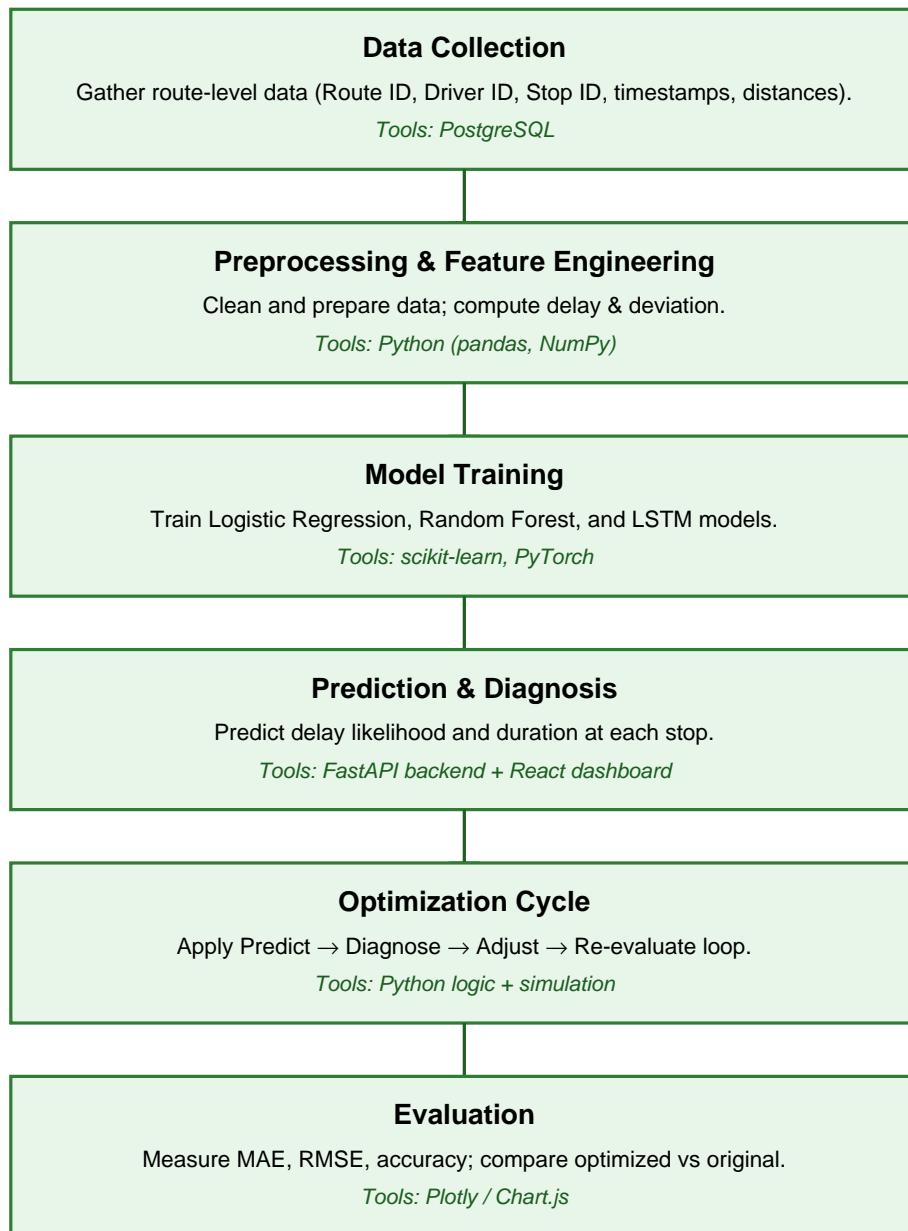


Method Outline – AI-Driven Route Optimization and Delay Prediction System

Workflow Flowchart



Optimization Integration

The predictive models generate early forecasts of potential delivery delays. These predictions are then used by the optimization component to make proactive adjustments: **Reorder stops** to minimize cascading delays. **Reassign drivers or vehicles** based on risk of lateness. **Suggest live recovery actions** when deviation exceeds thresholds. The cycle continuously improves efficiency and reliability through ongoing learning and data feedback.

Summary

The proposed method integrates data processing, predictive modeling, and optimization into a unified AI-based workflow. Historical route data is preprocessed and fed into machine-learning and deep-learning models to predict delivery delays and route deviations. These predictions are then used in an optimization loop—Predict, Diagnose, Adjust, Re-evaluate—to make proactive decisions such as reordering stops or reallocating drivers. The cycle continuously improves delivery efficiency, reduces travel time, and supports sustainable, data-driven logistics management.