

Logistics Optimization Using Predictive Analytics and Dynamic Load Management – Full FYP Documentation

1. Introduction

This project focuses on enhancing logistics operations by integrating predictive analytics with dynamic vehicle load management and optimized route planning...

(Shortened for demonstration — you can ask me to expand any section into full-length chapters.)

2. Problem Statement

Traditional logistics systems rely on static planning and heuristic-based load allocation...

3. Objectives

- Forecast demand using ML models
- Optimize vehicle load management
- Improve routing using OR-Tools

4. System Architecture

1. Data Collection
2. Forecasting Module
3. Load Optimization Module
4. Route Planning Module
5. Dashboard Interface

5. Methodology

5.1 Data Preprocessing

Cleaning, feature extraction, normalization.

5.2 Predictive Analytics

Models used:

- ARIMA

- Prophet
- XGBoost
- LightGBM

5.3 Load Optimization

Algorithms:

- Bin Packing
- Knapsack Algorithm

5.4 Route Optimization

Tools:

- Google OR-Tools
- Vehicle Routing Problem (VRP)

6. Implementation Details

Technologies:

- Python
- Streamlit / Flask
- Pandas, Numpy
- OR-Tools
- Matplotlib

7. Results

Forecast accuracy, optimized loading efficiency, cost reduction metrics.

8. Conclusion

The project significantly improves logistics efficiency through AI-driven decision-making.