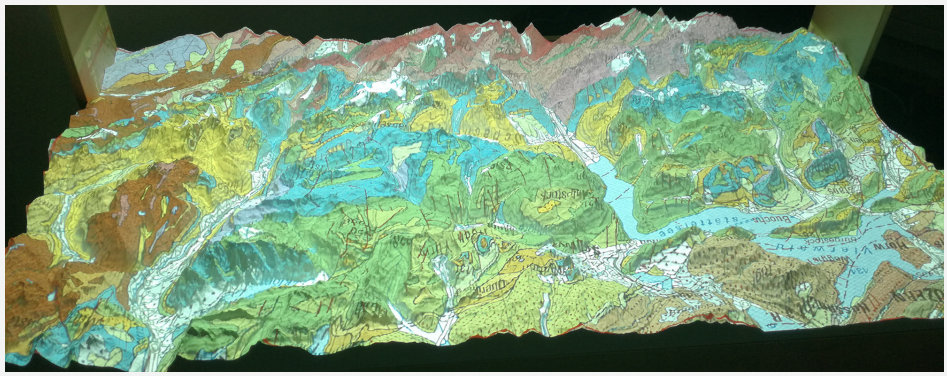
Implementing an Interaction Technique for GeoTable

University of Zurich[UZH]

Context

The purpose of geographical visualization is to present spatial and temporal data in a more perceivable way. Different geographical visualization techniques have been designed to deliver information to the users on paper or flat monitors. However, conveying 3-dimensional information on these 2-dimensional media is challenging. For example, the arrangement of mountains and valleys can be shown using cartographic techniques such as contour lines or rendering techniques such as lighting and projection.

MML's GeoTable is designed and made to provide a geographical visualization in which the landscape is presented in the form of a physical relief model on which the dynamic and interactive information can be projected. The physical model enhances the understandability of the shape of the terrain while the projected overlay enables us to dynamically customize the displayed information based on the application and user interaction. The range of applications of this system is very broad including the exploration of streets, rivers, vegetation, residential areas, weather, transportation, hiking trails, etc.



Current State

Currently, the hardware of GeoTable comprises a physical frame for holding the rest of the hardware, a 3D relief, a projector and a computer to supply the overlay visualization. The software of the GeoTable has the exact model of the relief. Based on this model, it can project different types of data such as maps, aerial images, vegetation height.

Assignment

In this project, an interaction technique will be implemented which is suitable for the physical form of GeoTable. The first step of implementing a physical interaction is detecting the gestures of the users which requires tracking their hands and head. A large body of research is dedicated to tracking in the field of human-computer interaction. In this project, we implement a technique in which several points of the body are marked by infrared reflectors or LEDs and infrared cameras capture these points. Based on the positions of these points in the captured images, their positions in the real world can be approximated. Such a system can detect simple interactions such as clicks as well as complicated interactions which enables the software to provide tools for selecting points, drawing shapes, activating menus and choosing menu items for selecting the desired visualization type and performing actions such as filtering.

Requirements

Interest in computer graphics and human-computer interaction. This project has to be done as a group project. If possible, all participants should have experience with OpenGL, optimally taken one of the graphics courses .

Work Load

- 40% theory
- 50% implementation
- 10% testing

Student Project Type

This topic can be done as Master Project in a group of 2-3 persons. Goals are adjusted depending on the project type and number of students.

Supervision

Prof. Dr. Renato Pajarola

Alireza Amiraghdam (assistant)

Contact

Write an E-Mail to amiraghdam@ifi.uzh.ch

VISUALIZATION AND MULTIMEDIA LAB

Prof. Dr. Renato Pajarola
Visualization and MultiMedia Lab
Department of Informatics
University of Zürich