

# TRAFFIC CONGESTION PREDICTION USING MULTI-SOURCE HISTORICAL AND REAL-TIME TRAFFIC FLOW DATA

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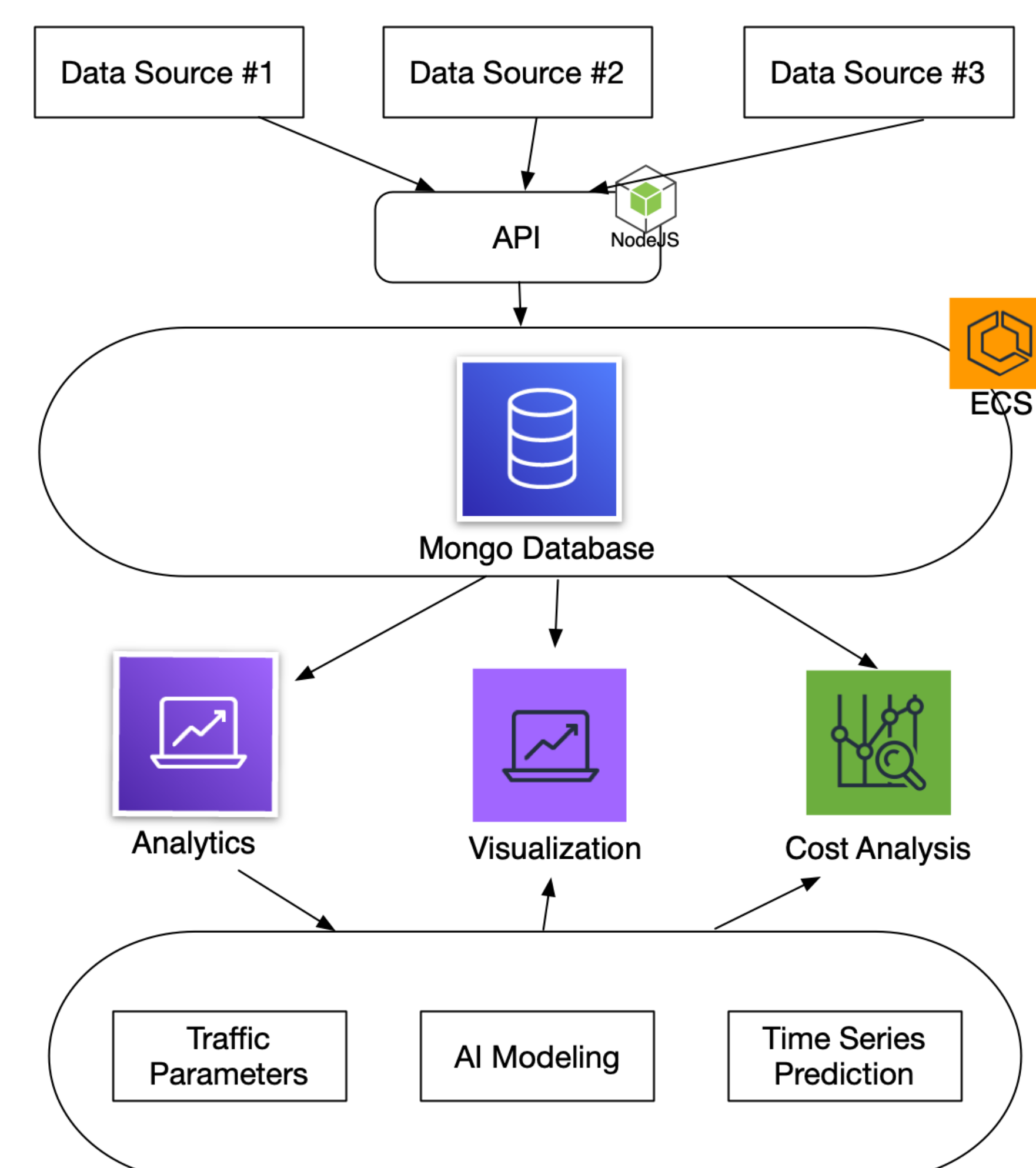
## 1. INTRODUCTION

- Traffic congestion is an issue that is costly in time, fuel, and money
- Congestion also causes mental stress and produces pollution
- By predicting the duration and severity of congestion beforehand, authorities can make drivers' trips much smoother

## 2. DATA COLLECTION

- For the first part of the project, we gathered data from various sources in order to develop a database that accounts for both stationary data and probe data
- The data taken was primarily vehicle data points and trip data

## 3. OVERVIEW

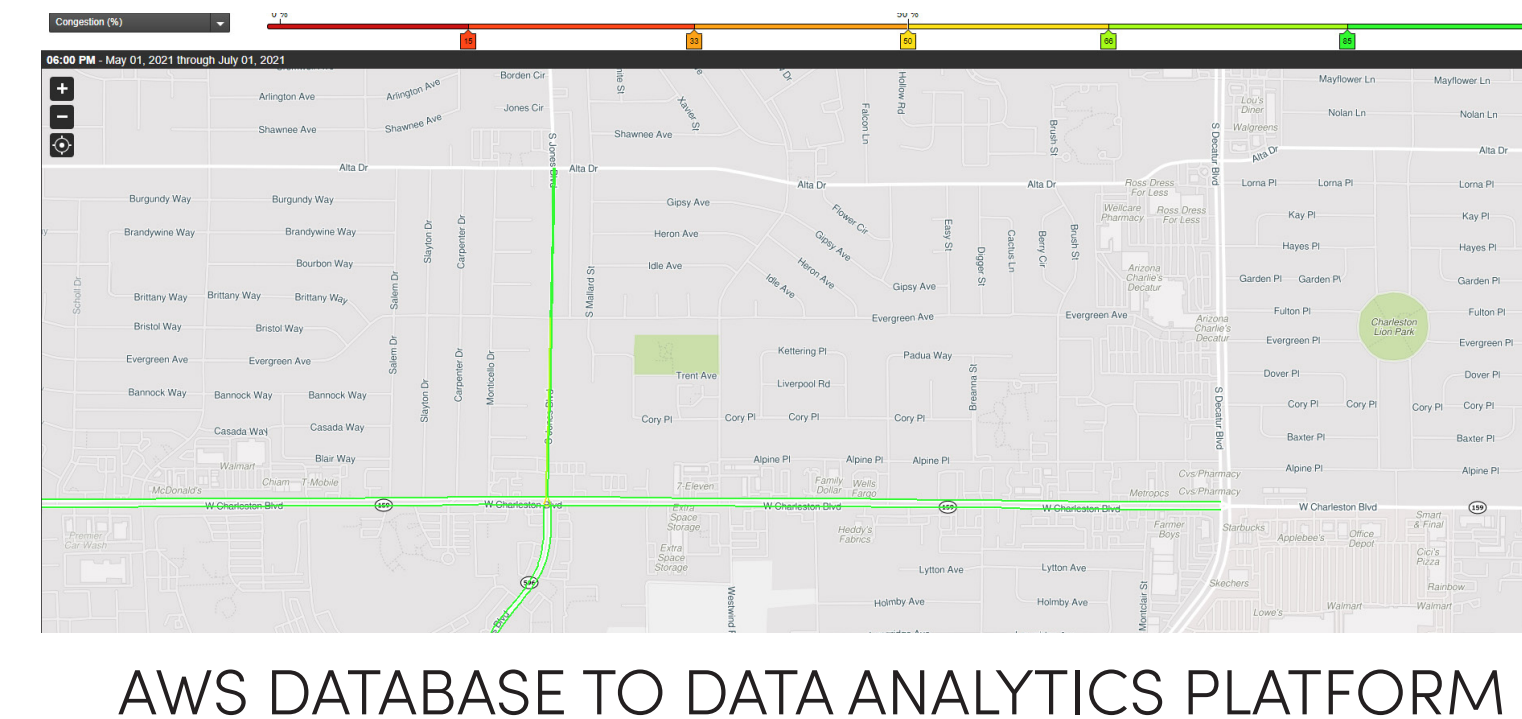
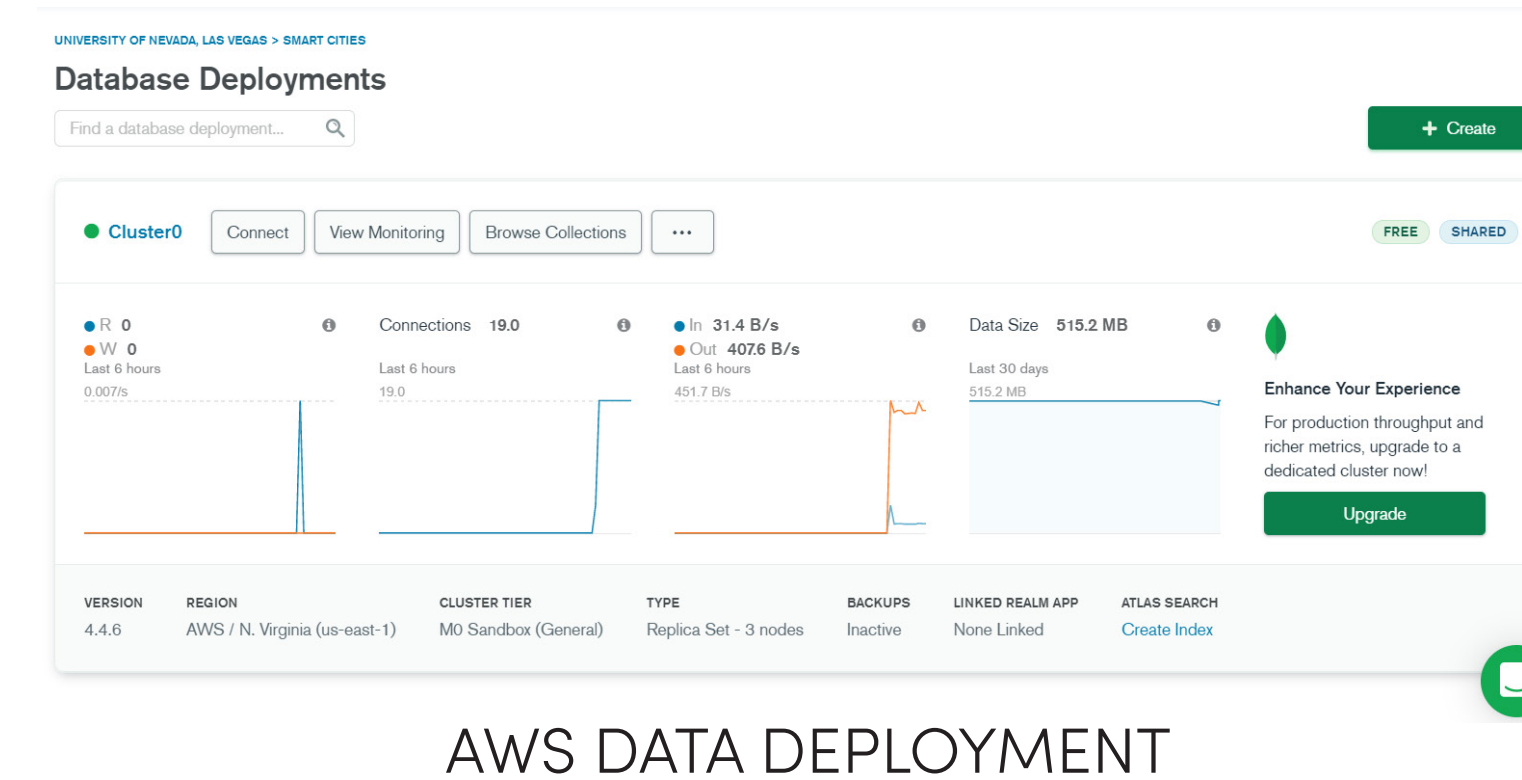


## 4. HYPOTHESIS

- Use of autonomous and crowd-source data provides reliability, coverage, and improved accuracy in traffic congestion prediction
- This is achieved in two steps: Data pre-processing from various sources and developing a prediction model

## 5. DATA PRE-PROCESSING

- Data taken was stored in MongoDB through AWS Cloud Services
- Data visualization was done through Leaflet API and a traffic data analysis platform



## 6. FUTURE RESEARCH

- Future research for this project would be comparing research models used for traffic prediction algorithms
- Evaluation Metrics that are used with evaluating congestion are:
  - Latency and Count [ between the predicted and [Rooted Mean Square Error (RMSE) and the Mean Average Error (MAE) ground truth values], Congested Hour, Buffer-time index (BTI), and Reliability Curves
- We would then test the prediction model on the data that we have collected and stored within the database

### TWO MAJOR METHODS OF TRAFFIC PREDICTION ALGORITHMS

Regression-Based Models	Machine Learning Models
Autoregressive Integrated Moving Average (ARIMA)	Recurrent Neural Network based models (RNNs)
Historical Average (HA)	Convolutional Neural Network based models (CNNs)
Vector Autoregressive (VAR)	Graph Convolution Networks based models (GCNs)
Gaussian Process Based	
Kalman Filtering Model	

## 7. ACKNOWLEDGEMENTS



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1. Evaluation of Opportunities and Challenges of Using INRIX Data for Real-Time Performance Monitoring and Historical Trend Assessment
  2. Auditing Work Zone Mobility Using Probe Vehicle Data
  3. Evaluating the reliability, coverage, and added value of crowdsourced traffic incident reports from Waze
  4. Spatial temporal incidence dynamic graph neural networks for traffic flow forecasting