Development Plan of Status Analysis Model for Administrative Big Data based on Spatial Data Cubes

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Abstract

The Republic of Korea is advancing an AI-driven industrial transformation through the development of cutting-edge artificial intelligence technologies. In emerging sectors such as Urban Air Mobility, autonomous vehicles, and indoor robotics, real-time spatial perception and analysis are crucial for intelligent decision-making. However, existing spatial information systems face limitations in representing multidimensional and spatiotemporal environments and in integrating global spatial data. To address these challenges, the Ministry of Land, Infrastructure and Transport (MOLIT) is developing the Spatial Data Cube, a voxel-based three-dimensional grid that manages aerial, surface, underground, and indoor spaces in an integrated framework. This study presents a development framework for a state analysis model utilizing administrative big data within the Spatial Data Cube. The model constructs a voxel-based analytical engine, selects administrative datasets suitable for visualization, and designs operational scenarios to derive real-time spatial insights. The proposed framework supports dynamic visualization, multidimensional analysis, and predictive modeling across various spatial domains. The findings are expected to contribute to the establishment of an intelligent spatial infrastructure that facilitates data-driven decision-making for future smart governance and infrastructure management.