



## THEORY OF CREATING CLUSTER MONITORING WEB MAPS USING GEOINFORMATION SYSTEMS

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### Abstract

Cluster monitoring is the process of identifying and analyzing clusters of events or phenomena in a specific geographic area. Geoinformation systems (GIS) and web maps are powerful tools for cluster monitoring, as they allow organizations to visualize and analyze data in a geographic context. This article provides an overview of how to create cluster monitoring web maps using data from geoinformation systems. It covers the basics of cluster monitoring web maps, including the types of data used and the role of web maps in cluster monitoring. It also addresses data collection and preparation, the process of creating web maps, and common challenges organizations face. Finally, it highlights the use cases of cluster monitoring web maps, and concludes with the prospects for cluster monitoring in the future.

**Keywords:** Cluster monitoring, Geoinformation systems (GIS), Web maps, Data visualization, Geospatial data, Data analysis, Data preparation, Data quality, User-friendly interfaces, Environmental monitoring, Disease surveillance, Crime analysis, Spatial data, Non-spatial data, Patterns and trends, Informed decision-making.

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## Абстракт

Кластерный мониторинг — это процесс выявления и анализа кластеров событий или явлений в определенной географической области. Геоинформационные системы (ГИС) и веб-карты являются мощными инструментами кластерного мониторинга, поскольку они позволяют организациям визуализировать и анализировать данные в географическом контексте. В этой статье представлен обзор того, как создавать веб-карты кластерного мониторинга с использованием данных из геоинформационных систем. Он охватывает основы веб-карт мониторинга кластеров, включая типы используемых данных и роль веб-карт в мониторинге кластеров. В нем также рассматриваются сбор и подготовка данных, процесс создания веб-карт и общие проблемы, с которыми сталкиваются организации. Наконец, в нем освещаются варианты использования веб-карт мониторинга кластеров и в заключении приводятся перспективы мониторинга кластеров в будущем.

**Ключевые слова:** Кластерный мониторинг, Геоинформационные системы (ГИС), Веб-карты, Визуализация данных, Геопространственные данные, Анализ данных, Подготовка данных, Качество данных, Удобные интерфейсы, Мониторинг окружающей среды, Наблюдение за заболеваниями, Анализ преступности, Пространственные данные, Непространственные данные, закономерности и тенденции, информированное принятие решений.

## Introduction

Geoinformation systems (GIS) and web maps are powerful tools for cluster monitoring, which involves identifying and analyzing clusters of events or phenomena that occur in a specific geographic area. By creating cluster monitoring web maps using data from geoinformation systems, organizations can gain valuable insights into patterns and trends, and make informed decisions based on that information. In this article, we will explore how to create cluster monitoring web maps using data from geoinformation systems [1].

A cluster monitoring web map is a mapping application designed to provide real-time monitoring and analysis of clustered data. Clustered data refers to a group of data points that are close to each other in a specific geographic area. These data points can represent various types of information, such as traffic patterns, weather conditions, social media activity, or sensor readings from IT devices.

The cluster monitoring web map allows users to visualize and interact with this data in a dynamic way, using different types of maps and visualizations such as heat maps,





point density maps, and scatter plots. The web map can be customized to display different layers of data, and the user can zoom in and out to see more or less detail [2].

Cluster monitoring web maps can be used in various fields, such as transportation, urban planning, public safety, and environmental monitoring. They can help users make informed decisions based on real-time data, predict trends and patterns, and identify anomalies or outliers that require attention.

### **Understanding the Basics of Cluster Monitoring Web Maps**

Cluster monitoring refers to the process of identifying and analyzing clusters of events or phenomena that occur in a specific geographic area. Web maps play a critical role in cluster monitoring, as they allow organizations to visualize and analyze data in a geographic context. The types of data used in creating cluster monitoring web maps can include demographic data, environmental data, health data, and more. Cluster monitoring web maps can be very useful in agriculture for a number of reasons. Here are some examples of the importance of cluster monitoring web maps in agriculture:

- **Crop monitoring:** Cluster monitoring web maps can be used to monitor crops in real-time and identify areas that require attention, such as areas with low or high plant density, areas with signs of pest or disease infestations, and areas with insufficient or excessive water supply. This information can help farmers take proactive measures to improve crop health and yield.
- **Weather monitoring:** Cluster monitoring web maps can be used to monitor weather conditions and predict weather patterns, which is particularly important in agriculture since weather can have a significant impact on crop growth and productivity. Farmers can use this information to adjust irrigation schedules, apply pesticides and fertilizers at optimal times, and protect crops from extreme weather conditions such as frost, hail, or drought.
- **Soil monitoring:** Cluster monitoring web maps can be used to monitor soil moisture, temperature, and nutrient levels, which are all important factors for crop growth and health. Farmers can use this information to adjust irrigation and fertilization practices, and to identify areas that require more or less nutrients or water.
- **Yield prediction:** Cluster monitoring web maps can be used to predict crop yield based on real-time data and historical trends. This information can help farmers make informed decisions about crop pricing and marketing, and plan for future seasons.





From since, cluster monitoring web maps can help farmers optimize their farming practices by providing real-time data and insights about their crops and the environment. This can lead to increased productivity, reduced costs, and improved sustainability [3].

### **Data Collection and Preparation**

To create a cluster monitoring web map, it is essential to collect and prepare the geospatial data that will be used in the map. This can involve collecting data from different sources, such as government agencies, non-profit organizations, and private companies. The types of geospatial data used in creating cluster monitoring web maps can include spatial data, such as maps and satellite imagery, as well as non-spatial data, such as demographic and environmental data.

The use of web maps can be very beneficial in various fields in Uzbekistan, especially in the context of rapid urbanization and economic growth. Here are some examples of how web maps can be useful in different fields:

**Urban planning:** Web maps can be used to visualize and analyze demographic data, land use patterns, transportation networks, and other factors that are important for urban planning. This can help urban planners make informed decisions about zoning, infrastructure development, and public services, and improve the quality of life for residents.

**Environmental management:** Web maps can be used to monitor and assess environmental risks, such as air pollution, water pollution, and natural disasters. This can help government agencies and NGOs take proactive measures to protect the environment and public health.

**Agriculture:** Web maps can be used to monitor crop health, soil moisture levels, and weather patterns, which are all important factors for agriculture. This can help farmers optimize their practices and increase crop yields.

**Public safety:** Web maps can be used to monitor crime rates, emergency response times, and disaster risks, which are all important factors for public safety. This can help law enforcement agencies and emergency responders improve their services and response times [4].

### **Creating Cluster Monitoring Web Maps**

The process of creating cluster monitoring web maps typically involves several steps, including data acquisition, data preparation, data analysis, and visualization. There are many tools and technologies available for creating web maps, such as ArcGIS, QGIS, and Leaflet. When creating cluster monitoring web maps, it is important to





address common challenges, such as data quality and accuracy, as well as the need for user-friendly interfaces. Creating Cluster Monitoring Web Maps is the process of identifying and analyzing clusters of events or phenomena in a specific geographic area using geoinformation systems (GIS) and web maps. Cluster monitoring web maps play a vital role in environmental monitoring, disease surveillance, and crime analysis, among other areas.

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The use cases for cluster monitoring web maps are varied and extensive. For instance, cluster monitoring web maps can be used to identify areas with high pollution levels or to track the spread of infectious diseases. By visualizing data in a geographic context, organizations can gain valuable insights into patterns and trends, and make informed decisions based on that information [5].

In conclusion, creating cluster monitoring web maps using data from geoinformation systems can provide valuable insights into patterns and trends, and help organizations make informed decisions based on that information. With the growing importance of geoinformation systems and web maps, the prospects for cluster monitoring are bright.

### **Use Cases of Cluster Monitoring Web Maps**

There are many use cases for cluster monitoring web maps, such as environmental monitoring, disease surveillance, and crime analysis. For example, cluster monitoring web maps can be used to identify areas with high pollution levels or to track the spread of infectious diseases. By visualizing data in a geographic context, organizations can gain valuable insights into patterns and trends, and make informed decisions based on that information.





Here are some examples:

1. **Environmental Monitoring:** Cluster monitoring web maps can be used to identify areas with high pollution levels or deforestation rates, among other environmental issues. These maps help organizations and governments make informed decisions related to environmental protection and conservation.
  2. **Disease Surveillance:** Cluster monitoring web maps can be used to track the spread of infectious diseases such as COVID-19. By analyzing the geographic distribution of cases and identifying clusters, health officials can take targeted measures to prevent the further spread of the disease.
  3. **Crime Analysis:** Cluster monitoring web maps can be used to identify high-crime areas and patterns of criminal activity. By analyzing these patterns, law enforcement officials can take targeted measures to reduce crime and keep communities safe.
  4. **Natural Disaster Response:** Cluster monitoring web maps can be used to track the effects of natural disasters such as hurricanes, earthquakes, and wildfires. By identifying areas affected by these disasters, relief organizations can allocate resources more effectively and respond more quickly to those in need.
  5. **Urban Planning:** Cluster monitoring web maps can be used to identify patterns of urban growth and development. By analyzing these patterns, city planners can make informed decisions related to zoning, transportation, and infrastructure development.
- In summary, cluster monitoring web maps have a wide range of use cases across various industries and sectors, and can provide valuable insights into patterns and trends that can inform decision-making and improve outcomes in many areas.

## **Conclusion**

In conclusion, creating cluster monitoring web maps using data from geoinformation systems can provide valuable insights into patterns and trends, and help organizations make informed decisions based on that information. By collecting and preparing geospatial data, using appropriate tools and technologies, and addressing common challenges, organizations can create user-friendly web maps that provide valuable insights into a wide range of phenomena. With the growing importance of geoinformation systems and web maps, the prospects for cluster monitoring are bright.

Creating maps can solve a variety of problems beyond the use of web maps. Maps can be used to visualize and analyze market data, such as customer demographics, spending patterns, and location data. This can help businesses make informed decisions about product placement, marketing strategies, and expansion plans. Maps can be used to study historical events and changes over time. Historical maps can





provide valuable insight into past landscapes, boundaries, and cultural practices. Maps can be used to help emergency responders locate and rescue people in distress. Maps can also be used to plan for and respond to natural disasters, such as floods, wildfires, and hurricanes. Overall, maps can be a powerful tool for solving a wide range of problems, from simple navigation to complex geographic analysis. By visualizing data in a geographic context, maps can help people make informed decisions and take proactive measures to address important issues.

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