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# Synthetic Data-Driven Prediction Using GANs and LSTMs for Smart Traffic Management

**Authors :** Srinivas Peri, Siva Abhishek Sirivella, Tejaswini Kallakuri, Uzair Ahmad

**Abstract :** Smart cities and intelligent transportation systems rely heavily on effective traffic management and infrastructure planning. This research tackles the data scarcity challenge by generating realistically synthetic traffic data from the PeMS-Bay dataset, enhancing predictive modeling accuracy and reliability. Advanced techniques like TimeGAN and GaussianCopula are utilized to create synthetic data that mimics the statistical and structural characteristics of real-world traffic. The future integration of Spatial-Temporal Generative Adversarial Networks (ST-GAN) is anticipated to capture both spatial and temporal correlations, further improving data quality and realism. Each synthetic data generation model's performance is evaluated against real-world data to identify the most effective models for accurately replicating traffic patterns. Long Short-Term Memory (LSTM) networks are employed to model and predict complex temporal dependencies within traffic patterns. This holistic approach aims to identify areas with low vehicle counts, reveal underlying traffic issues, and guide targeted infrastructure interventions. By combining GAN-based synthetic data generation with LSTM-based traffic modeling, this study facilitates data-driven decision-making that improves urban mobility, safety, and the overall efficiency of city planning initiatives.

**Keywords :** GAN, long short-term memory (LSTM), synthetic data generation, traffic management
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