

AI based Customized Time Slot Delivery of Articles and Parcels

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Abstract: *In the era of e-commerce and rapid logistics, ensuring timely and efficient delivery of parcels has become a critical component of customer satisfaction. Traditional parcel delivery systems often rely on static time slot allocation or manual scheduling, which may not consider dynamic factors like customer preferences, traffic conditions, urgency levels, or past delivery behaviour. This project, titled "AI based Parcel Delivery System", aims to address this challenge by employing machine learning to intelligently predict the most suitable delivery time slot for each parcel.*

The system uses a dataset that includes customer professions, address types, parcel types, urgency levels, traffic conditions, preferred slots, and historical delivery acceptance or rejections. A Random Forest Classifier was trained to analyse these features and predict the optimal delivery slot from available options such as Morning, Afternoon, and Evening. The model achieved an impressive accuracy of 98.8%, demonstrating high reliability and strong generalization across various user and delivery profiles.

The implementation integrates the trained model into a Flask-based API and a Streamlit web interface, allowing both automated backend integration and user-friendly frontend interaction. Users can submit delivery details and receive an AI-recommended time slot, which aligns not only with their preferences but also with predictive logistics intelligence.

Comprehensive testing of the system confirmed its robustness, speed, and adaptability. The solution significantly reduces failed delivery attempts, improves logistics efficiency, and enhances user satisfaction by aligning delivery schedules with real-world constraints and historical trends.

This project demonstrates how artificial intelligence can transform traditional logistics operations into smart, data-driven systems. It sets the stage for future enhancements such as real-time traffic updates, dynamic rerouting, and integration with delivery personnel availability, paving the way toward fully autonomous delivery scheduling systems..

Keywords: last-mile delivery, machine learning, time slot prediction, Random Forest, e-commerce logistics, Flask API, Streamlit

