VISWIZ – A VISUALIZATION TOOLKIT FOR 3-D / 4-D GEOSPATIAL DATA REPRESENTATION

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ABSTRACT

Three dimensional data representation and visualization are common features of modern geographic information systems (GIS). However, the research related to the visualization of real world 3-D data is mostly shifted to the computer graphics society. Also the aspect of 4-D - given by adding time as a fourth dimension to the spatial data representation - is mostly neglected. Many stand-alone applications and plug-ins have been developed to visualize 3-D models for a variety of applications. A fully integrated and easy-to-use 3-D GIS solution is currently not available.

We address the problem by introducing an easy-to-use and extensible toolkit for visualizations called VisWiz. Here, we focus on a intuitive interface to support the user in selecting a suitable state-of-the-art 3-D visualization technique both in the sense of scientific and information visualization to analyze the data rapidly. The VisWiz is designed to support users in selecting a suitable visualization technique for arbitrary data. This is even more important if the user is not familiar with visualization in general or the content of the data. In order to be usable for a wide variety of data sources and by a broad user group, great emphasis was put on the following points for the design of the VisWiz: independence from data source, extendable visualization collection, intelligent visualization proposal, and simple user interaction. The integration and extension of visualization techniques was set up as a plugin architecture using the Service Provider Interface (SPI) [1]. It can be used to easily extend the collection of visualization techniques. During our talk we will illustrate the benefits of the extensible architecture with respect to basic, advanced, as well as customized visualizations. Finally, we will demonstrate different visualization techniques (e.g. algorithm for 3-D iso-surfaces, animation of 3-D visualizations based on time series, etc.) and the integration of the VisWiz into the utilized NASA World Wind SDK [2].

The World Wind SDK is a free and open source Java-API for a virtual globe released under the NASA Open Source Agreement. The framework provides a powerful platform for giving the basic means to express and manipulate data. It already provides a Virtual Globe metaphor, improved navigation capabilities and support for basic geospatial services. The VisWiz enhances those features and can be easily integrated into any application which is based on the World Wind SDK.

The presented work is part of the SUDPLAN (Sustainable Urban Development Planner for Climate Change Adaptation) project [3]. It offers an easy-to-use web-based planning, prediction, decision support and training tool, for the use in an urban context, based on a what-if scenario execution environment. This tool is based on an innovative and visionary capacity to link, in an ad-hoc fashion, existing environmental simulation models, information and sensor infrastructures, spatial data infrastructures and climatic scenario information in a service-oriented approach, as part of the Single Information Space in Europe for the Environment (SISE). SUDPLAN is a project co-funded by the European Framework Program 7, under challenge ICT-2009-6.4 ICT for Environmental Services and Climate Change Adaptation of the Information and Communication Technologies program, project number 247708.

Literature

[1] http://docs.oracle.com/javase/tutorial/sound/SPI-intro.html

[2] http://www.goworldwind.org

[3] http://www.sudplan.eu