Environmental Engineering and Management Journal xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
http://www.eemj.icpm.tuiasi.ro/; http://www.eemj.eu

"Gheorghe Asachi" Technical University of Iasi, Romania

EXPLORING THE DEVELOPMENT OF AN INFRASTRUCTURE FOR SUSTAINABLE URBAN TRAFFIC INFORMATION MANAGEMENT AND SERVICE USING ARTIFICIAL INTELLIGENCE

Wei Guo

Beijing Police College, Beijing, 102202, China, E-mail address: bjyyhyl@126.com

Abstract

The urban social economy and people's lives are both significantly impacted by the transportation system's ability to support its further development sustainably. Currently, the government and the whole population are quite worried about the traffic problem. This study suggests a Deep Learning (DL) method for predicting urban traffic that integrates data from Twitter messages with traffic and meteorological data. Deep particle swarm optimizations with bilateral recurrent neural network (DPSO+Bi-RNN) architecture were used for data analysis and traffic flow prediction. The DPSO+Bi-BRNN architecture used by the proposed platform combines the benefits of BRNN and PSO. The Bi-BRNN can detect temporal relationships in traffic data, and DPSO improves the network parameters to increase the Bi-BRNN's capacity for learning and prediction. The DPSO+Bi-BRNN may be trained using historical traffic data to forecast traffic conditions and foresee congestion in metropolitan areas. The platform uses a distributed computing structure that allows the effective processing of significant amounts of data to provide scalability and flexibility. AI-driven optimization is necessary for enhanced sustainability since traditional traffic management techniques are ineffective in managing changing, real-time situations. An advanced visualization methods are also used to portray traffic data in a clear and user-friendly way, assisting users in making well-informed decisions. The analysis's findings indicate that the infinite neural network offers superior data processing capability and more powerful computing efficiency. Results shows that our proposed DPSO + Bi-RNN approach attains significant outcomes of 99% cost efficiency, 98% reliability, 95% user satisfaction, 98% scalability, 69% response time, 98.69% accuracy, 97% precision and 96% recall.

Key words: distributed computing, sustainable, traffic information management, traffic prediction, visualization

Received: May, 2024; Revised final: May, 2025; Accepted: June, 2025