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RESEARCH ON THE HISTORY OF THE DEVELOPMENT OF GEOGRAPHIC INFORMATION SYSTEMS

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Annotation: The use of geographic information systems (GIS) is one of the new, but increasingly popular directions in science. The article considers the experience of assessing the use of geoinformation technologies by foreign countries and the analysis of news, developments and unfinished production. A comparative analysis of geoinformation systems is carried out.

Keywords: Satellite, GIS monitoring, geoinformation technologies, history of GIS development.

ИССЛЕДОВАНИЯ ИСТОРИИ РАЗВИТИЯ ГЕОИНФОРМАЦИОННЫХ СИСТЕМ

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Аннотация: Использование геоинформационных систем (ГИС) является одним из новых, но все более популярных направлений в науке. В статье рассмотрен опыт оценки использования геоинформационных технологий зарубежными странами и анализа новостей, разработок и незавершенного производства. Осуществлен сравнительный анализ геоинформационных систем.

Ключевые слова: Спутник, ГИС мониторинг, геоинформационные технологий, история развития ГИС.

Currently, based on the requirements of new information technologies, management systems related to the need to display information on electronic maps have been created and are operating.

Geoinformation systems

- Control Systems
- Projecting systems

A large amount of topographic, hydrographic, infrastructural objects location information is used to solve social and technical issues. Representing this or that situation on the computer screen means displaying various graphic images.

Geoinformation technologies aimed at the practical application of data expressed in the form of a system of electronic maps and data processing environments of various natures. The main class of geoinformation systems is coordinate data that store geometric information and reflect the spatial aspect. The main types of coordinate data are: point (nodes, vertices), line (open), contour (closed line), polygon (area). In practice, a large number of data is used to build real objects. These are: floating point, pseudonode, normal node, overlay, layer, etc. These given data types have different relationships with each other. They can be divided into three groups:

- Connections designed to build complex objects from simple elements;
- Connections calculated according to the coordinates of objects;
- Connections identified during data entry.

Vector and raster models are the basis of visual presentation of information in the use of GIS technologies. Vector models are based on the expression of geometric information using vectors. In raster models, the object (region) is reflected in spatial cells that form a periodic grid. Each cell of the raster model corresponds to parts of the surface that are the same in size, but different in

characteristics (color, density). This procedure is called pellising. Raster models are divided into regular, irregular, and recursive or hierarchical mosaics. Flat regular mosaics come in three types: square, triangular, and hexagonal. A square shape is convenient for processing large amounts of information, and for creating triangular spherical surfaces. Irregular mosaics are irregularly shaped triangular grids and Thiessen polygons. They are used to build digital models of given parts of the area by given groups of points. Thus, vector models store information about the location of the object, and the raster model stores information about what is located at one or another point of the object. Raster models are mainly used in the processing of aerospace images.

A digital map can be organized in the form of a set of layers. GIS layers consist of a set of digital cartographic models based on the combination of spatial objects with common functional characteristics. The set of layers forms the basis of the graphic part of GIS.

The use of geographic information systems (GIS) is one of the new, but increasingly popular directions in science. Currently, GIS is used in history, demography, archeology and archeography along with geography, geology, cartography, economics.

It is known that historical events and processes take place in a certain place and time. All historical objects exist on one or another border. Delineation of this border on the map allows creating a more complete picture of the historical event. So, working with a map is considered a necessary component of historical research. However, the process of creating a historical map is considered to be quite complicated, correcting the geographical map according to the studied period, including all objects based on general information about this historical border, maps will need to be compared to each other. It takes a lot of time. Therefore, it is advisable to upload the process of creating a map to a computer.

Table 1.

List of the most used applications in the world:

№	GIS, Manufacturer's name	The task	Opportunities
1	**ER Mapper (ER Mapping)**	Large-scale photogrammetric data processing, thematic cartography (geophysics, natural resources, forestry	Resolution, map printing, three-dimensional images, library of algorithms
2	**ГеоДраф, ГеоГраф (Russia)**	Creation of multi-layer cartographic systems and electronic atlases	Ability to use multiple applications, Borland C++, Visual Basic, Delphi programs
3	**ArGIS, Moscow State University of Geodesy and Cartography**	Construction of digital terrain models using aerial photographs	The use of large computing resources, a library of conditional symbols
4	**ArcCAD,ESRI – Institute for Environmental Research**	Linking maps and databases, spatial analysis (engineering and business projects, construction and transport)	Using the AutoLISP language, the standard of all GIS technologies
5	**ArcView,ESRI**	Creation and analysis of cartographic information (business, science, education, sociology, demography, ecology, transport, urban economy)	Creation, processing, communication with other programs of cartographic information
6	**AtlasGIS, Strategik Mapping INC (USA)**	A fully functional cartographic system for analysis and presentations	Easy and flexible software

7	**SICAD/open, Siemens nixford (Germany)**	Processing of geo-informational data using distributed technology	A systematic product for workstations
8	**Star, Star Informatic**	Integrated modular environment, design, analysis and assessment of networks (sewerage, water, energy and heat supply, communication, roads)	Subject-oriented modules, digital model building and data model management projects
9	**Small World GIS, Small World Systems Ltd, (Great Britain)**	Geographic operating system for modeling spatially connected objects	Full cross-platform (HP,IBM, SUN, DEC)
10	**CADdy, ZIEGLER Informatics GmbH**	Creation of cadastral geo-information systems (topographic electronic maps, topographic and geographical data bank maintenance, visual representation of various three-dimensional objects, urban economy, industry)	Using object-oriented technology, advanced modular structure, creating user projects using the C language
11	**MGE, IntegralMGE**	Application of GIS workflows and cartography in various fields	Choice of operating systems (MS Windows, Windomws NT, DOS, Unix), modular structure, analysis and query tools, (eight different types of one object model), interactive user interface
12	**MapInfo**	Searching for geographic objects, working with data bases, processing data of geodetic measurements, preparing cartographic documents for publication	Choice of operating systems (MS Windows, Windomws NT, DOS, Unix), universality
13	**ArcInfo**	Creation of geoinformation systems, creation of land, forest and geological cadastres, design of transport networks, assessment of natural resources	A set of drivers for monitors, digitizers and plotters, with networked and standalone options for use
14	**Панорама (Russia)**	Construction and processing of digital and electronic maps, maintenance of cartographic and attributive databases	A special interface for searching electronic map objects according to the characteristics of the data base, using simple tools for implementation
15	**ERDAS Imagine, ERDAS**	Processing of aerospace images	Modular system, graphical interface, hypertext system

The basis of GIS is a set of electronic maps on topics. In general, computerized historical maps are divided into two types: illustrative (visual collections of existing data) and research or analytical (collections of data files that can be converted into different sets of images). It is on the basis of this second group of maps that it is possible to create full-fledged space-time models of historical processes. These models make it possible to identify patterns and connections that cannot be found in conventional studies. But illustrative maps can also effectively serve to visually present one or another research moment. GIS is mainly used in geography and historical demography, which are areas of history education. At the same time, GIS is widely used in land surveying, land property accounting, forestry management and other fields. In the field of education, GIS is used to study subjects such as geography, historical geography, environmental history. GIS connects the image of the geographical border with qualitative and quantitative information of ecological,

geographical, administrative nature. The strength of such a connection lies in the combination of visual and statistical information. It is possible to create maps that include information such as the structure of soil layers, flora, lighting level, roads, property relationships and the total value of land plots. Likewise, all historical buildings in the city can be mapped. In the West, the possibilities of computer cartography were given importance in the 80s of the last century, and scientific works on the application of GIS in the field of history appeared.

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