Theoretical aspects and practical implementation of creating geoportals

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SUMMARY

This article is devoted to researching the potential of geoportals as an effective tool for monitoring newly formed territorial communities. In modern conditions, territorial changes take place at different levels - from the unification of villages to the creation of new municipalities. Tracking and analyzing such changes requires new approaches and tools, among which geoportals play a significant role. The purpose of the study is to determine the capabilities of geoportals in the context of monitoring newly formed territorial communities. The paper analyzes modern trends in geo-information technologies, studies methods and approaches to monitoring territorial changes. Methods of creating geoportals are considered in detail. The given example illustrates the interaction of different programming languages in a complex when creating geoportals.

Keywords: geoportal, programming, geospatial data, geo-information technologies
Introduction

Relevance of the research topic: The development of geoportals remains a very relevant and important task. Geoportals are web-based platforms that provide users with access to geographic information, maps, satellite images, terrain data, and other geospatial information.

For many fields, such as ecology, geology, agriculture, urban planning, geoportals help to collect, analyze and visualize data related to specific geographic regions. Governments and local authorities use geoportals to plan the development of cities and regions, improve infrastructure, management of the land resources and the other aspects. Geoportals are an indispensable tool for managing emergency situations, such as natural disasters, epidemics, fires, etc. They allow monitoring the situation in real time, coordinating aid and making quick decisions. Geoportals help researchers study changes in natural processes, study climate patterns, sea currents, the spread of diseases and much more.

Geoportals can be used to involve the public in decision-making, for example in matters of land planning or the location of new infrastructure facilities. Geoportals help tourists and travelers plan their trips, find interesting places to visit, restaurants, hotels, etc (Pashova L., & Bandrova T., 2017; Guigoz Y., Giuliani G., Nonguierma A., Lehmann A., Mlisa A., & Ray N., 2017; Crompvoets J., Vancauwenberge G., Ho S., Masser I., & Timo de Vries W., 2018; Gómez P. M., García M. P., Seco G. G., Santiago A. R., & Johnson C. T., 2018).

Theory

A geoportal is a type of web portal used for searching and accessing geographic information (geospatial information) and related services (geographic mapping, editing, analysis, etc.) via the Internet. Geoportals are important for effective use of geographic information systems (GIS) and a key element of the spatial data infrastructure. The geoportal is designed for creating, storing, searching, visualizing information, location and characteristics of spatial data sets, cartographic products and accompanying documentation, as well as for quickly getting the necessary data to your computer.

The geoportal can be implemented both at the level of one organization (to obtain information about data stored in the organization’s internal network or on its remote servers), and at the global level. Providers of geographic information, including government agencies and commercial sources, use geoportals to publish geospatial metadata descriptions) of their geographic information. Consumers of geographic information use geoportals to search and access the required information. Thus, geoportals play an increasingly important role in sharing geographic information and can avoid duplication of effort, inconsistencies, delays, confusion, and wasted resources (Karpinskyi Yu. O., Liashchenko A. A., Makarenko D. H., & Cherin A., 2021; Romaniuk V., Prykhodko M., Kukhtar D., Bodnaruk I., Dovhan I., 2021).

There are several levels of geoportals by territory coverage: global, national, and local (Butenko E., & Lutskyi V., 2018).

World geoportals are web platforms that provide access to geographic data and information at a global level. They are of great importance in promoting global development, science, technology and many other aspects. Examples of world-class geoportals are Google Maps, Bing Maps, OSM, etc.

Open Street Map is an open mapping platform that allows users to create and edit geographic data. OSM is based on the principle of openness, cooperation and joint contribution of the internal community. Users can add new objects, make changes within the system, and use OSM data in their projects. OSM provides a wide range of cartographic services, including map viewing, locating and routing.
Bing Maps is a geoportal developed by Microsoft. It also provides users with the ability to view maps, search for locations, get directions, and other features similar to Google Maps. Bing Maps is known for its high-quality satellite imagery and street imagery. It also provides an interface for developers to integrate Bing Maps into their own applications and websites.

Google Maps is one of the most popular geoportals that offers a wide range of functions. Users can view a map with different types of substrates (satellite images, maps, street view), search for places and businesses, get directions and navigate using GPS. Google Maps also provides the ability to open the map in web applications, mobile applications and integration with other Google services.

National-level geoportals are important tools for organizations, government structures, businesses and the public in specific geographic areas. They provide access to geographic information and data that is specific to a given region.

Geodesy, cartography, and land cadastre agencies: Some government agencies responsible for geodesy, cartography, and land cadastre create geoportals with data on land parcels, regional boundaries, and other geospatial data.

Tourist geoportals: Some regional authorities and tourism agencies create geoportals to promote tourist objects, routes and events.

Ecological geoportals: Organizations engaged in environmental activities can create geoportals for monitoring the state of the environment, measuring air and water quality, location of ecological objects, etc.

Geoportals for regional development: Some regional administrations in Ukraine create geoportals for regional development planning, coordination of investment projects and other regional initiatives.

Emergency situations and security: Regional emergency authorities can create geoportals to monitor hazards, provide information to citizens during crisis situations and emergency events.

Education and research: Universities and research institutions can create geoportals for geographic research, teaching and learning purposes.

Local geoportals include geoportals of local self-government bodies: Many local councils and administrations create their own geoportals, which provide information about the area, infrastructure, services and decisions of authorities. Below is a brief description of the algorithm for creating local georeferences.

Examples

This resource uses 3 programming languages: HTML, CSS and JavaScript. Each of these languages performs important functions that contribute to the optimal functioning and appearance of the site.

HTML (HyperTextMarkupLanguage) is the main markup language responsible for the structure and organization of content on pages. It allows you to define headings, paragraphs, lists, links and other elements that structure information on the site.

CSS (CascadingStyleSheets) is used to style the look of a website. This language allows you to define colors, fonts, element placement, borders, backgrounds, and other design aspects. CSS allows you to make the site attractive and easy to understand for visitors.
JavaScript is a programming language used to add dynamic functionality to a website. With the help of JavaScript, you can create user interaction with the site, validate forms, animate elements, download data from the server without reloading the page, and much more.

The overall interaction between these three languages allows you to create websites with an attractive appearance, structured content and a variety of functionality. Each language plays a role in this process, which helps ensure a quality user experience when browsing and interacting with the website. An example of visualization of a web resource is shown in Figure 1.

![Geoportal’s interface](image)

**Figure 1 Geoportal’s interface**

When we go to the site, the user first of all sees texts and buttons that are created in HTML. Their placement and shape, styles, backgrounds are all created in CSS. Text movement, button color changes, and transitions to other pages are created using JavaScript. The peculiarity of this geoportal from other geoportals is:

- Ease of use;
- Does not require a large budget to create;
- Easy to maintain.

Further details about the functionality of this geoportal are below. For starters, this website has a “Menu” button that is responsible for opening and closing the side navigation bar. When you click this button, a JavaScript function is executed that determines whether the navigation bar is currently open or closed. If the navigation bar is closed, it will open and you will see links to different sections of the website, such as "Home", "Maps", "Data", "Help" and "User". When you click on "Home", thanks to JavaScript, you will be redirected to the main page of the site. Clicking on "Maps" will take you to a page where different types of maps are presented, clicking on one of the types of maps will open a map from this set. Then, when you click on the "Data" page, a page will open with data sets about the maps, their download date, size, and information on each of the maps. With the help of the “Filter” button, which is shown in the upper right corner of the page, it is possible to enter the date and the name of the map that interests the user, and the site will find and present him (her) the number (by which the map can be found on the “Maps” page) and data about this card. When clicking on the "Help" button, users will be provided with instructions for using the site. There is also a “User” button on this site, it allows users to register, through which they can communicate with other users, share data, and propose new innovations and directly participate in the development of their city.

**Conclusions**

In the modern world, geoportals play an important role both in providing effective access to geographic information and in promoting the development of geo-information technologies and various spheres of society.
Geoportals allow consumers and providers of geographic information to interact using web-based platforms that facilitate data retrieval, analysis, visualization, and sharing. This becomes especially important in the context of the growing volume of geospatial data and its role in decision making.

The article describes the method of creating a geoportal at the local level. This example illustrates the interaction of different programming languages in a complex when creating geoportals. This text considered the importance and role of three programming languages - HTML, CSS and JavaScript - in the creation and functioning of websites. Each of these languages performs specific functions that help ensure the optimal structure, design and functionality of the site.

In general, the combination of these programming languages in the creation of a website allows you to provide a user-friendly and attractive interface, dynamic functionality and easy administration, which makes the geoportal effective tool for communication, data exchange and development of settlements.

References


