Distance Learning for GIS in Serbia

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Abstract

Today brings rapid advancement of technology and opens up more and more opportunities to be with the latest information and communication technology comes to quality knowledge and skills. At the same time GIS knowledge becomes part of our everyday life both at work and in everyday life. Facilitating learning about GIS systems via the Internet is a step towards promoting education in Serbia. Problems that commonly found in Serbia when it comes to distance learning are the number of computers per capita, computer illiteracy of the population and Internet connection.

Keywords: GIS, distant learning, Internet, faculty

1 Introduction

Computer technologies have already become our everyday reality. Follow us on every step, and computers have largely become an integral part of our lives. Nevertheless, information technology in areas related to spatial data is still very little presence in Serbia, so are the software made in this area a little less common. More and more of those who are privately or professionally interested in learning more about geographic information systems, which nowadays increasingly to the Internet and online learning. Serbia is trying to keep up with the world in this respect, but despite the large number of young and educated professionals is extremely difficult to follow the technical and technological trends in distance learning of GIS systems.

2 GIS and its characteristics

Systems for handling spatial data are being developed in the sixties in the United States, where it first appears with a graphical display ability to manage data. Allows users to visual representation important data. In 1967 the leads to the development of world operating system for handling spatial data in Ottawa. The development of this system is helped by the Federal Ministry of Energy, Mines and Resources. Developed by Roger Tomlinson, and was named Canada's GIS (Geographical Information System). This system is used for storing, analyzing and managing data.

This system had the possibility of overlap, measurement, digitization/scanning. The system was never available on the market as a commercial system. The success of this system has encouraged various commercial mapping applications. The creator of this system is known as the father of GIS. Since 1965 to 1991 at Harvard University have developed many important theoretical concepts related to the use of spatial data. During the eighties and nineties, growing use of GIS systems on personal computers. At the end of the twentieth century there were those within the system the relatively small platforms.

In the end of this century, users begin to export the concept of viewing GIS data over the Internet. Last few years and increased number of free GIS packages, such as for example, GRASS GIS and Quantum GIS. In particular the two packages work on multiple platforms and can be adjusted for execution of various tasks.
Today we are witnesses to the world's more established and operating companies that engaged in collecting and processing data and are able to prepare data the geographical needs of a wide range of users. The rapid development of World Wide Web for access and retrieval of data has resulted to a large number of spatial data will be available via the Internet.

Today we are witnessing a system that allows us a unique set of data and processing model that will encompass all existing and potential applications, specification for each of the major database for the implementation of this model data specification for each of the major computing environments implementation of the model data. This provides us with OpenGIS. The aim is to allow users easy access to various tools and geographical data sources, and thus to raise the further development of concepts of open systems for handling spatial data. Open system for handling spatial data should eliminate the differences among specific formats the data.

The system for handling spatial data for the two basically different model to represent the real world in digital form: vector and raster, so the on the basis that the systems for handling spatial data sharing to raster and vector.

The raster model is a model in which the image is a grid, where each cell has a certain attributes and values. The cells are sometimes called pixels. Cell size determines the grid resolution. Each cell joins the attribute value. Grids are usually added to vector drawings as a basis for digitization, for completing the drawings, adding information and the like.

The vector model represents the environment in the form of points, lines, polygons. It is based on vectors. These geometric elements are stored as pairs of x and y coordinates. The vector data model uses points that are stored with their real coordinates. The position of any object can be represented with x and y coordinates, or Cartesian coordinates. Roads, water can be represent with lines, or series of dots. Lakes, parcel, a building also contains related items, with the first and last must coincide. The vector model is extremely useful for representation of discrete locations and difficult is applicable for monitoring variables size as for example changes in temperature. Display objects are actually in this case of simplification or approximation of phenomena that change over time.

As for geographic information systems in Serbia, I mentioned the laboratory for computer graphics and geographic information systems, which was formed in 1991 as a research laboratory of Electronic Engineering, University of Nis. Today the lab is member AGILE association of GIS laboratories in Europe. Some of the projects done in this laboratory are:

- Geographic information systems - a project made from 1990-1997 years, whose partners and customers were EI and JP Informatics Institute for Regional and Urban Planning;
- Intelligent system for monitoring and management of spatial objects - a project developed in the period 1994-1997, at which participated in the Yugoslav Army, Ministry of Science and Technology of the Republic of Serbia;
- Development of software to create graphical list of local cable TT lines and cables based on GIS technology - a project developed in the period 1995-1996 had been conducted for the Serbian Telekom;
- Development of an integrated system of GIS technology for maintaining, recording, analysis and planning of further development of telecommunication networks - the project was done between 1998 and 1999. Partners and beneficiaries of the project were TELEKOM Serbia and the Ministry of Science and Technology of the Republic of Serbia;
- Geographic Information System to support the functioning of local government based on Internet/Web technologies - the project was done between 2002 and 2004, and participated in the project and the Municipality of Nis and the Ministry of Science and Technology of the Republic of Serbia;
- project GISEE-GI, made between 2002 and 2003 with the European Union.
The aforementioned are just some research in this field. One of the conference that in recent years in the former Yugoslavia held a conference "Spatial Database in Bosnia and Herzegovina" in January 2008. Also in May 2008 the conference was held in Opatija "GISDATA Users Conference 2008".

Some of the more recent GIS system performed by us include:
  - BeolandMap (http://gis.beoland.com/beolandmap/)
  - Kragujevac GIS (http://www.gis.kragujevac.org.yu/)
  - GIS City of Nis (http://gis.ni.sr.gov.yu/)
  - GIS Pirot (http://www.pirot.org.yu/latin/e-gov/isistem.htm)
  - GIS green areas of Belgrade.

3 Distance learning for GIS in Serbia

Distance learning can be defined as education or training that is offered to students at a different place or physically remote from the speakers or sources of information. In practice, distance learning is a lot more complex than this definition because it involves the use of new technologies and new interactive teaching methods. This method opens up opportunities for lifelong learning, provides an opportunity to obtain degrees and certificates online from almost every university in the world. It takes place on the Internet and students can obtain their degree without having set foot in a conventional classroom.

In Serbia, the best known solution for distance learning is LINK's Distance Learning System (DLS) - a system for distance learning, which is based on the use of modern ICT technologies in almost all aspects of the learning process. Learning in a network of computers over the Internet or the Intranet is the basic idea of this system. Internet and Intranet is used to achieve the conditions for users to interact with the content, lecturers (authors) and other participants in the Distance Learning model of learning. This software solution meets all of the expected future maintenance needs of different types of DL courses: computer courses, foreign language, thematic seminars, business courses, courses from traditional education (mathematics, physics, history, etc.).

LINK's Distance Learning System enables "on earth" and the complete management of exchange rates on the Internet and the realization of communication and data exchange. The system is generally designed for all organizations that organize personnel training or educational institutions, without distinction. The system covers the needs of the following main groups of users: authors, lecturers, instructors, course managers, teachers, administrators, organizers continue, administrator of the system, training managers, students, course participants, employees of companies. The main elements of the Distance Learning System: a system of course design, the system for the preparation of the course - running through the course, system testing, system monitoring the progress of the user, system monitoring status of the user. There is a possibility of final delivery of content and also the development of educational content on demand.

To develop GIS in Serbia requires experts in the field of GIS technology and a lot of learning in the field of geographic information systems. In addition to the aforementioned research laboratory of Electronic Engineering, University of Nis is now studying GIS at: Faculty of Agriculture in Novi Sad, Master study program of Modern Information Technologies University Singidunum, Civil Engineering, University of Belgrade, Faculty of International Economics Megatrend University, Faculty of Geography, University of Belgrade. Most curriculum adapted from Europe and USA.

Here, only some of these studies have been developed that allow remote access to knowledge to the general public. These are: Master study program of Modern Information Technologies Singidunum University, Faculty of International Economics Megatrend University, Faculty of Geography, University of Belgrade.
The mentioned schools are studying GIS projects, spatial analysis, database management, space operations, visualization. Items that are offered to students as part of distance learning geographic information systems are now only optional, but there is a strong tendency to distance learning GIS stood in the curriculum of some universities. Faculty of International Economics encourages interaction between students, which is mainly limited by rules of teaching. Also, try to provide students with adequate access to e-library and also working on the computer literacy of students to be able to adequately follow the classes. It does'nt of great importance to the distance learning environment, such as chat-rooms etc. Also, this particular faculty takes into account the requirements of the software and hardware, for distance learning GIS is very important.

Main advantages of using distance learning GIS of the faculty are simple procedures use by all participants, working in Intranet and Internet versions, creating, connecting and distribution of courses and tests, definition of training requirements of the users, a high level interactivity between applications and users, users monitor the progress of courses, modules, access from any networked location in accordance with a hierarchy of access, independent of server platform and software tools, overcome the drawbacks of the Internet infrastructure in Serbia, without the use of special requirements for the configuration of workstations and servers, using a different browser application, reaching a low price at the rate of use for end users and connect to existing databases, existing or new information systems, other Internet sites, import of existing learning materials or materials of independent authors.

4 Problems in distance learning for GIS in Serbia

E-learning has some disadvantages. First, teachers must have adequate knowledge, motivation and skills for distance learning because the teacher's role is very important. Number of computers is also an important factor, as well as Internet connections, which in Serbia can be dial-up, ISDN, ADSL. For many users use the Internet is very expensive and therefore totally unacceptable or acceptable, but in insufficient quantity. In Serbia there are also problems of the knowledge of Internet users, where there are plenty of great computer illiterate computer users. It takes a lot to address the need for information and telecommunication technologies, in order to acquire the technical prerequisites for distance learning GIS in Serbia only 52 percent of households have computers and 41 percent use the Internet. In the European Union (EU) 80 percent of households have computers and 75 percent of citizens use the most advanced broadband internet.

In order to enhance communication technologies EU in 2020. invest 30 billion euros available through funds intended for the knowledge economy and communication technologies. The number of computers has increased over the previous year by 3.6%, a number of Internet connections by 2.3%. The number of users of broadband Internet access, Serbia with 23% of users the latest in Europe. In Serbia, 97.8% of enterprises with ten or more employees have computers and 96.8% of them use the Internet. Among them, 67.5% have a web site, and 64% is used to represent their products, services and pricing. The results show that for the year came to a certain increase in the number of computer users and the Internet.

All leads that will create conditions for distance learning over time and improve the existing universities now favoring Serbia distance learning GIS work to ensure that conditions are better and thus attract more students. For this purpose, was formed and Serbian academic network - AMRES working on distance learning and is formed by the Government of the Republic of Serbia, and the purpose of construction, development and management of education and scientific research computer network in different areas.
5 Conclusion

Distance learning can enhance learning in several ways, and what students and lecturers brings experience on the Internet. Internet still offers new student information, which lead to conscious participants of activities and development, and progress in work. Distance Learning GIS gives students a chance to learn new skills and qualifications and to develop in new directions. The rationalization of teaching is conducted in a rational changes teaching methods in order to obtain better performance and better results. Education conventional methods have some significant drawbacks. One of the largest place the necessity of attending the teaching. The expansion application of computers and the Internet listed successfully overcome the problems. It is expected that future investment in efforts to overcome existing problems to widespread GIS dissemination through education can be achieved.

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