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APPLICATION OF WEB TECHNOLOGIES IN THE CREATION OF APIS GEOINFORMATION SYSTEM

Abstract: This article focuses on the development of a special information system for providing the necessary information in the planning of effective use of pasture land. The given data and images are obtained using remote sensing methods and processed using GIS technologies. With the help of these data, methods of creating a software tool called "Automated Pasture Information System" (APIS) were considered and the necessary conclusions were given.

Key words: pasture, geographic information system (GIS), remote sensing (RS), web technology, automated pasture information system (APIS).

Introduction. An information system created through the study of pasture lands using a geoinformation system and remote sensing is a valuable tool for monitoring and managing grazing lands. By integrating geospatial data with remote sensing technology, it is possible to obtain detailed information on vegetation cover, land use patterns, and other ecological variables that are critical for effective pasture management.

The information system can be designed to collect, store, analyse and display information in real-time, allowing ranchers and land managers to make informed decisions about grazing practices, herd management, and pasture restoration. The system can also provide predictive modelling capabilities, allowing users to anticipate changes in vegetation growth and climate patterns, and adjust their management practices accordingly.

The use of remote sensing and geoinformation systems in pasture management has numerous benefits, including improved efficiency, increased productivity, and reduced environmental impact. With the ability to collect and

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analyse large amounts of data quickly and accurately, this technology can help ranchers and land managers make better-informed decisions about how to manage their grazing lands for optimal results.

Based on this, the use of web technologies in the creation of the APIS geo-information system is considered within the method of this research.

Research methodology. Geographic information systems (GIS) are software tools that provide effective opportunities for analyzing and visualizing geographic data. These web applications provide the ability to retrieve and analyze data over the Internet [1].

There are several types of GIS web applications, such as:

Mapping applications. Mapping applications are designed to display maps and geographic information on the Internet. These applications allow users to zoom in and out of geographic information and view it in a panoramic view. Mapping applications can be used for a variety of purposes, including urban planning, emergency management, and environmental monitoring [2].

Analytical applications. Analysis applications provide a platform for conducting geographic analysis over the Internet. These applications allow users to perform geographic data, buffer analysis, and other geographic analysis functions. Analytics applications are used in a variety of fields, including environmental studies, urban planning, and transportation [3].

Data management applications. Data management applications are designed to manage GIS data over the Internet. These applications allow users to download and edit GIS data. Data management software is used in a variety of industries, including government, environmental studies, and urban planning [4].

In addition, there are remote sensing applications that can be used to analyze the surface of the earth in terms of various parameters [3].

If we talk about the convenience of GIS web applications, they are:

Data can be obtained from any point on the Earth's surface. GIS web applications allow users to access GIS data and analysis tools from anywhere with an Internet connection [2].

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Economic efficiency. GIS web applications eliminate the need for expensive GIS software and hardware, making it effective for organizations with limited budgets.

The possibility of cooperation. GIS web applications allow users to collaborate on GIS projects in real-time, regardless of location.

Based on the analyzed data, it is aimed to create a web information system for placing the data obtained from the remote sensing system on the Internet using a web application and displaying it to users.

As a result, a software tool was created in the form of a web application and is called APIS - Automated pasture information system. Using this software, we can plan the use of pasture land in the study area and get information about the condition of pasture land online.
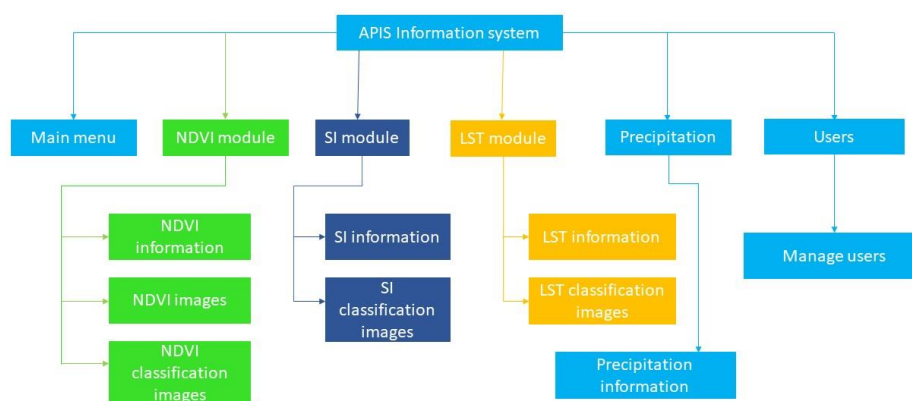

Figure 1. APIS system architecture

This information system consists of a main menu, three main modules, precipitation information, user management, and additional parts in each module. (Fig. 1). The functions of the main modules are as follows:

1.   NDVI - information about the condition and productivity of the vegetation;

2. SI - information about soil salinity;

3. LST - information about land surface temperature.

Results and discussions. These parts of the system can be accessed using the navigation menu on the left. The navigation menu is shown in the image below (Fig. 2).
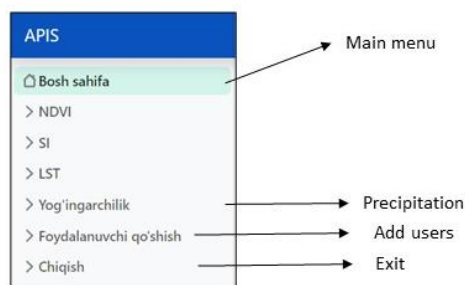
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Figure 2. APIS system navigation menu

The NDVI module includes three parts, the first of which provides a graphical display of data collected on the NDVI index for the period from 2013 to 2022. In the SI and LST modules, the data for years are displayed in a graphical form (Fig. 3).
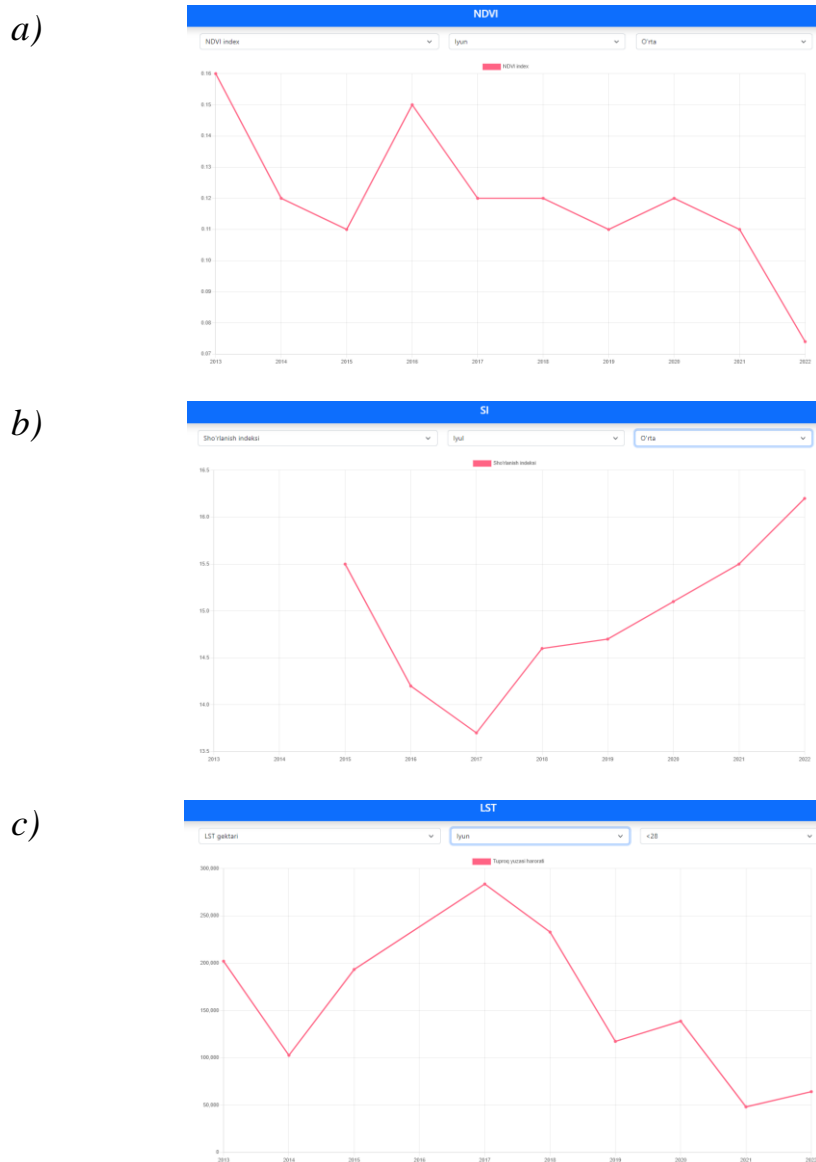
a)

b)

c)

Figure 3. Data of NDVI (a), SI (b) and LST (c) in years

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Also, each module has classification images, which can be used to compare state images of the maps by year and month (Fig. 4).
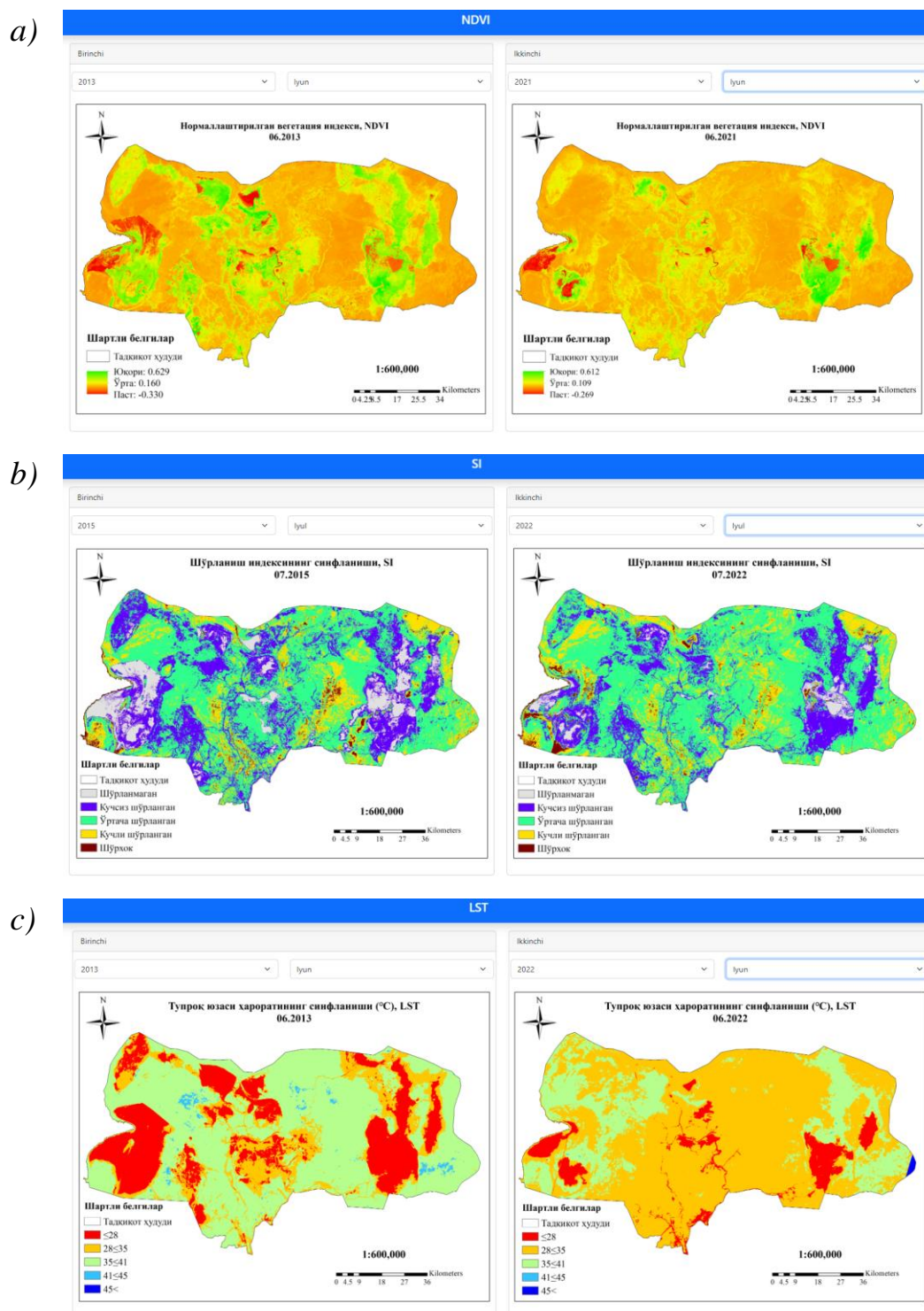

Figure 3. The output of maps with year and month filters on NDVI (a), SI (b), and LST (c) data

Web technologies were used in the creation of this information system developed during this research, as a result, a web application with high data processing speed and efficiency was created.

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Conclusion. GIS web applications are software tools designed to receive, analyze and manage data from geographic information systems via the Internet. They are used in a variety of fields, including emergency response, environmental studies, urban planning, and natural resource management. GIS web applications offer several advantages, such as increased usability, cost-effectiveness, and operational speed. The use of today's GIS web applications is developing day by day, as a result of which we believe that innovative information systems will be developed using this technology in the near future.

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