

Design of Tools for spatio-temporal data analysis and dynamic visualization in a web-based GIS

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Abstract

A spatio-temporal GIS prototype with analysis tools and dynamic visualization in a web setting has been designed. The context of this work involves the historic aspect for the study of the Dynamic Complexity of Cooperation-Based Self-Organizing Networks in the First Global Age (DynCoopNet Project). Data were extracted from “The Voyages” (www.slavevoyages.org) with the purpose of studying slave trade across the Atlantic Ocean during the 16th-19th centuries. The database is bulky – recording 35,000 voyages – containing information concerning ships, crew, slaves, harbours, departure and arrival dates for every stage of a voyage. Building on this information, a conceptual data model has been generated with the aim of implementing it in a web-based spatio-temporal GIS, supporting queries, editing, analysis and dynamic visualization of trading flows.

GIS are appealing for the study of trade routes although their integration as a historical analysis tool has been unsuccessful due to information storage difficulties, retrieval and relationship among data and lack of queries allowing recognition of behaviour patterns. The traditional GIS, based on the carrying out of spatial queries, allows neither visualization nor analysis of the unfolding events and it does not allow the recognition of behaviour temporal patterns either. Hence, the need for the development of a spatio-temporal GIS.

The process followed for the development of these spatio-temporal tools has consisted of designing a web interface for entering and editing data and also designing a dynamic visualization tool where the trading routes selected by the user in a region or specific period will be represented. It should be pointed out that object-oriented analysis using UML has been employed for tool modelling. The design of the described prototype is considered as the starting point for the development of geoinformatic tools and their further implementation in the web-based spatio-temporal GIS.

Keywords: *GIS, spatio-temporal tools, dynamic visualization*