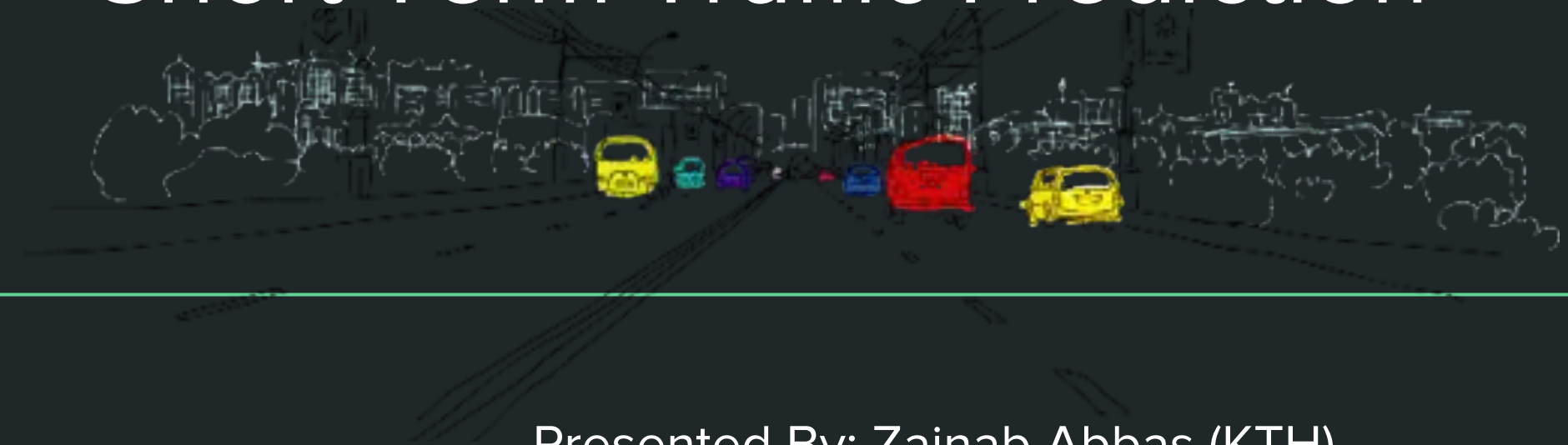
Short Term Traffic Prediction



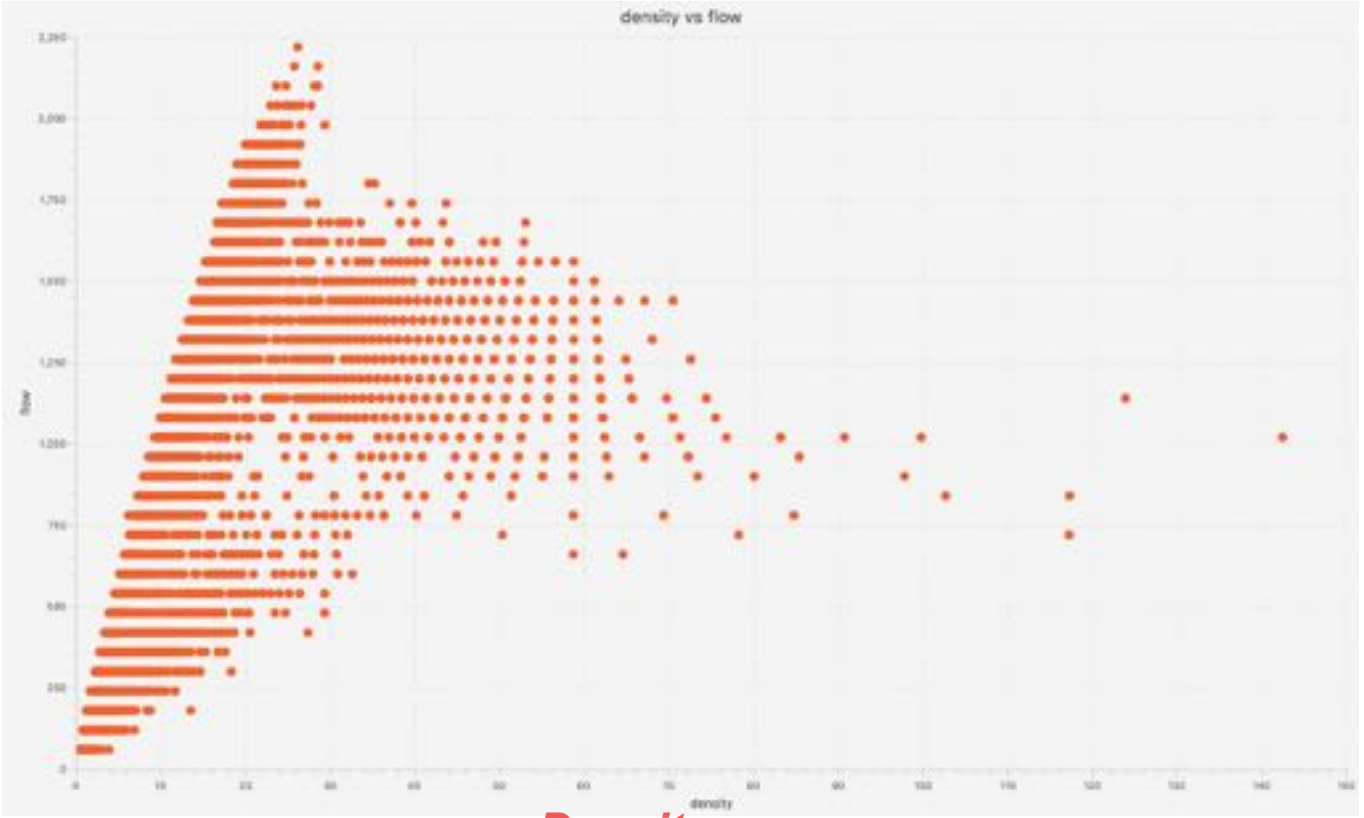
Presented By: Zainab Abbas (KTH)
Collaborators: Ahmad Al-Shishtawy, Vladimir Vlassov and Sarunas Girdzijauskas.

Traffic Data

- Time
- Flow (no. of cars per minute)
- Average Speed (Km per hr)

flow / speed = Density (Cars per Km)

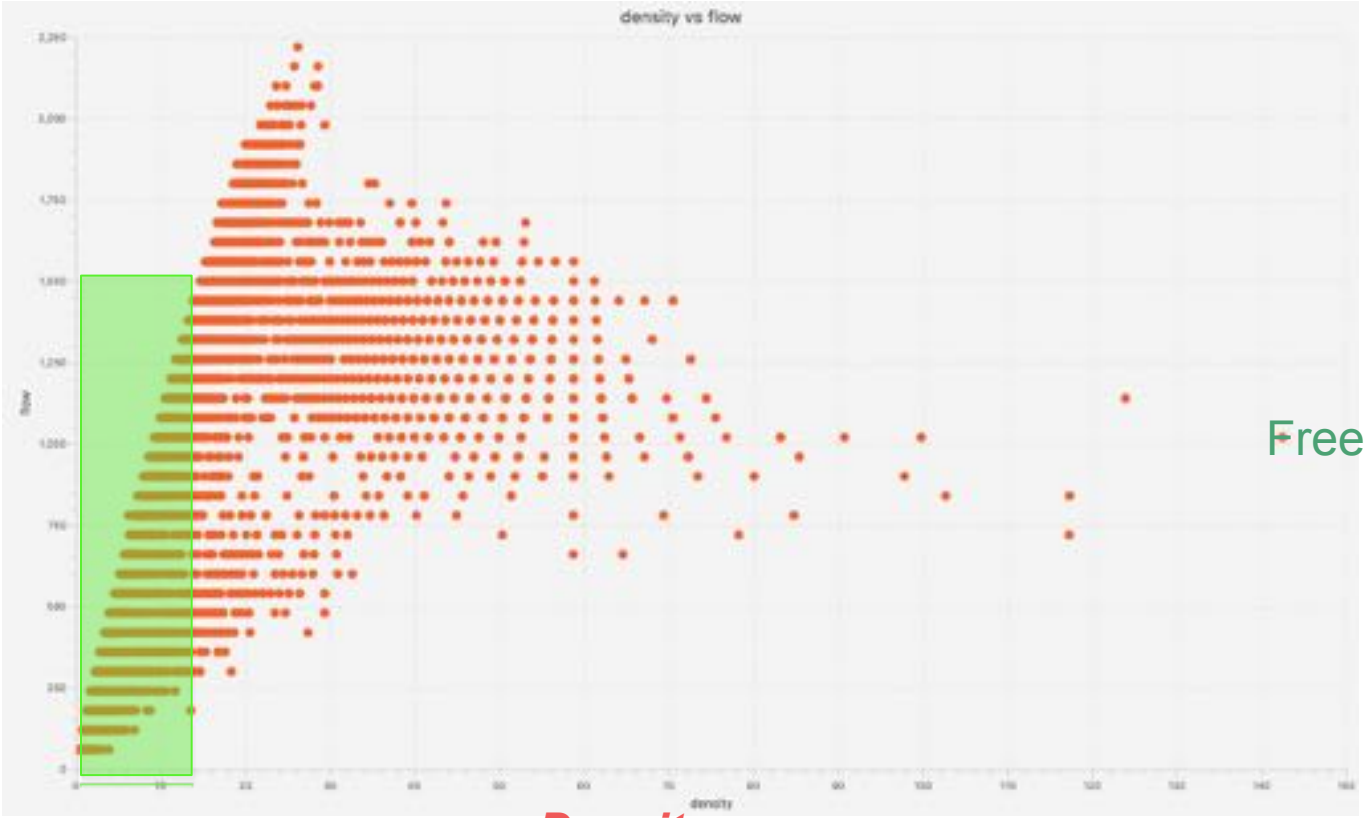
Traffic Flow Measurements



Flow

Density

Traffic Flow Measurements

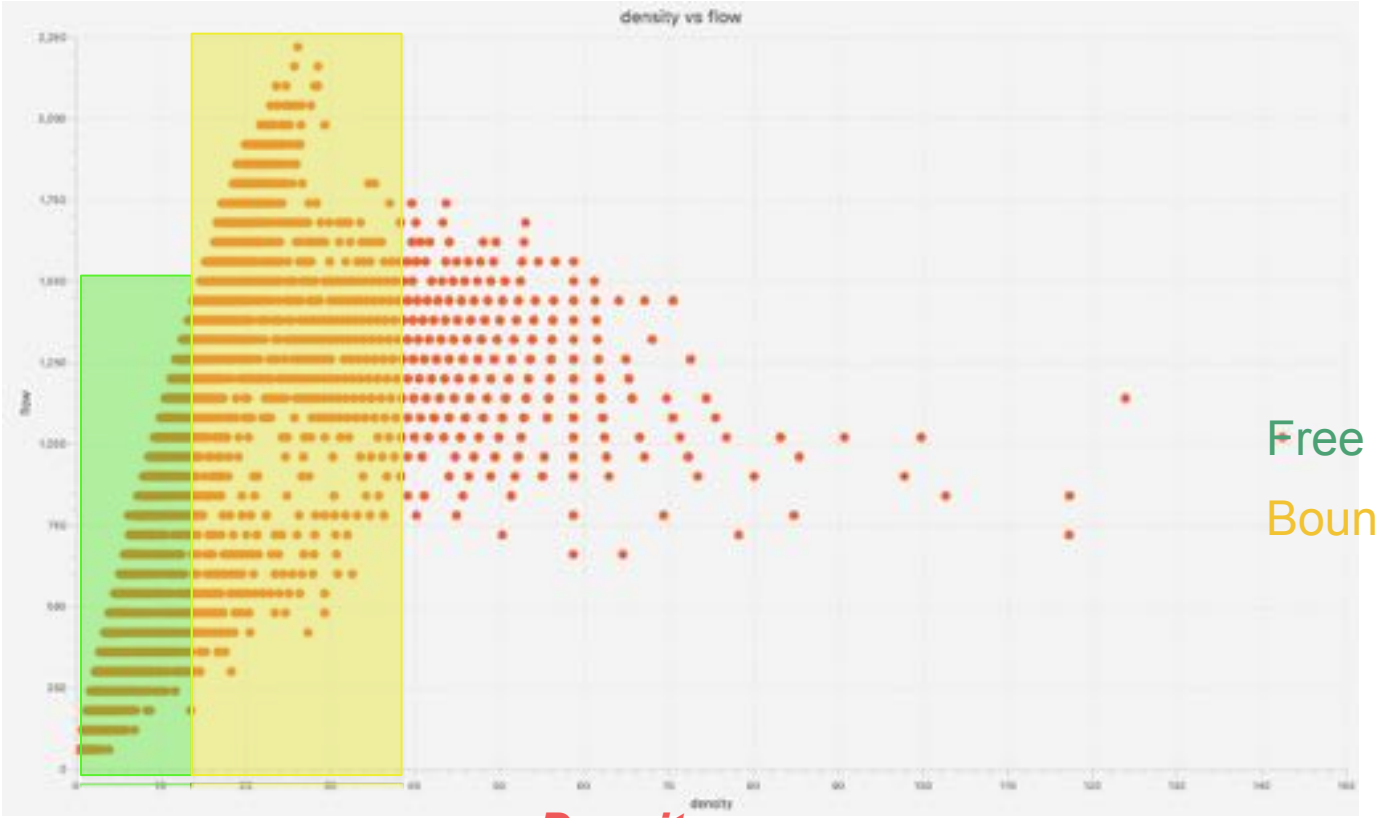


Flow

Free flow

Density

Traffic Flow Measurements



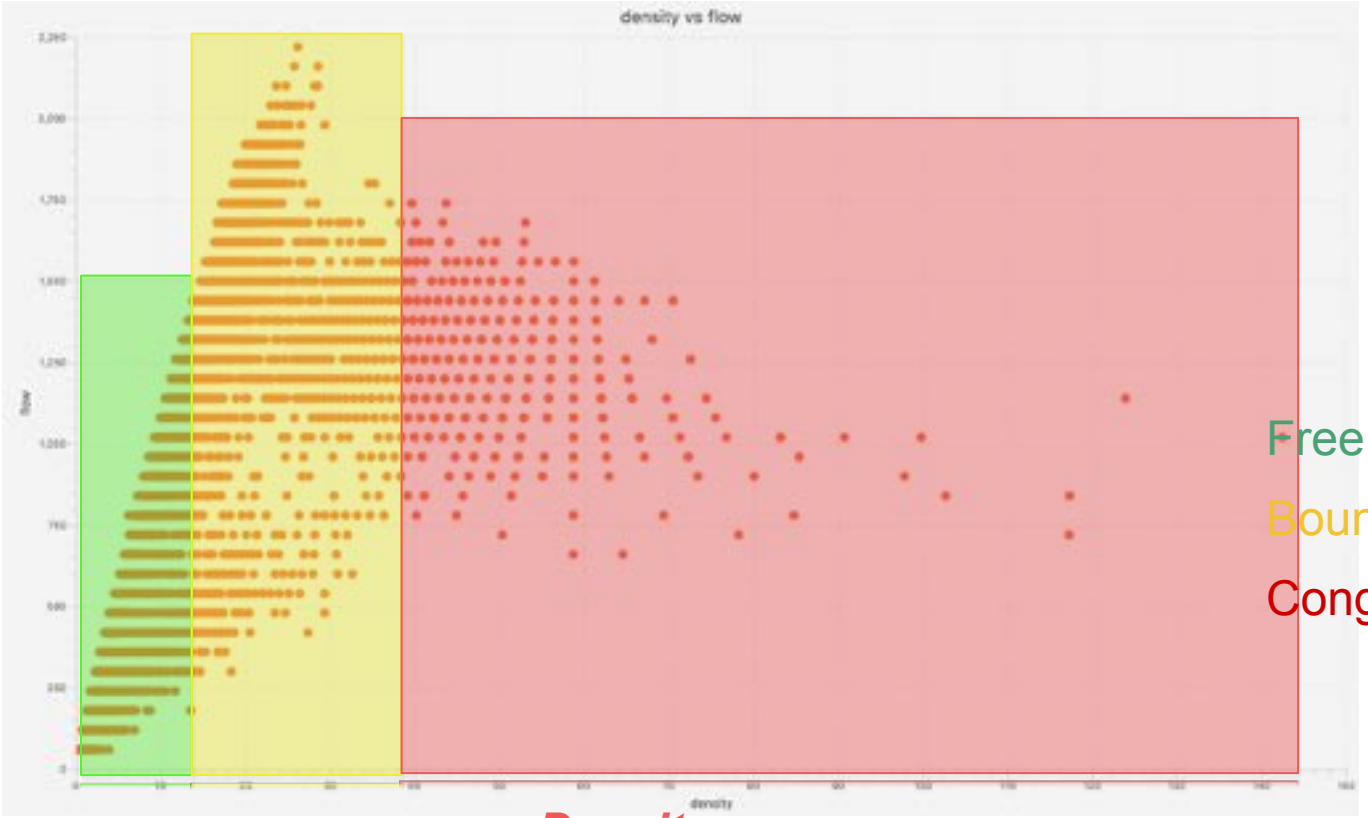
Flow

Density

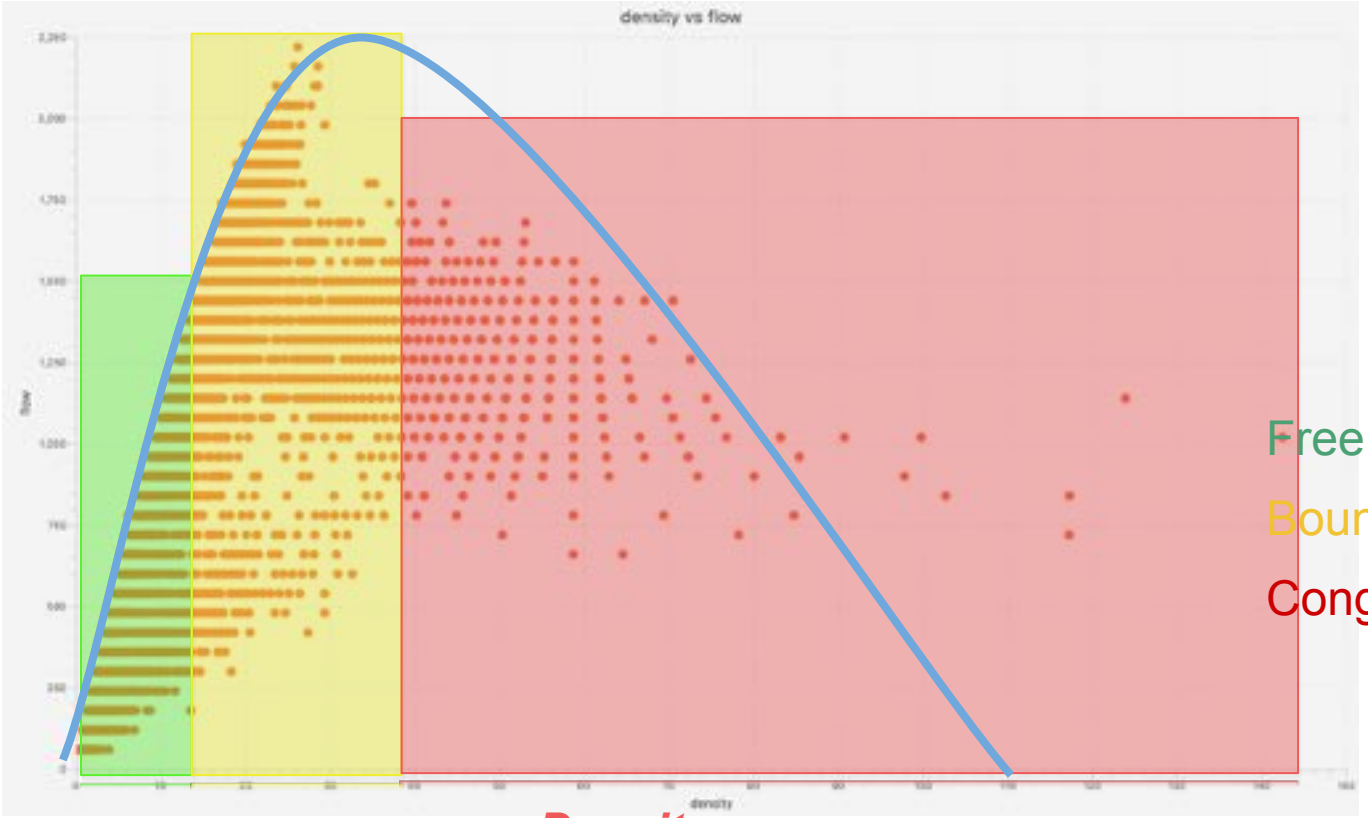
Free flow

Bounded flow

Traffic Flow Measurements

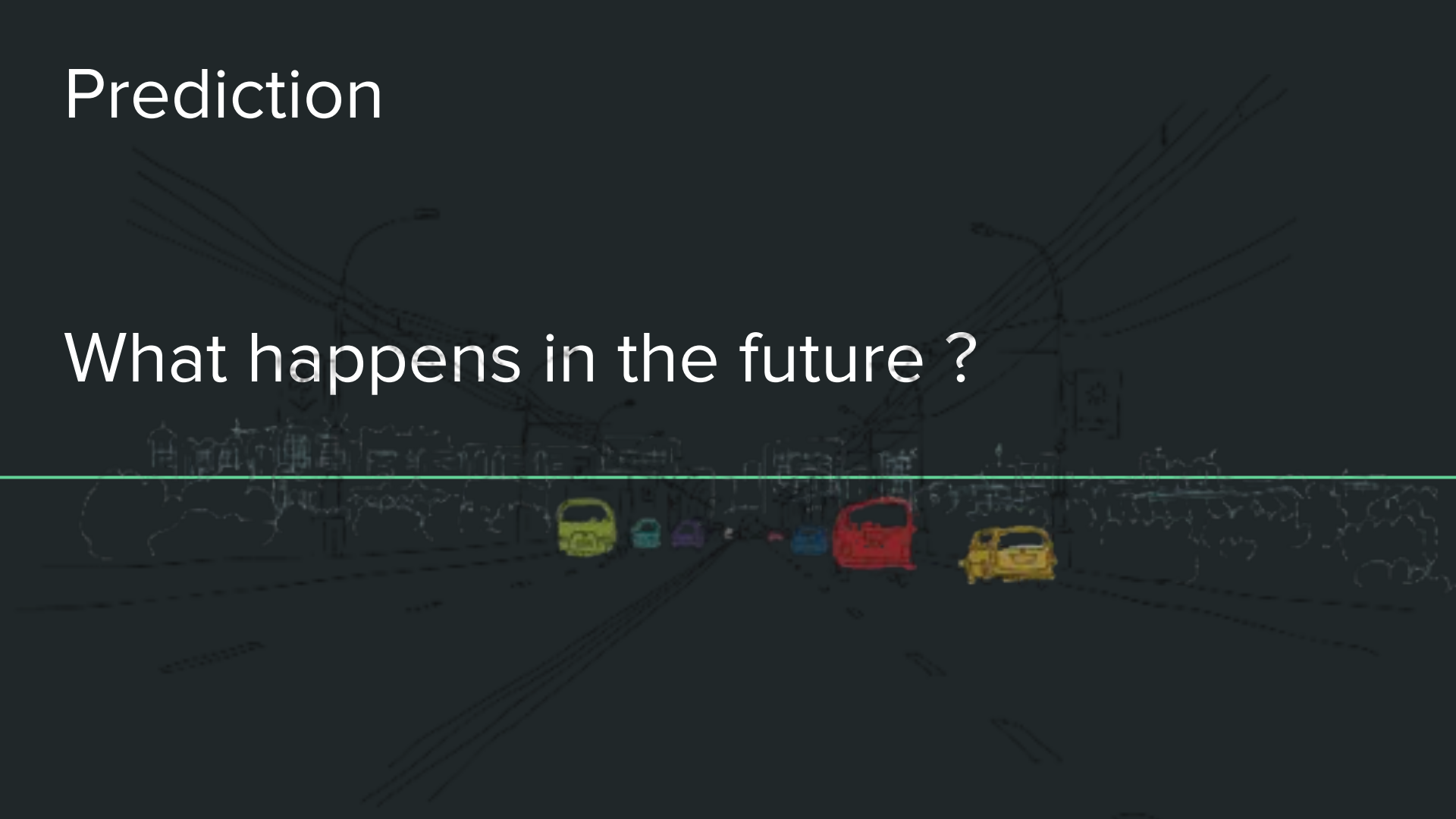


Traffic Flow Theory



Prediction

What happens in the future ?



Models

- **Time Based:**
  - Based on time series of data
  - Input data is entered in time series
  - Predict the future values in the time series

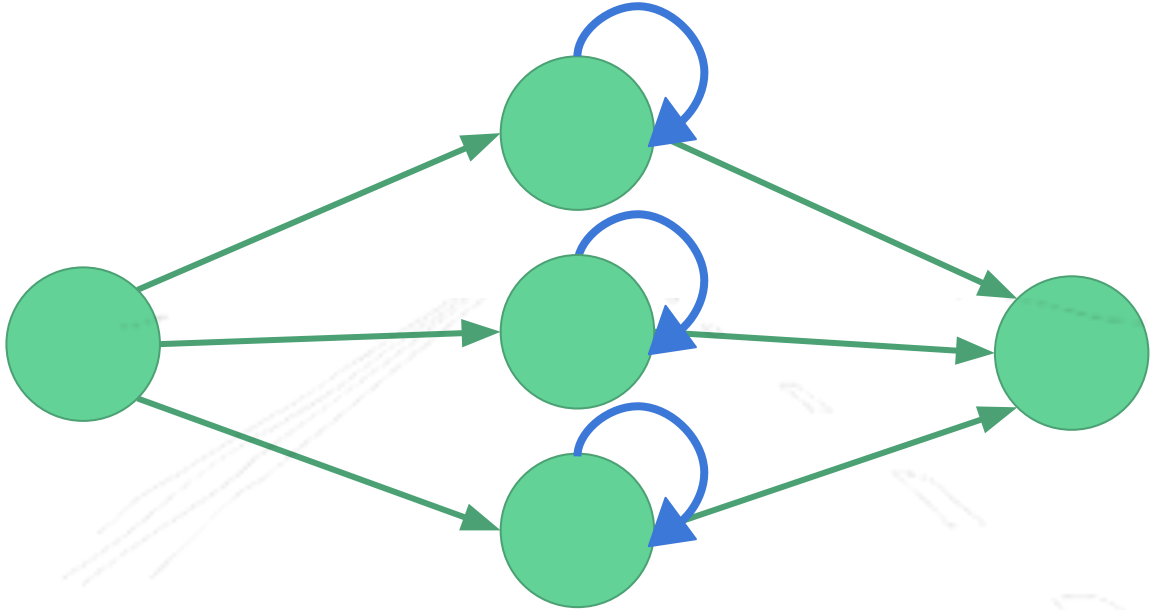
- **Space and Time Based:**
  - Based on placement of the sensors
  - Input data (time series) is entered for few sensors
  - Predict the values for missing sensors

Technology

- **Keras** machine learning library in python
- RNN recurrent neural networks (**LSTMs**)
- **Stacked** LSTMs

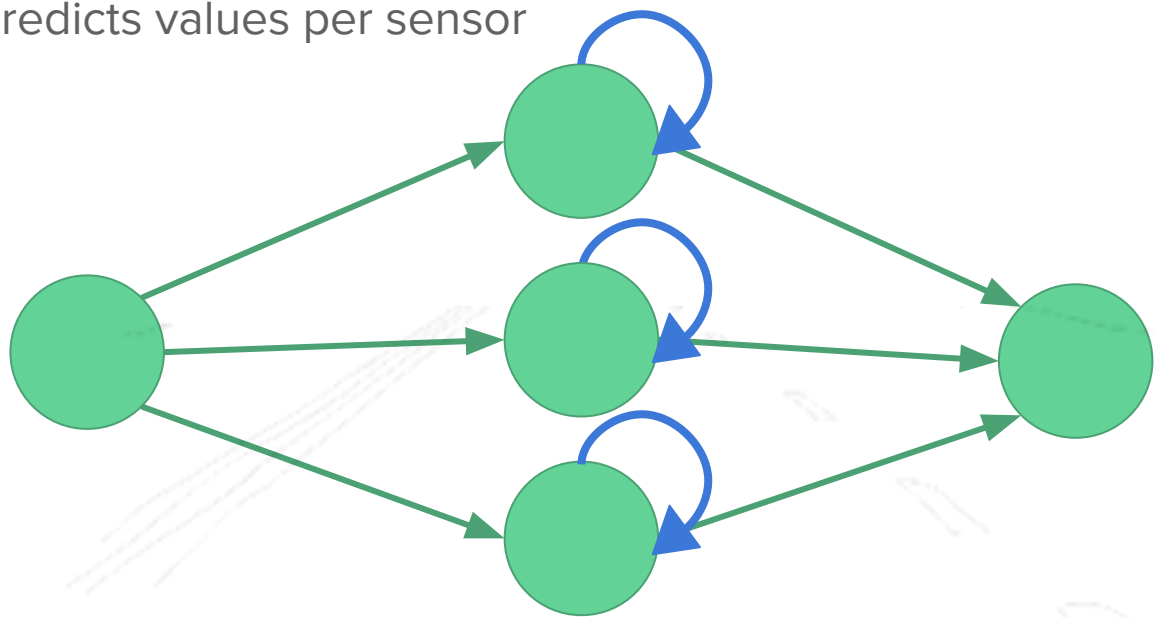
RNN (Recurrent Neural Networks)

- Good for learning **sequential** data
- Maintains a *”**memory***” to keep information about the past using **feedback.**



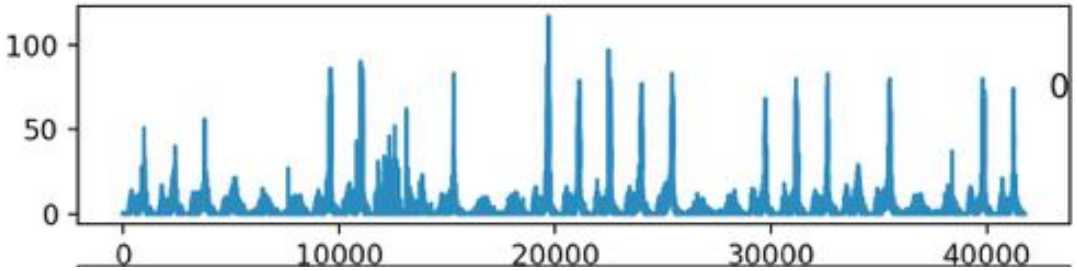
Time Based -i

- The model is trained separately for every sensor
- The model predicts values per sensor

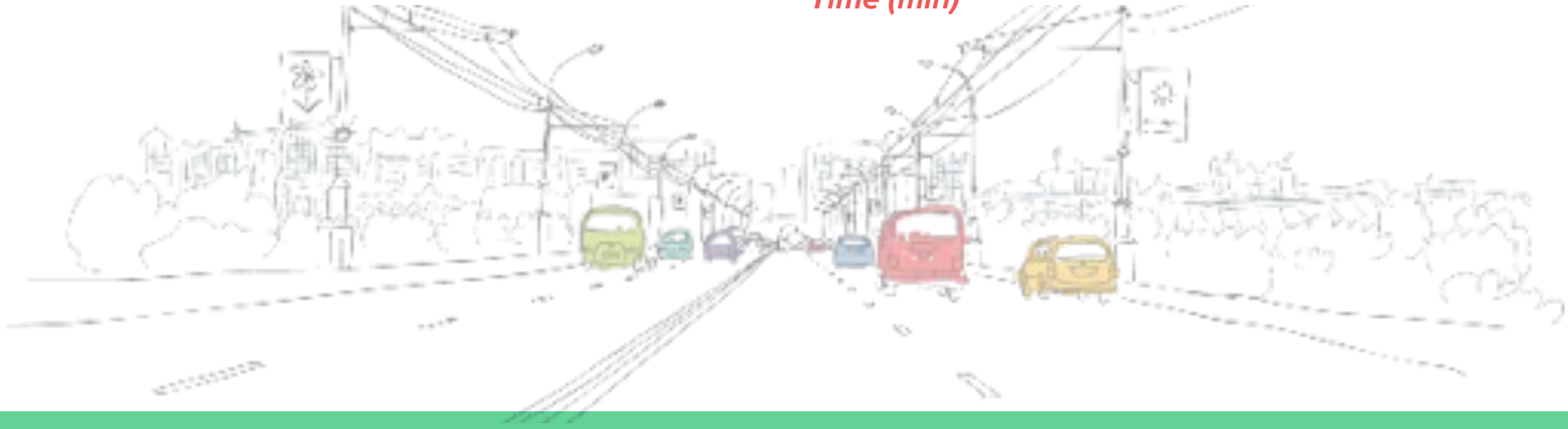


Input

Density (vehicle / km)



Time (min)

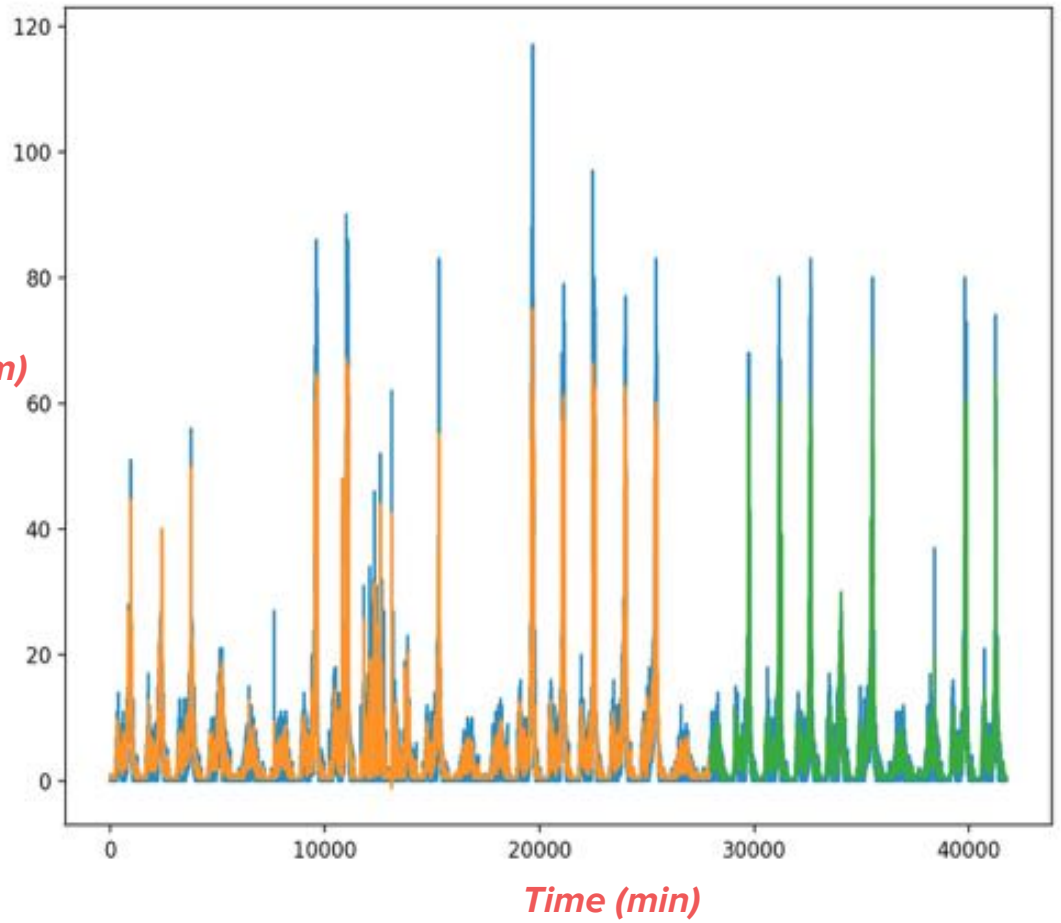


Prediction

Actual

Predicted: Training

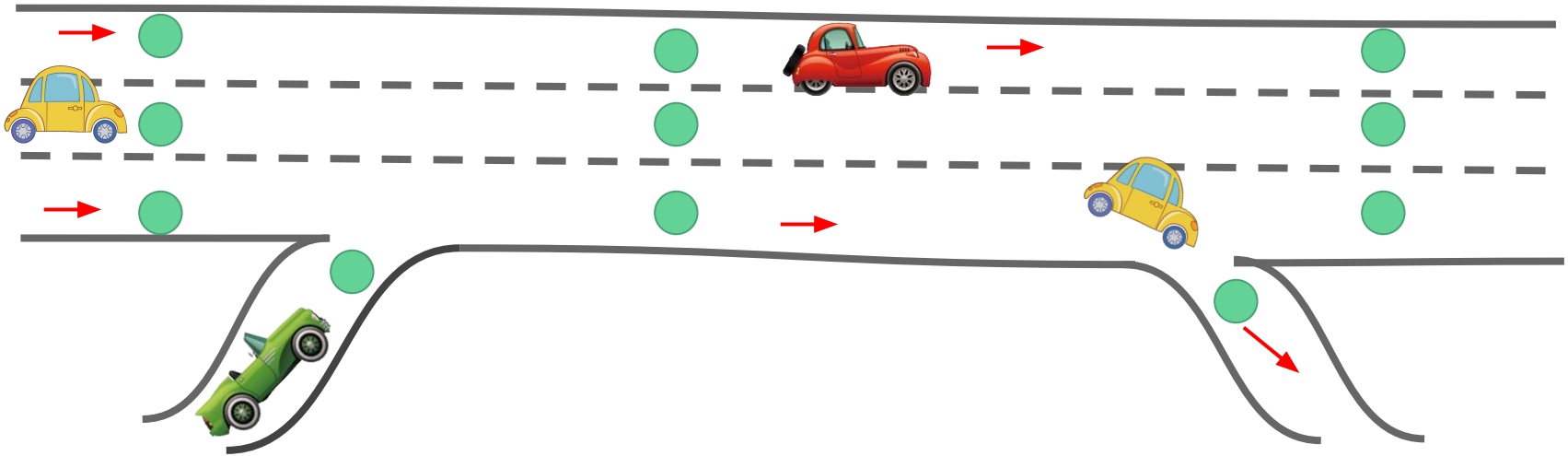
Predicted: Test



RMSE: 3
20 min

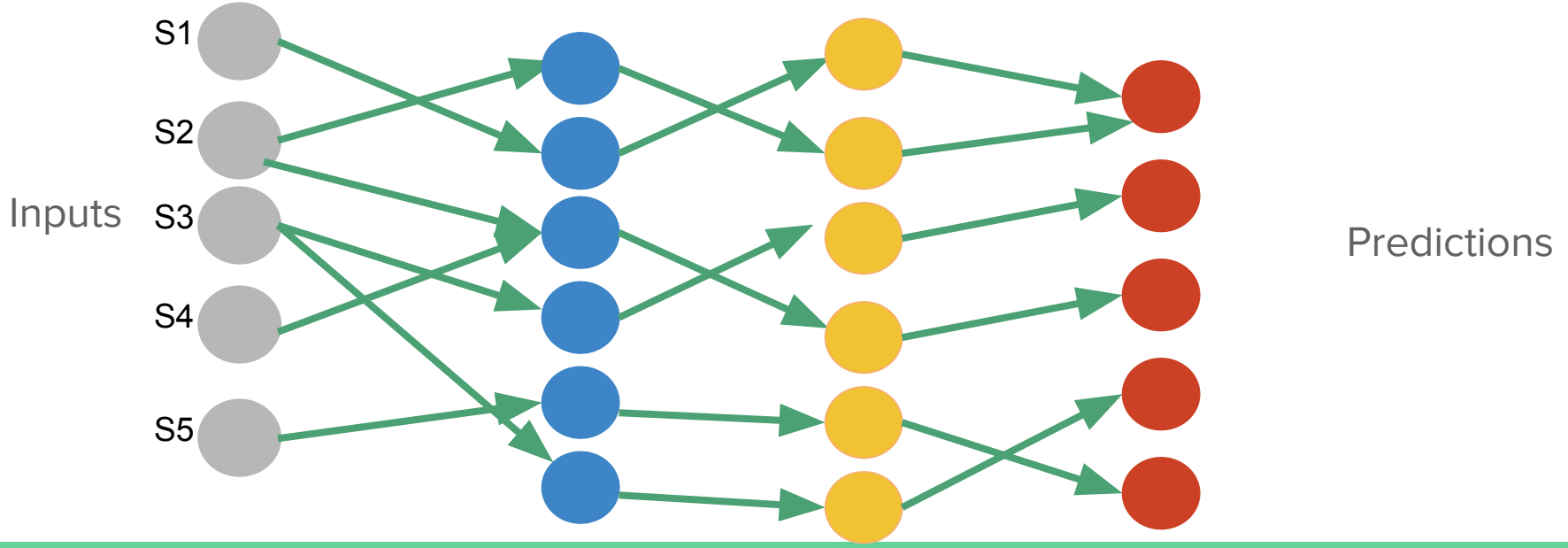
Time Based -ii

- The model is trained for all the sensors in a road segment
- The model predicts values for all the sensors



Time Based -ii

- The model is trained for all the sensors in a road segment
- The model predicts values for all the sensors

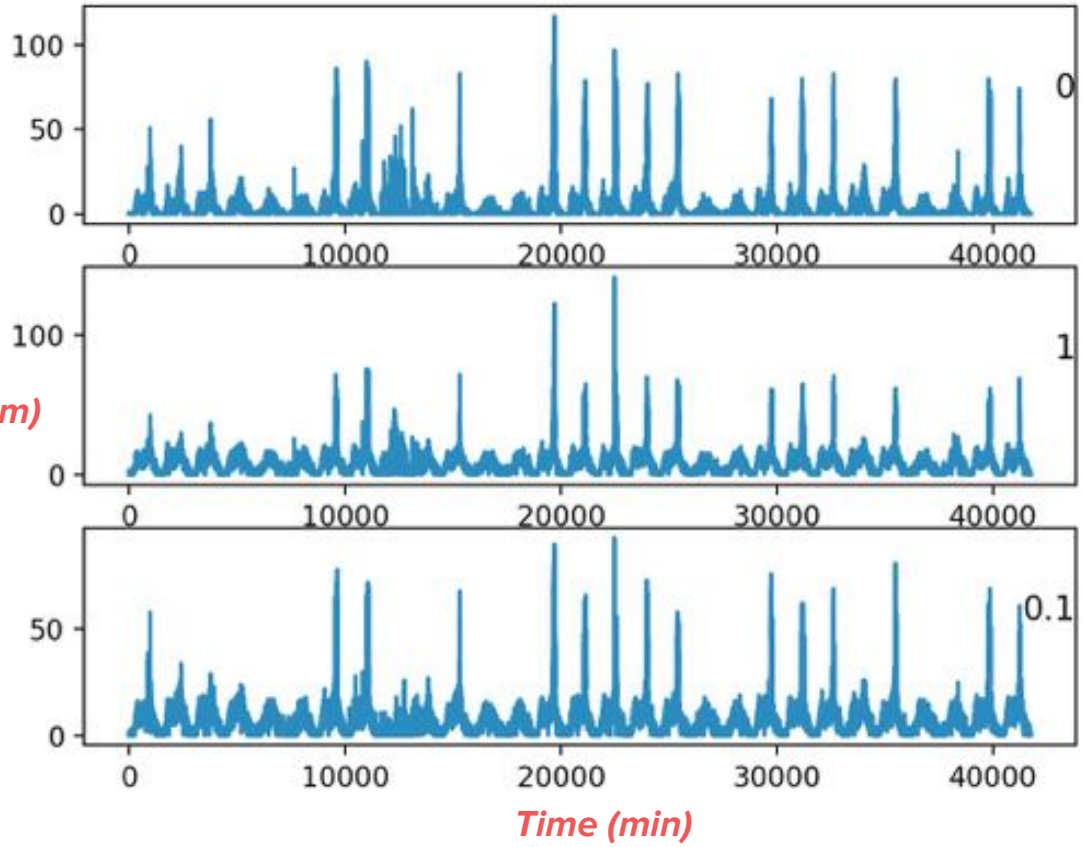


Time Series

Sensor 1

Sensor 2

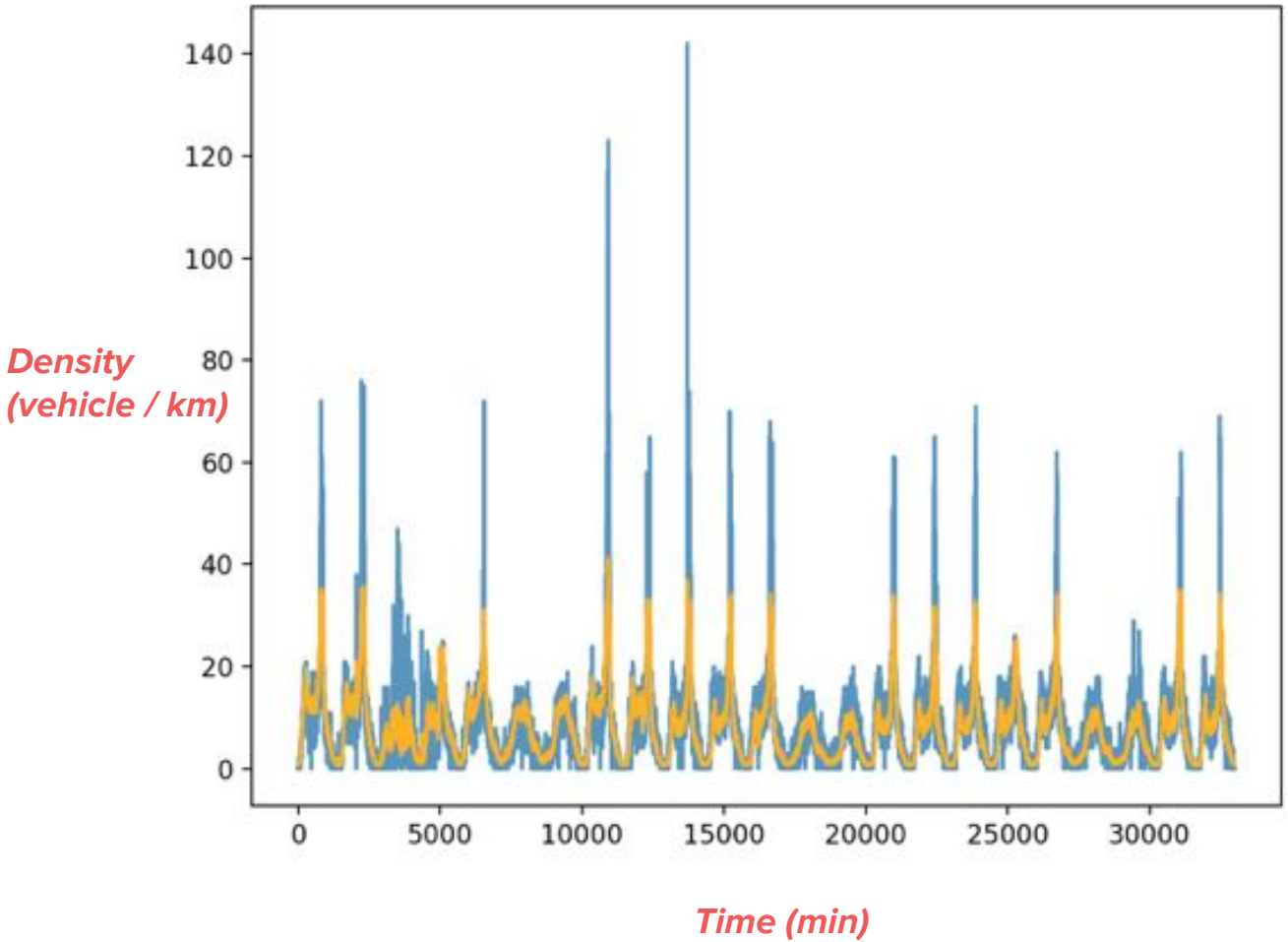
Sensor 3



Results

Actual

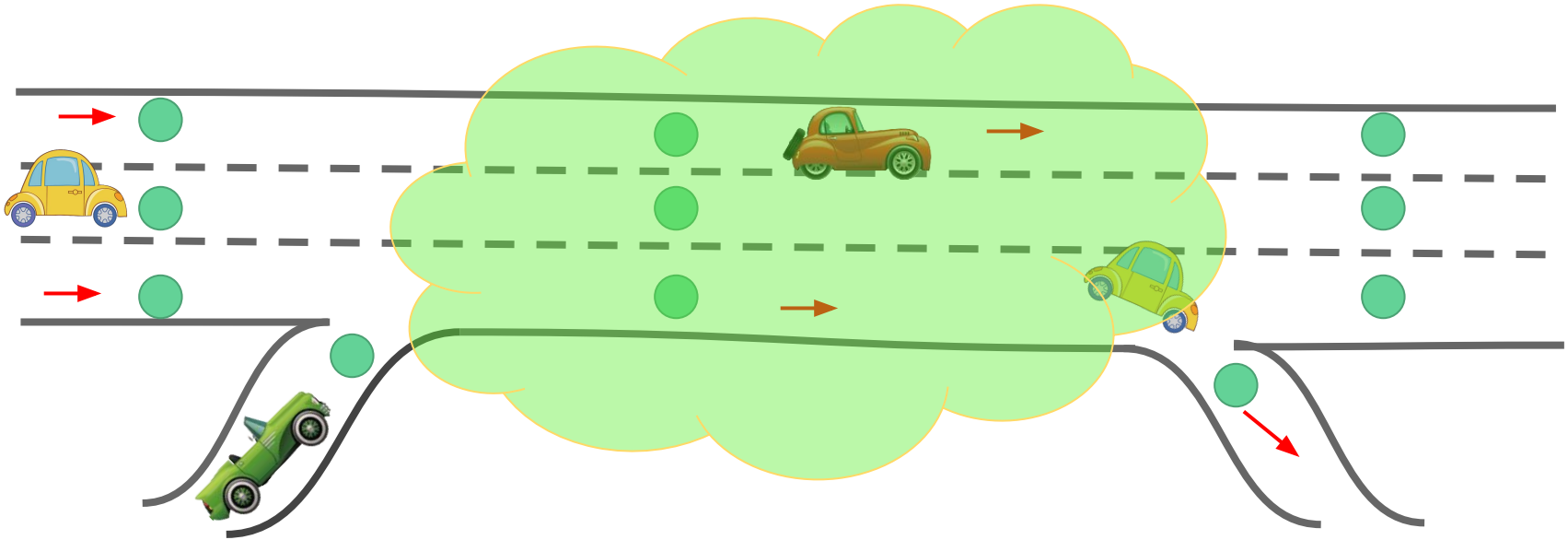
Predicted



RMSE: 3.25
20 min

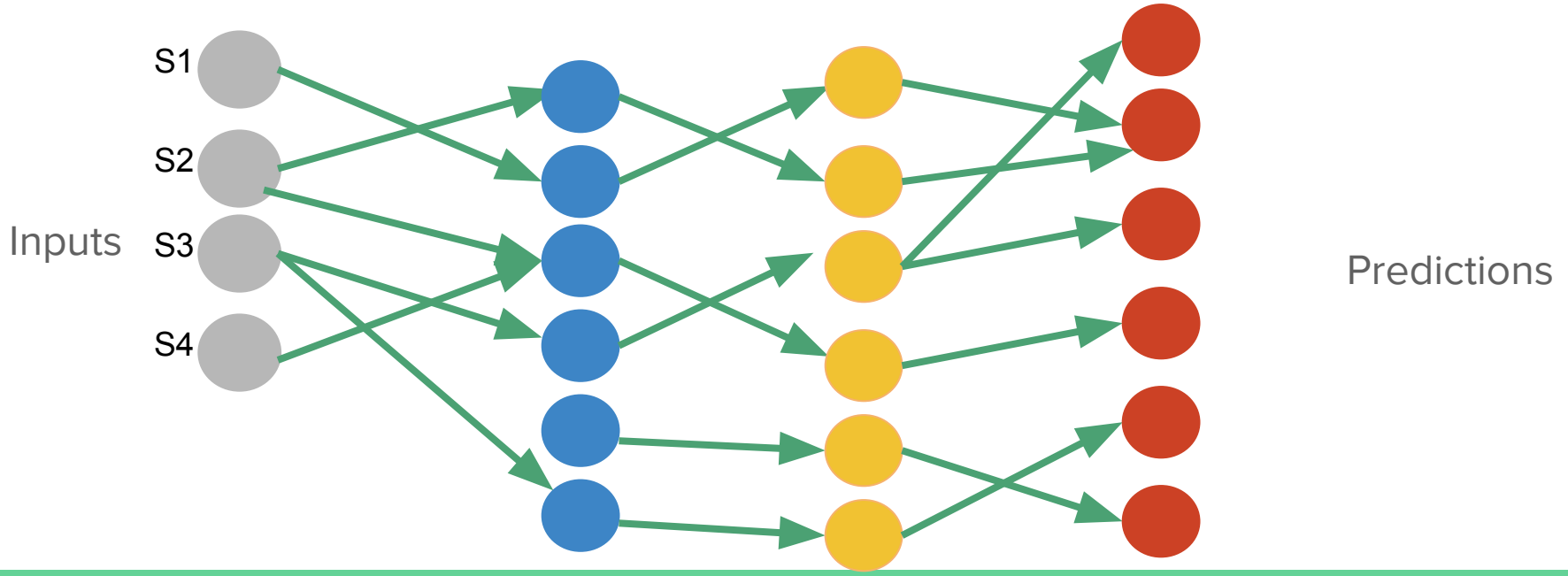
Space & Time Based

- The model is trained for few sensors in a road segment
- The model predicts values for all the sensors



Space & Time Based

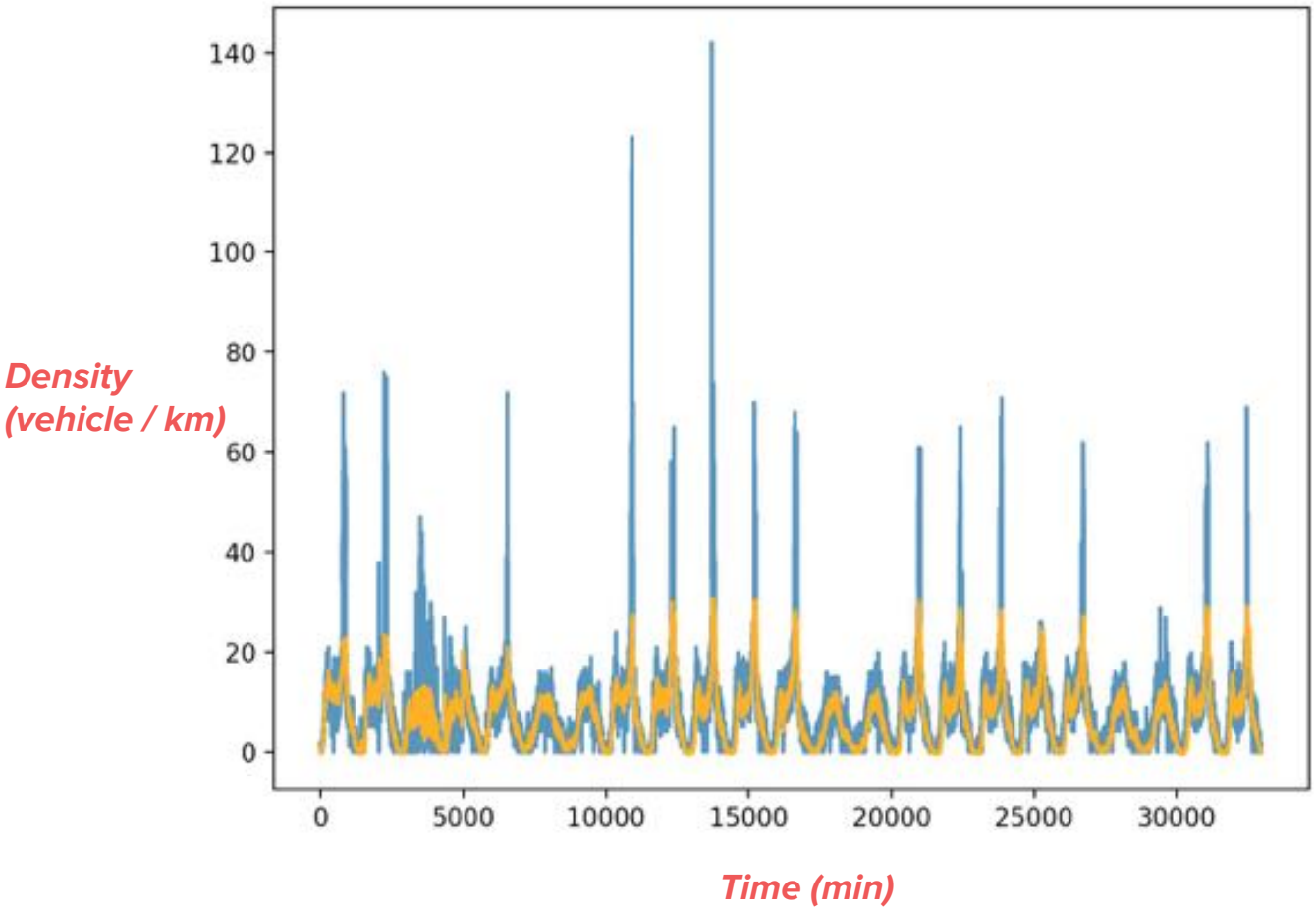
- The model is trained for few sensors in a road segment
- The model predicts values for all the sensors



Results

Actual

Predicted



RMSE: 5.14
20 min

Future Work

- Clustering similar sensors for the time model (i).
- Comparing all different models