

Traffic Flow Forecasting Using LSTM Internship Project

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Domain: Data Science & Machine Learning



Context

Introduction

Traffic congestion is a major issue in growing urban cities. Predicting future traffic flow helps in:

Better traffic signal management

Reduced congestion

Improved travel efficiency

In this project, traffic flow is predicted using a Deep Learning model (LSTM) based on historical vehicle count data.

Problem Statement

Traffic varies with time of day, weekdays, weekends, and events. Traditional fixed traffic signal systems cannot adapt to changing traffic conditions.

Therefore, we need a system that:

- Learns traffic patterns automatically
- Predicts future vehicle count accurately
- Helps optimize traffic management

Dataset Description

Traffic	捕口	岔道上	队一	行车	行五	下港卡
Da000	29.794	30.07	1.48	17.28	1.48	1.48
Da000	29.177	23.58	1.18	27.28	1.94	222
Bao00	29.380	23.88	1.43	17.28	1.45	1.28
Bao00	29.146	31.38	1.11	27.28	2.25	243
Bao00	29.198	75.98	1.45	11.28	1.90	1.45
Bao00	29.350	26.58	1.45	11.25	2.15	243
Da000	29.180	20.86	1.80	21.48	1.40	1.22
Da000	29.140	29.06	1.84	21.28	2.86	220
Da000	29.166	28.96	1.55	27.26	2.45	1.45
Da000	29.254	29.06	1.20	27.45	1.46	1.28
Da020	29.293	23.36	1.95	27.26	1.96	223
Bao00	29.197	20.90	1.95	27.47	2.86	243

- Contains timestamp-based vehicle count from multiple junctions
- Columns include: Date-Time, Junction ID, Vehicle Count
- Data is time-series in nature
- Suitable for sequence and trend analysis

Data Preprocessing

01

Converted Date and Time into a proper datetime index

02

Grouped and resampled data to uniform time intervals

03

Handled missing values using interpolation

04

Extracted time-based features

05

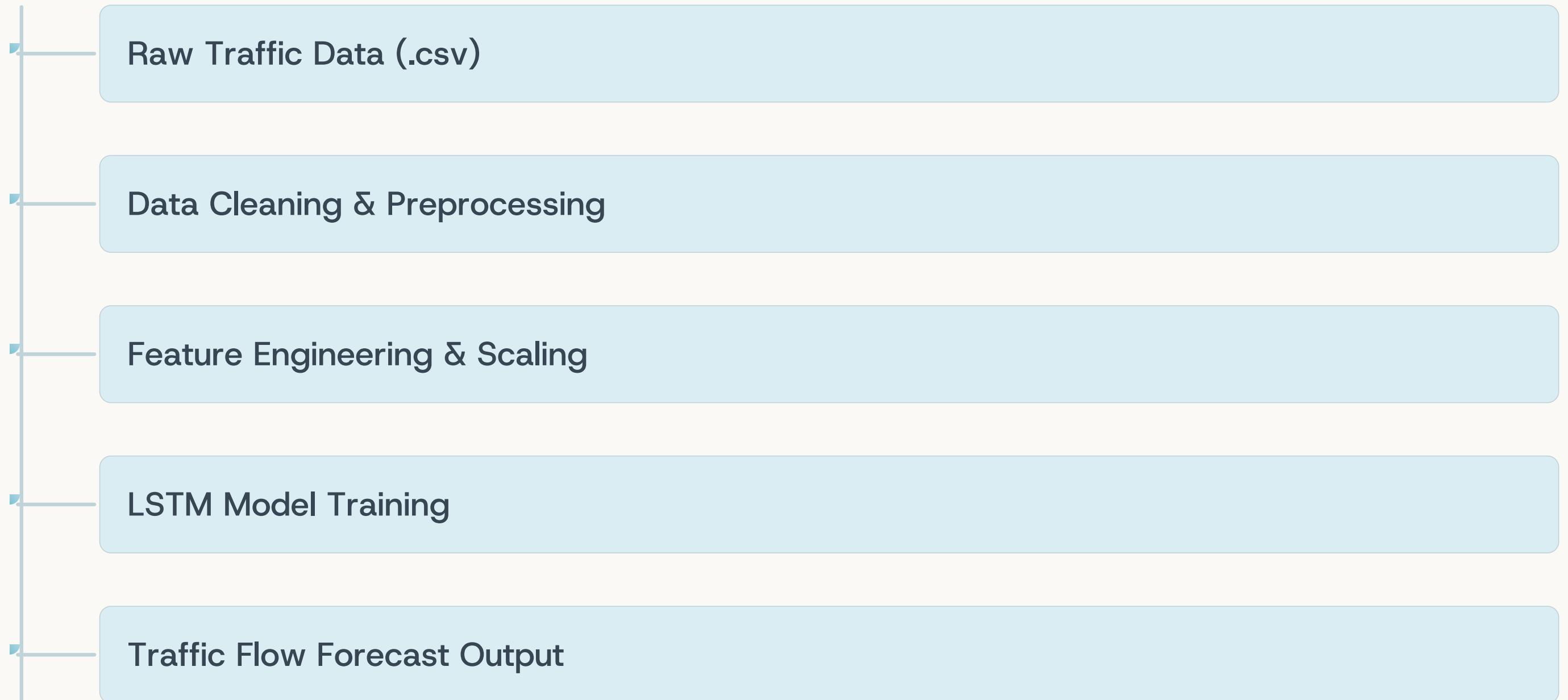
Applied Min-Max Normalization for smooth model training



Extracted time-based features:

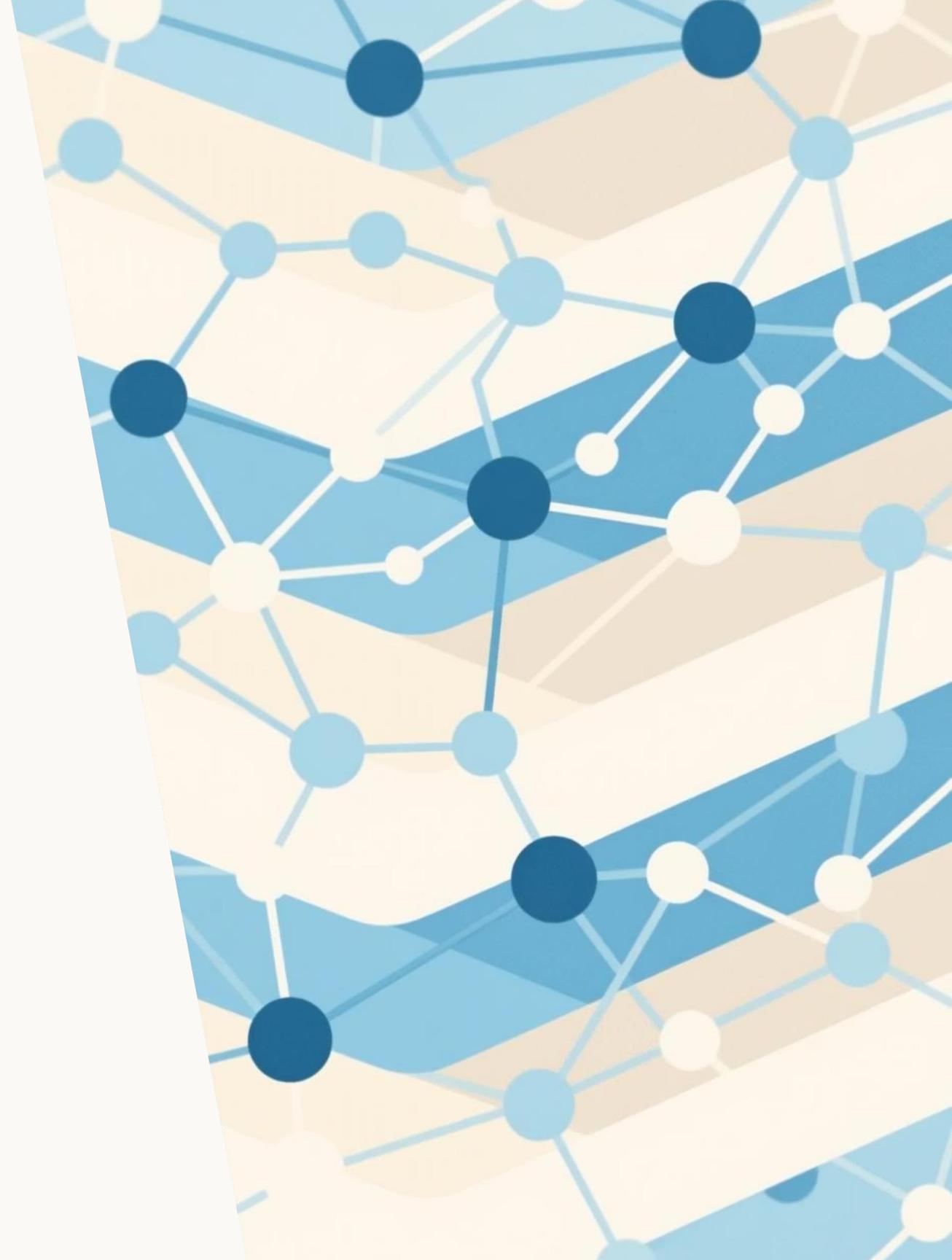
- Hour of the day
- Day of the week
- Weekend indicator

Proposed System Flow



Why LSTM Model?

- LSTM (Long Short-Term Memory) is designed for sequential data
- Remembers long-term traffic behavior patterns
- Handles time dependency better than traditional models
- Ideal for time-series forecasting problems like traffic prediction



Model Training

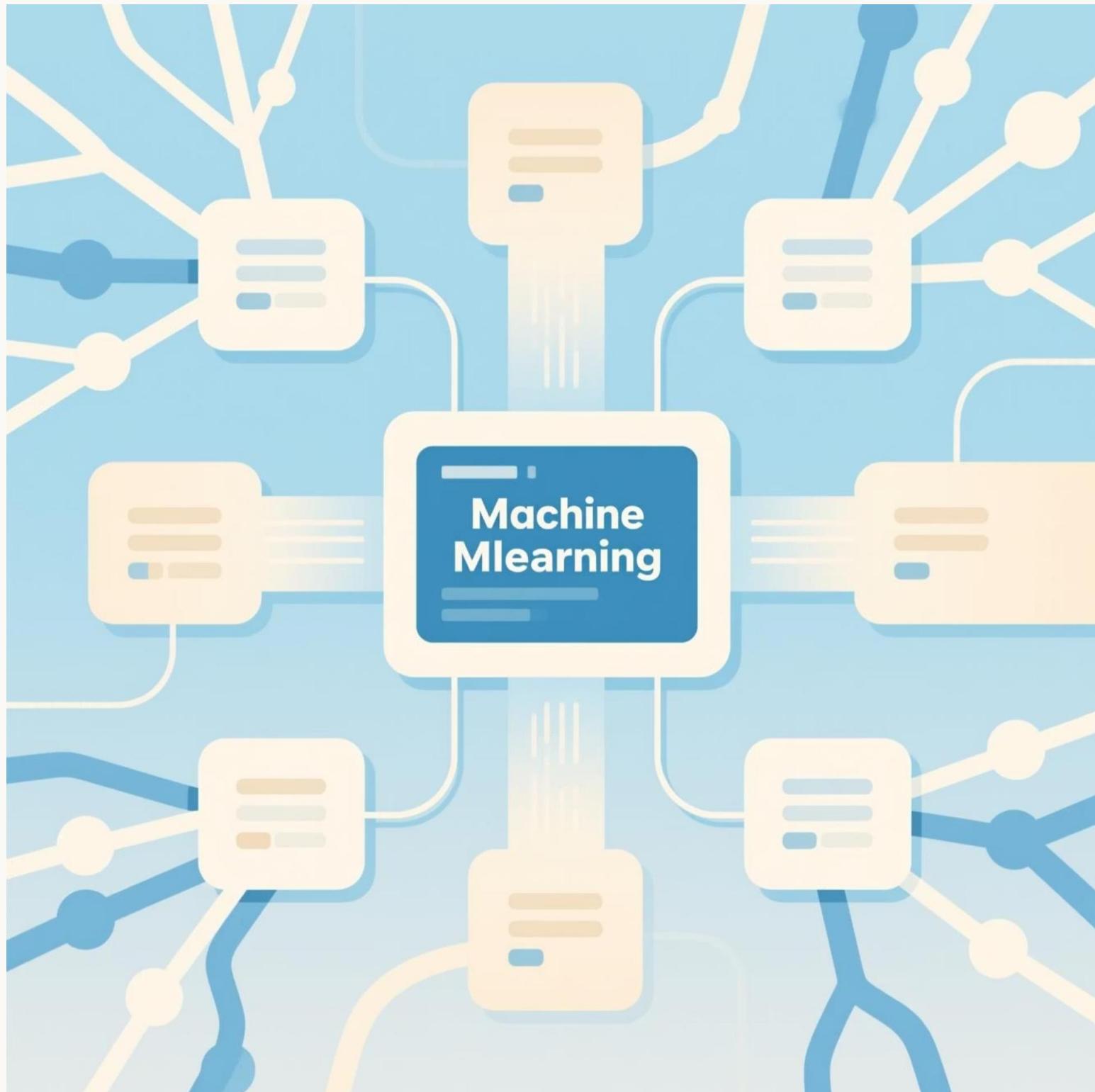
Input:

Previous traffic values (look-back window)

Model Structure:

- LSTM Layer
- Dense Output Layer

- Loss minimized during training to improve accuracy
- Model predicts next-hour traffic count for each junction



Results

Model successfully captured daily traffic patterns

Predicted future traffic values were realistic and trend-consistent

Predictions saved in submission_lstm.csv format

Can be used for:



Traffic signal timing optimization



Peak hour analysis



Road planning assistance

Conclusion

LSTM-based forecasting provides meaningful traffic predictions

Helps in planning and managing city traffic efficiently

Can be extended for real-time smart city applications