УДК 528.4:004.8

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APPLICATION OF ARTIFICIAL INTELLIGENCE TO GEODETIC DATA PROCESSING

У статті розглядається застосування штучного інтелекту для обробки геодезичних даних та його вплив на покращення точності, ефективності та швидкості аналізу.

***Ключові слова**: штучний інтелект, обробка геодезичних даних, точність, ефективність, швидкість аналізу, геодезія, картографія.*

The article considers the use of artificial intelligence for geodetic data processing and its impact on improving the accuracy, efficiency and speed of analysis.

***Key words**: artificial intelligence, geodetic data processing, accuracy, efficiency, analysis speed, geodesy, cartography.*

Geospatial information plays a role, in fields like map making, city planning, environmental surveillance and geological engineering. However, dealing with this data can be intricate and time consuming due to its volume and complexity. Artificial intelligence (AI) offers an approach to analyze and process such data.

AI involves computer systems of performing tasks that traditionally rely on intelligence like learning, decision making and speech recognition. Its application in geodesy and map making streamlines tasks enhances the accuracy and speed of data processing and uncovers intricate patterns within information.

To validate this theory a research project utilized AI techniques such as machine learning and neural networks for analyzing data.

Machine learning is an AI technique that enables computers to learn from data without programming. Neural networks are a type of machine learning algorithm inspired by the structure and function of the brain.

In the study neural networks were employed for categorizing information, like elevation, slope angles and directional aspects.

The findings indicated that employing networks, for categorizing data yielded a 95% accuracy rate surpassing traditional approaches by 15% [3]. Additionally, the utilization of machine learning algorithms to forecast changes in data led to a 20% enhancement in accuracy compared to statistical models [4]. An instance of an AI implementation in processing data is the "DeepGlobe" initiative conducted by "Carnegie Mellon University" and "CosmiQ Works". Within this project neural networks were utilized for automated extraction of buildings from satellite imagery. The outcomes revealed that neural networks can attain a 90% accuracy rate, in building extraction significantly outperforming techniques [5].

Using AI to process data offers advantages beyond just enhancing accuracy and efficiency. For example, it can automate tasks reduce the reliance, on labor and minimize errors linked to human related factors. Additionally, AI has the capability to uncover patterns and connections within data that may not be easily recognizable by humans. This feature proves valuable in detecting changes like soil erosion, sea level fluctuations and climate variations.

Furthermore, AI aids in handling volumes of data gathered from diverse sources such as satellite images, aerial photographs, drones and ground sensors. With its capacity to swiftly process datasets AI enables geodesists to produce dependable outcomes in a more expedited manner.

The research findings demonstrate that leveraging AI for geodetic data processing significantly enhances accuracy, efficiency and analysis speed. This advancement opens up horizons in the fields of geodesy and cartography especially pertaining to surveillance urban development planning and engineering geological studies.

Despite the promising outcomes achieved far exploration in this domain is still, at a developmental stage.

More research is required to enhance the effectiveness of AI algorithms in analyzing information and to investigate the applications of AI in various geodesy related fields. One area that warrants exploration is utilizing AI for the analysis of Light Detection and Ranging (LiDAR) data, which's crucial, for generating precise 3D models of Earths terrain. While LiDAR offers elevation and surface information its data processing can be intricate and time intensive. Leveraging AI could automate LiDAR data processing leading to improved accuracy and efficiency, in analysis.

Another avenue, for exploration involves utilizing AI to analyze data gathered by UAVs. UAVs are becoming increasingly prevalent in geodesy and cartography for capturing data about the Earth's surface. Integrating AI can streamline the processing of UAV data enhancing the precision and effectiveness of analysis [7].

Additionally, AI has the potential to develop systems that can autonomously adapt to environmental changes and fine tune their parameters based on acquired data. Such systems could prove invaluable in scenarios where environmental shifts happen swiftly and unexpectedly such as during calamities.

Consequently, leveraging intelligence for data processing holds promise in advancing accuracy, efficiency and rapidity of analysis. This paves the way for possibilities in the realms of geodesy and cartography in environmental monitoring, urban planning and engineering geology. Nonetheless research in this domain is still nascent necessitating exploration to refine AI algorithms tailored for processing data effectively and uncovering AIs potential, across other facets tied to geodesy.

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