

Studies in Systems, Decision and Control 563

Aleksander Ślaskowski *Editor*


# Using Artificial Intelligence to Solve Transportation Problems

 Springer

# **Studies in Systems, Decision and Control**

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# Machine Learning in Road Freight Transport Management

Artur Budzyński and Aleksander Śladkowski

**Abstract** Machine learning methods have emerged as powerful tools across numerous domains, with transportation being no exception. This paper delves into the application of machine learning techniques specifically within road freight management. Addressing three predictive challenges—truck fuel consumption, demand forecasting and price prediction, this study navigates through the intricacies of implementation and analysis. The methodology entails harnessing the capabilities of the Python programming language along with essential libraries such as Pandas, Scikit-Learn, NumPy, Matplotlib, and Seaborn. Challenges associated with data collection are elucidated, underscoring the importance of meticulous data acquisition processes. Subsequently, the paper elucidates the methodology for processing the amassed raw data, emphasizing the significance of data preprocessing techniques. Model training and validation procedures are meticulously detailed, showcasing the iterative process of refining models to optimize predictive accuracy. Moreover, the feasibility of model implementation is explored, shedding light on potential real-world applications and implications. The paper discusses the theoretical underpinnings of the models and provides practical insights into their deployment. Furthermore, this publication underscores its commitment to open science by making all materials and code implementations available on a dedicated GitHub repository. By fostering transparency and reproducibility, this endeavor aims to facilitate further research and collaboration in machine learning and transportation management.

**Keywords** Freight transportation · Prediction · Machine learning · Python · Intelligent transport · Transport management · Predictive modeling · Road transport · Demand forecasting · Price prediction · Data preprocessing · GitHub repository

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