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"MILLIY STATISTIKA TIZIMIDA YANGI BOSQICH: BARQAROR RIVOJLANISH MAQSADLARI, XALQARO STANDARTLAR VA ZAMONAVIY TENDENSIYALAR"

MECHANISMS FOR IDENTIFYING REGIONAL DISPARITIES BASED ON ARTIFICIAL INTELLIGENCE TECHNOLOGIES

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Abstract. This study analyzes mechanisms for identifying regional imbalances based on artificial intelligence technologies. The research develops a conceptual framework integrating socioeconomic, spatial, and digital data within an AI-driven analytical system. Machine learning methods, including clustering, regression, anomaly detection, and deep learning, are applied to identify underdeveloped and unevenly developed regions. The results include imbalance indicators and priority regional groups to support effective resource allocation and territorial development planning. The study demonstrates that AI-based approaches significantly improve the accuracy and timeliness of regional imbalance detection compared to traditional statistical methods.

Keywords: Artificial intelligence, GIS, regional disparities, socio-economic development, demographic analysis, digital economy.

Аннотация. В данном исследовании анализируются механизмы выявления региональных дисбалансов на основе технологий искусственного интеллекта. Разрабатывается концептуальная структура, интегрирующая социально-экономические, пространственные и цифровые данные в аналитическую систему, управляемую ИИ. Методы машинного обучения, включая кластеризацию, регрессию, обнаружение аномалий и глубокое обучение, применяются для идентификации слаборазвитых и неравномерно развитых регионов. Результаты включают показатели дисбаланса и приоритетные группы регионов, что способствует эффективному распределению ресурсов и планированию территориального развития. Исследование демонстрирует, что подходы на основе ИИ значительно повышают точность и оперативность выявления региональных дисбалансов по сравнению с традиционными статистическими методами.

Ключевые слова: Искусственный интеллект, ГИС, региональные дисбалансы, социально-экономическое развитие, демографический анализ, цифровая экономика.

Introduction

Regional imbalances remain one of the key challenges to sustainable economic development and social stability. In many countries, including Uzbekistan, such disparities are reflected in unequal levels of infrastructure

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development, access to quality education and healthcare, employment opportunities, and the availability of digital services across regions. In particular, noticeable differences can be observed between urban and rural areas, as well as among individual regions in terms of income levels and access to modern technologies. Traditional approaches to identifying regional disparities are mainly based on official statistical indicators and descriptive analysis. While these methods provide a general overview, they are often limited in their ability to capture complex, rapidly changing socioeconomic processes. In addition, such approaches tend to be retrospective and do not always allow for timely detection of emerging imbalances. The growing application of artificial intelligence technologies offers new opportunities for improving the assessment of regional development. AI methods make it possible to process large volumes of diverse data, including socioeconomic statistics, geospatial data, and satellite imagery. This allows for a more detailed identification of hidden patterns and spatial inequalities that may not be visible through conventional analytical tools. In particular, machine learning techniques such as clustering, regression analysis, and anomaly detection can be used to classify regions, evaluate their development levels, and identify potential risks of imbalance. The paper examines mechanisms for identifying regional imbalances based on artificial intelligence technologies. Its main objective is to develop a conceptual framework that integrates heterogeneous data sources into a unified analytical system. The study also aims to systematize relevant AI methods for diagnosing territorial disparities and to form a set of composite indicators that reflect the degree of regional imbalance. The results of the research are expected to contribute to more informed decision-making in regional policy, including more effective allocation of resources and improved strategic planning.

Main section

Regional disparities are significant differences in socio-economic development between regions, affecting economic stability, employment opportunities, access to education, healthcare, and infrastructure. These disparities are often visible between urban and rural areas as well as among different provinces. Over the last two decades, income gaps between small regions have grown in many countries. For example, OECD research shows that in over half of the countries studied, per capita income gaps between regions increased between 2000 and 2020 [1]. Traditional methods of analyzing regional disparities rely on official statistics and descriptive reports. While they provide general information, these approaches are limited in handling large datasets and detecting complex patterns in real time. They often fail to capture rapidly changing socio-economic conditions and emerging issues, which makes planning and resource allocation slower and less efficient. The use of artificial intelligence and machine learning

methods enables the processing of large and heterogeneous data from multiple sources. Economic indicators such as regional income, employment, and investment can be analyzed using clustering and regression analysis to detect differences and trends between regions. Demographic indicators, including population density, migration patterns, and age structure, can be assessed using classification and anomaly detection methods to identify regions that require targeted interventions [2]. Disparities in GDP per capita are often more noticeable when analyzed at smaller regional levels. For instance, in 2018, the top 20% of regions in GDP per capita had nearly twice the income level of the bottom 20% of regions [3]. Infrastructure and service indicators, including schools, healthcare facilities, transport networks, and internet access, can be assessed through predictive modeling. Digital indicators, such as internet penetration, mobile network coverage, and e-commerce usage, are evaluated using Big Data analytics to understand differences in digital economy participation. In Uzbekistan, regional inequalities are clearly observable. The average annual income in Tashkent is approximately 6.2 million UZS, while in Xorazm it is only 2.8 million UZS. Similarly, employment rates vary between regions: 58% in Tashkent and 42% in Sirdaryo [4]. These differences highlight the importance of accurate regional analysis to guide development policies and improve resource allocation. AI-based systems allow for the integration of economic, demographic, infrastructure, and digital data into comprehensive regional assessments. This means that instead of looking at only one factor, such as income or population, all important aspects of a region can be considered together. By combining different types of information, it becomes easier to see which areas are lagging behind and which are developing faster. For example, a region may have a high income level but poor access to schools or healthcare, and this approach helps to identify these kinds of imbalances. Using this method, local authorities and policymakers can make decisions based on a fuller picture of the region. They can prioritize investments where they are needed most, such as building new hospitals, improving road networks, or providing better internet access. It also helps to plan for the future, by showing trends like population growth or migration patterns that might affect regional development. In short, combining different kinds of data gives a clearer and more practical understanding of how to reduce regional disparities and improve living conditions for people in all areas.

Conclusion

Regional disparities in income, infrastructure, and services continue to challenge sustainable development in Uzbekistan. Traditional methods cannot fully capture these differences, but integrating economic, demographic, infrastructure, and digital data provides a clearer picture. AI-based approaches help identify underdeveloped regions and support better policy and resource allocation. Using

these methods can promote more balanced regional development and improve overall economic stability.

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