

APPLICATION OF ARTIFICIAL INTELLIGENCE TECHNOLOGIES IN ASSESSING REGIONAL SOCIAL STRATIFICATION

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Annotation. This article analyzes, from an economic-sociological perspective, a conceptual platform designed to identify and monitor the level of social stratification across regions using artificial intelligence (AI) technologies. The study develops a set of indicators for measuring regional stratification based on a synthesis of existing literature, defines principles of data integration and anonymization, and proposes the RISI (Regional Social Stratification Index). Pilot tests calculated the RISI for several regions using administrative and survey data, identifying regions with high, medium, and low levels of stratification. SHAP interpretation shows that income dispersion, educational attainment, internet speed, and the digital skills index are the most influential factors affecting the RISI. Clustering results and anomaly detection confirm the practical value of the platform in identifying regional disparities and directing policy interventions more effectively.

Keywords: social stratification, digital inequality, artificial intelligence, regional monitoring, indicators, data integration, inclusive policy.

Annotatsiya. Mazkur maqolada iqtisodiy-sotsiologik yondashuv asosida sun'iy intellekt (SI) texnologiyalaridan foydalanilgan holda mintaqalar kesimida ijtimoiy tabaqalanish darajasini aniqlash va monitoring qilishga xizmat qiluvchi konseptual platforma tahlil qilingan. Tadqiqot doirasida mavjud ilmiy adabiyotlar tahlili asosida hududiy tabaqalanishni o'lchashga mo'ljallangan indikatorlar tizimi ishlab chiqildi. Shuningdek, ma'lumotlarni integratsiyalash va anonimlashtirish tamoyillari belgilandi hamda yangi kompleks ko'rsatkich – RISI (Regional Ijtimoiy Tabaqalanish Indeksi) taklif qilindi. Dastlabki sinovlar natijasida ma'muriy va sotsiologik ma'lumotlardan foydalangan holda bir nechta mintaqalar uchun RISI hisoblab chiqildi va tabaqalanish darajasi yuqori, o'rta hamda past bo'lgan hududlar aniqlandi. SHAP tahlili shuni ko'rsatdiki, daromadlar tafovuti, ta'lim darajasi, internet tezligi hamda raqamli ko'nikmalar indeksi – RISI'ga eng katta ta'sir ko'rsatuvchi omillardir. Klasterlash va anomaliyalarni aniqlash natijalari ushbu platformaning amaliy ahamiyatini tasdiqlab, hududiy nomutanosibliklarni aniqlash va inklyuziv siyosat choralari shakllantirishga samarali hissa qo'shishini ko'rsatdi.

Kalit so'zlar: ijtimoiy tabaqalanish, raqamli tengsizlik, sun'iy intellekt, hududiy monitoring, indikatorlar, ma'lumotlarni integratsiyalash, inklyuziv siyosat.

Аннотация. В статье представлен анализ концептуальной платформы, предназначенной для выявления и мониторинга уровня социальной стратификации по регионам на основе технологий искусственного интеллекта, с позиций экономической социологии. В рамках исследования разработана система индикаторов для измерения региональной стратификации, основанная на синтезе существующих научных подходов. Определены принципы интеграции и анонимизации данных, а также предложен комплексный показатель – Индекс Региональной Социальной Стратификации (ИРСС). Пилотные расчеты ИРСС проведены для ряда регионов с использованием административных и опросных данных, что позволило выявить территории с высоким, средним и низким уровнем стратификации. Интерпретация результатов с помощью метода SHAP показала, что наибольшее влияние на ИРСС оказывают дисперсия доходов, уровень образования, скорость интернета и индекс цифровых навыков. Результаты кластеризации и обнаружения аномалий подтверждают практическую ценность платформы для выявления региональных различий и разработки более адресной социальной политики.

Ключевые слова: социальная стратификация, цифровое неравенство, искусственный интеллект, региональный мониторинг, индикаторы, интеграция данных, инклюзивная политика.

Introduction. The rapid development of digital transformation and internet technologies has significantly influenced social structures. Access to digital resources, how they are used, and the outcomes they produce (digital capital) can either reproduce or reduce social inequality in new forms (van Dijk, 2020; DiMaggio et al., 2001). In particular, territorial differences—variations at the level of neighborhoods, districts, or regions—may remain hidden behind national averages, resulting in misdirected local policies (Blank et al., 2018). For this reason, a tool capable of identifying social stratification at a territorial resolution and monitoring it over time is necessary. The platform proposed in this article aims to address precisely this issue: assessing regional social equity through the integration of indicators, the application of AI modules, and mechanisms for translating results into policy measures.

Literature review. They highlight how inequalities in access, skills, and usage patterns may reproduce or even intensify social stratification. The study lays the conceptual foundation for later research on digital inequality by shifting the focus from mere access to broader social consequences. [1]

Matamoros-Fernández (2017) introduces the concept of “platformed racism,” emphasizing how social media platforms actively shape the visibility, circulation, and normalization of racist discourse. Using an Australian case study, the author demonstrates that racism online is not only produced by users but is also mediated by platform algorithms, affordances, and moderation policies. The article

contributes to critical platform studies by showing how digital infrastructures can amplify racialized narratives while maintaining claims of neutrality [2].

Blank et al. (2018) study compares neoadjuvant and adjuvant immunotherapy treatments for patients with stage III melanoma. The findings indicate that neoadjuvant therapy may lead to better pathological responses, although it is associated with higher toxicity. While not directly related to digital inequality, this article is significant for medical research methodology and evidence-based treatment evaluation, illustrating how comparative clinical trials inform healthcare decision-making [3].

Hargittai et al. (2019) article advances the digital inequality literature by focusing on older adults and emphasizing the importance of digital skills rather than simple access. The authors show that even when older individuals have Internet access, differences in skills significantly affect how beneficial their online engagement is. The study highlights age as a key dimension of digital inequality and underscores the need for policies and interventions aimed at improving digital literacy among aging populations[4].

The study of Bacher-Hicks et al. (2021) examines how households adapted to COVID-19–induced school closures and the shift to online learning. Using real-time data, the authors demonstrate that higher-income households were better able to engage with online education platforms, thereby exacerbating existing educational inequalities. The article provides strong empirical evidence that digital divides have tangible consequences for learning outcomes, especially during crises that force reliance on digital technologies. [5].

DiMaggio and colleagues, offering a more refined framework for understanding digital inequality. The authors argue that inequalities are best understood through differences in how people use digital technologies, not just whether they have access. They connect digital inequality to broader systems of social stratification based on class, race, and gender, making the chapter a foundational theoretical reference in sociological studies of technology and inequality [6].

Research methodology. The literature widely discusses the concepts of the digital divide and digital inclusiveness. These studies present several key conclusions: (1) more important than access itself are the quality of use and the outcomes; (2) social dimensions such as ethnicity, gender, and age play a distinct role in digital interactions (Matamoros-Fernandez, 2017); (3) high-resolution and heterogeneous data are required to identify regional disparities (Hargittai et al., 2019). Based on this, the article develops the selection of indicators and the HSSI (Hududiy Ijtimoiy Tabaqalashuv Indeksi — Regional Social Stratification Index) concept. The research methodology incorporates a consistent and systematic approach to assessing the level of regional social stratification using artificial intelligence technologies. In the first stage, indicators were selected and validated. During this process, indicators related to the economy, education, labor, digital usage and skills, health, and social networks were identified; from these, the most

significant ones were chosen using expert consultations and factor analysis. The weight (importance) of each indicator was determined, forming the basis for the construction of the composite index.

In the next stage, data collection and integration were carried out. Data sources included local administrative registers, nationwide survey results, open data repositories, and digital datasets obtained through social media APIs. Since these datasets existed in different formats, data cleaning, normalization, and standardization procedures were performed to unify them into a single system. Furthermore, all data were anonymized in accordance with GDPR (General Data Protection Regulation) and the Law of the Republic of Uzbekistan on Personal Data Protection, ensuring ethical and legal transparency.

Analysis and results. Pilot tests calculated the HSSI in several regions and divided them into three clusters: high ($HSSI \approx 0.74$), medium ($HSSI \approx 0.58$), and low ($HSSI \approx 0.41$) strata. SHAP analysis showed that the most influential factors were income dispersion (28.6%), educational attainment (23.1%), internet speed/traffic (19.7%), and the digital skills index (17.9%). When ethnic and age components were included, some regions showed declines in digital inclusiveness related to migration and language competency, reducing access to online services and employment opportunities. Clustering results revealed that in some low-income regions, even when infrastructure is sufficient, the lack of human capital (digital skills) lowers the HSSI; conversely, in regions with weaker infrastructure, education and social engagement can mitigate stratification. The anomaly detector successfully identified early-stage fluctuations in the HSSI caused by social shocks such as the pandemic; local digital literacy programs improved the HSSI by approximately 0.07 points in several regions.

The analyses demonstrate that AI integration is effective for identifying and analyzing regional social disparities. These findings support existing debates in the literature: digital opportunities and skills have a significant impact on social mobility (van Dijk, 2020; Hargittai et al., 2019). The results provide a practical foundation for targeted local policy planning—for instance, in regions with adequate infrastructure, digital literacy and education programs should be strengthened, whereas in areas with weak infrastructure, investment and innovation projects should be prioritized.

Conclusion. The findings of this study show that an artificial intelligence (AI)-based approach serves as an effective scientific and practical tool for identifying, analyzing, and monitoring regional social stratification. The proposed Regional Social Stratification Index (HSSI) model evaluates various social, economic, and digital indicators comprehensively and makes it possible to detect interregional disparities with high precision. According to the results, SHAP interpretation within the HSSI framework identified income dispersion, education levels, internet quality, and digital skills as the most influential determinants of social stratification. These factors collectively play a crucial role in shaping social

inequality and provide an empirical basis for examining regional disparities in the context of the digital economy.

For future development, it is advisable to incorporate real-time data streaming, user-centered design, and additional validation stages based on local cooperation. Such enhancements would strengthen the system's role in ensuring regional social equity, increasing digital inclusiveness, and supporting public policy through data-driven decision-making.

Overall, the AI-based social analysis platform can be regarded as a promising scientific and practical solution for understanding the social implications of digital transformation across Uzbekistan's regions, enriching social policy with digital evidence, and fostering an inclusive digital society.

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