PERSPECTIVES ON DEEP LEARNING IN PREDICTION AND OPTIMIZATION TASKS IN URBAN PLANNING AND ENVIRONMENTAL MANAGEMENT

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The relevance of geospatial analysis and forecasting is increasing due to the growth of spatial data and its importance for strategic decision-making in a multitude of domains. The examination of spatial patterns facilitates the formulation of sustainable development strategies and the optimal utilization of resources at the municipal and national levels [1].

The application of deep learning methods has the potential to enhance the efficiency of geospatial analysis, as they facilitate the automated processing of large data sets and enable the identification of intricate spatial and temporal dependencies [2]. Furthermore, they facilitate spatial forecasting, incorporating dynamic variables such as weather patterns or demographic shifts that conventional analytical techniques often struggle to process [3]. Recurrent models and reinforcement learning approaches facilitate not only forecasting but also optimization of decisions in real time, thereby providing the adaptability and accuracy required for modern spatial planning and management.

The objective of this report is to provide an overview of the current state of development of deep learning methods and tools for addressing geospatial analysis challenges.

The report examines the principal approaches employed to process spatial data, including convolutional, recurrent, and graph neural networks. The primary domains of application encompass natural disaster forecasting, sustainable urban development, analysis of animal migration processes, and optimization in agriculture. The integration of deep learning in these domains can enhance forecast precision and management efficacy, which is crucial for contemporary spatial analysis.

Список літератури

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