Smart City: Traffic prediction using Deep Learning

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INTRODUCTION

BRIEF DESCRIPTION

- Traffic is a PROBLEM!
- Smart cities can avoid the problem.

PROJECT OBJECTIVE

- Analyzing and predicting traffic.
- Help smart cities understand traffic patterns.

DATASET

DATA SOURCE

- Kaggle as an open-source.
- Sensors at every junction.

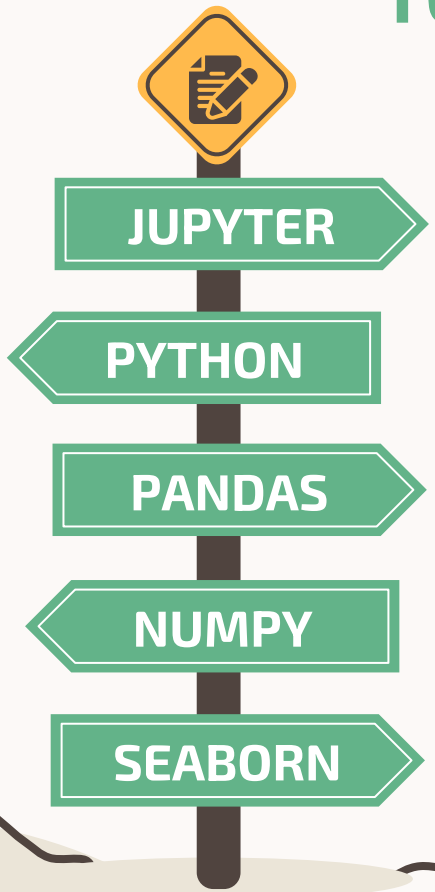
48120

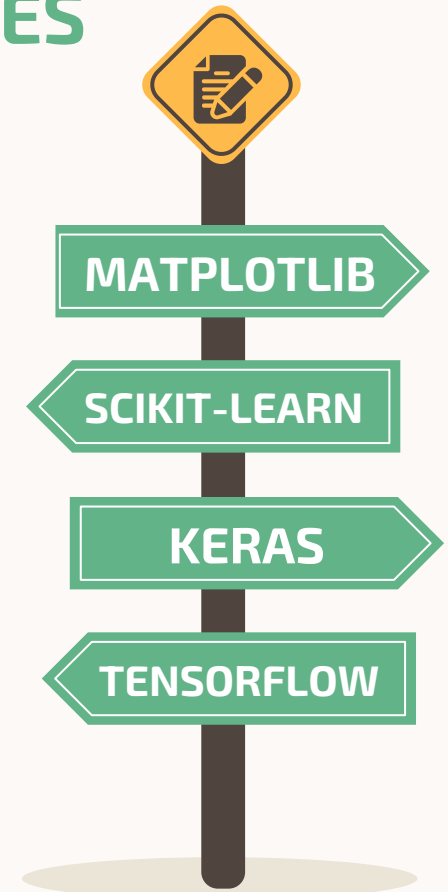
RECORDS

COLUMNS

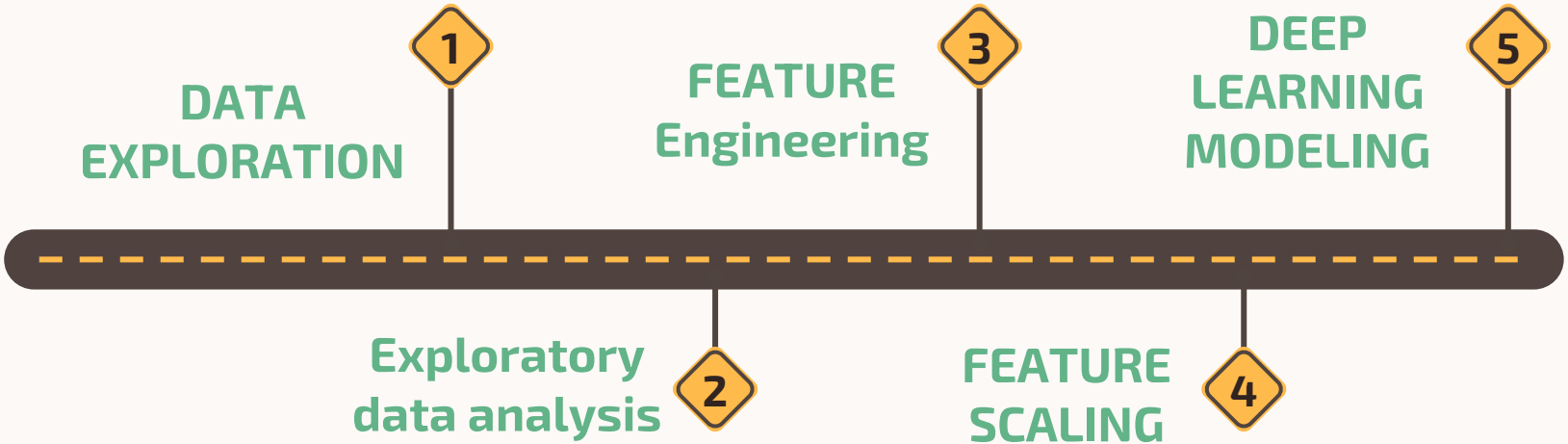
4

TOOL & LIBRARIES

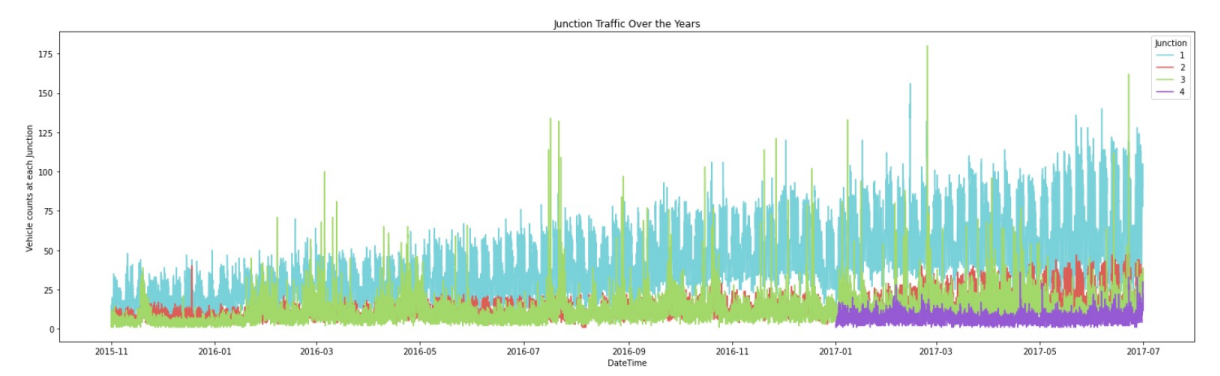




METHODOLOGY



EXPLORATORY DATA ANALYSIS



Traffic increases over the year.

48000+

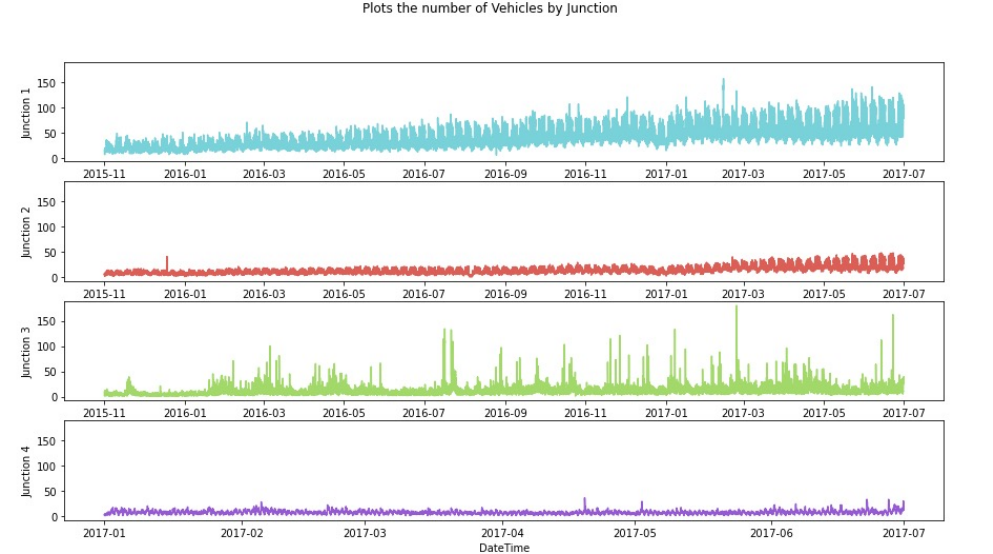
Total observations

4

+1,000,000

2015-2017

EXPLORATORY DATA ANALYSIS



Timeseries of traffic for each junction over the year.

48000+

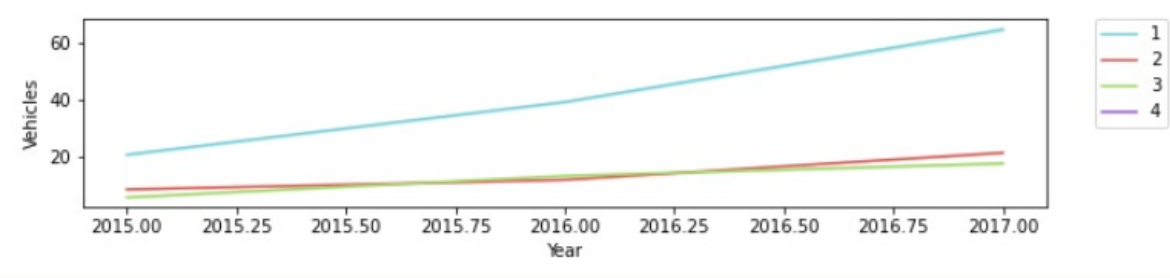
Total observations

4

+1,000,000

2015-2017

EXPLORATORY DATA ANALYSIS



All three junctions have an upward trend except the fourth.

48000+

Total observations

4

+1,000,000

2015-2017

FEATURE ENGINEERING

1

Formatting the datetime

2

Dropping unnecessary columns

	DateTime	Junction	Vehicles	ID	Year	Month	Day_Num	Hour	Day	Year_Quarter
0	2015-11-01 00:00:00	1	15	20151101001	2015	11	1	0	Sunday	4
1	2015-11-01 01:00:00	1	13	20151101011	2015	11	1	1	Sunday	4
2	2015-11-01 02:00:00	1	10	20151101021	2015	11	1	2	Sunday	4
3	2015-11-01 03:00:00	1	7	20151101031	2015	11	1	3	Sunday	4
4	2015-11-01 04:00:00	1	9	20151101041	2015	11	1	4	Sunday	4

FEATURE SCALING

1

Normalization

Average & STDV

2

Differencing

- Week difference
- Day difference
- Hour difference

DEEP LEARNING MODEL

Split data:

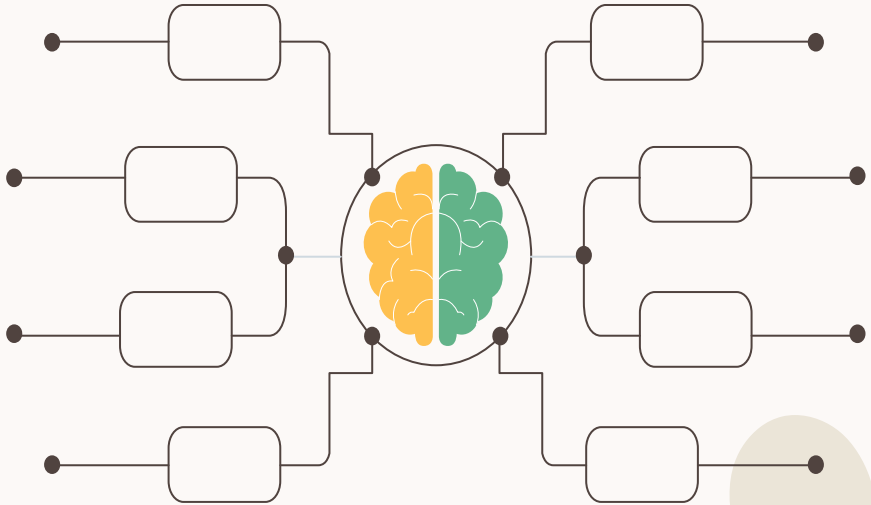
- Split on junction base
- Split data for 85% training and 15% testing

Gated Recurrent Unit (GRU)

GATED RECURRENT UNIT (GRU)

- The Developed Model of RNN
- Solves the short time memory
- Solves the vanishing gradient

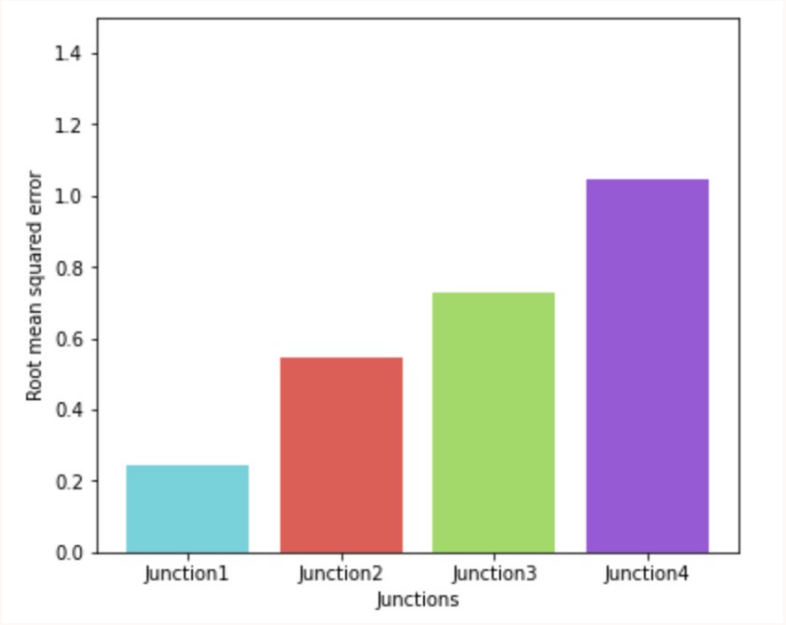
- Six Layers
- Tanh as the activation function
- SGD as the optimizer



RESULTS AND ANALYSIS

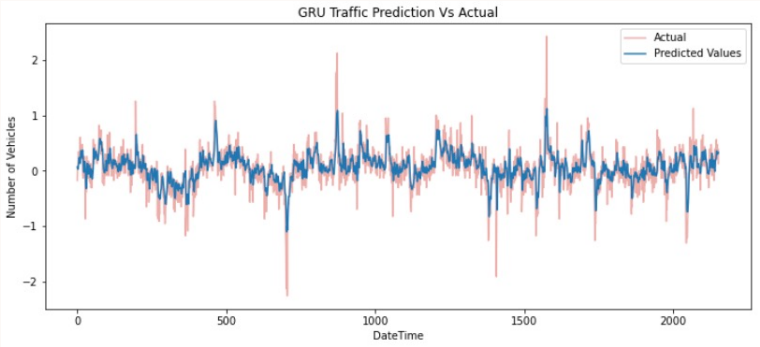
Epochs 35

JUNCTIONS	RMSE
Junction 1	0.2443
Junction 2	0.5470
Junction 3	0.7337
Junction 4	1.0391

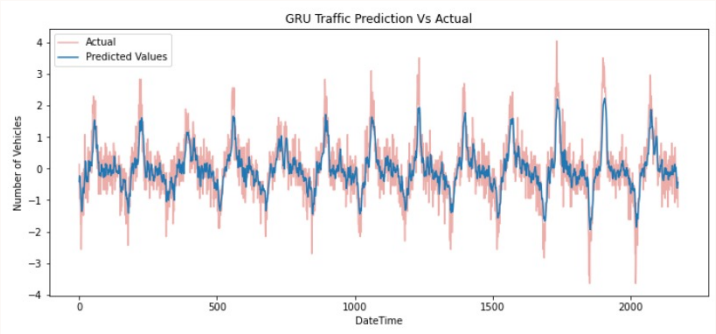


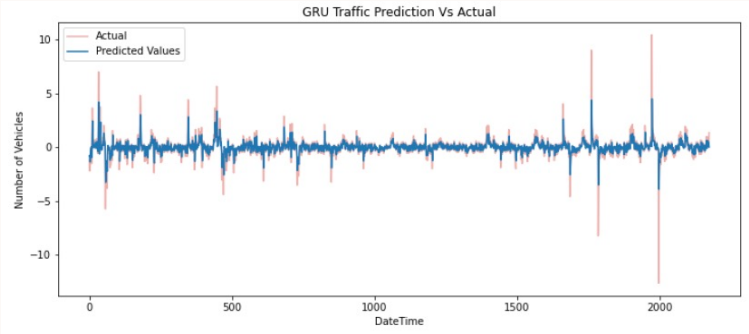
RESULTS AND ANALYSIS

Junction 1

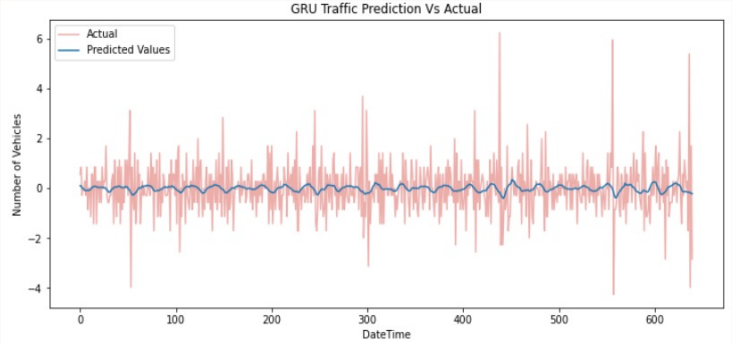


Junction 2





Junction 3



Junction 4

CONCLUSION

Summary

- Traffic Prediction
- Junctions Data
- GRU model

Recommendations:

- Infrastructure
- Smart cities
- Improve Traffic Management

THANKS!

Do you have any questions?