Web Information System Platforms for Publishing Spatial Data

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ABSTRACT

The best tools to manage the exchange of information and services between heterogeneous subjects through new technological tools with particular reference to information systems are certainly the Web-based information systems. Leveraging the infrastructure of the Web, these systems may be able to handle multimedia data, to perform distributed and cooperative applications based on service, in addition to customizing applications and related data. This paper provides an overview on Web Information Systems with particular reference to GIS, presenting a description of the usage scenarios and a comparison between two significant platform for publishing spatial data.

Keywords: Geographical Information Systems, Information Exchange, Spatial Data, Web-Based Information, Web Information Systems, Web Infrastructure, Web Services

1. INTRODUCTION

The aim of this work is to find a solution to the problems related to the dissemination of spatial information. This is typically done through a particular type of Information Systems specially devoted to the management of spatial data, in the meantime with an attention towards the distributed technologies of the new era: the Web-based Geographical Information Systems (WebGIS).

The exposition is organized with an initial introduction of the concepts of geography and cartography (see Section 2). Then, Information systems in general and geographic information systems (GIS) in particular are analyzed and examined in their structural characteristics (see Section 3). In Section 4 we introduce Web Geographical Information Systems aimed at managing spatial data and propose the design of a WebGIS system. Then we examine two potential implementation tools, an open source and a legacy WebGIS software. Finally, in Section 5 we analyze the results of the implementation project, with its comparison of features and advantages/disadvantages of the proposed software tools.

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2. GEOGRAPHY AND CARTOGRAPHY

Many representations of events and things also related to temporal aspects are based on cartography and geography. Maps and geographical information are vital to our way of knowing the world, with an infinite complexity that comes with a multitude of choices about what and how to represent them.

For clarity we distinguish geography by mapping defining them as follows: geography analyzes and explains the phenomena on Earth’s surface and helps us to increase our understanding of the world, whereas mapping helps to develop theories, concepts and skills to describe and display events, models and processes of geography with an emphasis on communication.

Both are dynamic entities that involve a wide range of theories, concepts and skills subject to constant development and improvement. The relationship between geography and cartography tends to change with the progressive evolution of technology, but the basic concepts of these two disciplines established in thousands of years are still important. With the help of technology today we have an easier and more intuitive approach to the use of these resources, which in the past were mostly managed by experts (cartographers and geographers).

2.1. Representation

The representation of a particular aspect is an abstraction, which reduces complexity, simplifies and highlights information and reports. Maps and geographic information obviously fall into these categories, according to the conventions that have the goal of making the representation usable in a simple and direct way.

The geographical representation is a key component in the Geographical Information Systems (GIS). The primary purpose for the geographical presentation is to conceptualize data needed to help answer questions of various kinds. Data is what is stored on the basis of observations and measurements; it needs significance, and to do so it is necessary for it to be associated with a context. It is also very important the way in which data is represented.

Stevens (1946) developed a framework in early 1940s which outlined a difference between intrinsic and extrinsic properties. The former are directly empirically measurable characteristics, while the latter are observed but associated with other properties. Due to the nature of intrinsic properties, Stevens suggested that measures should be differentiated according to their capacity to combine with other measurements. His work formed the basis for geography (Unwin, 1981) and cartography (Muehrcke, 1976; Chang, 1978).

Sinton (1978) instead devised a system for the examination of space, time and properties in three possible areas: fixed, measured and controlled. For example, a device placed in a fixed point measures an attribute in a given time interval.

The choices involved in creating a geographical representation are broad and not obvious because conventional methods of study of geography merge together. The choices have a direct impact on cartographic representation and communication.

- **Collection of Data**: To represent things and events data must be collected in order to provide sufficient geographic information, attributes, and temporal data for the proposed target.
- **Updating the Data**: It is critical to system reliability.
- **Attributes**: What characteristics and qualities of things and events are included and how they are recorded makes certain representations and analyses possible or impossible.
- **Coordinate Systems**: Commonly used in geographic information. Maps also make use of coordinate systems, a combination of projections, data and reference systems of locations.
- **Vector/Raster**: Map must highlight an area of particular attributes understood as vec-
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