Traffic Lane Data Analysis for Optimal Control and Safety

Veronica Ahn

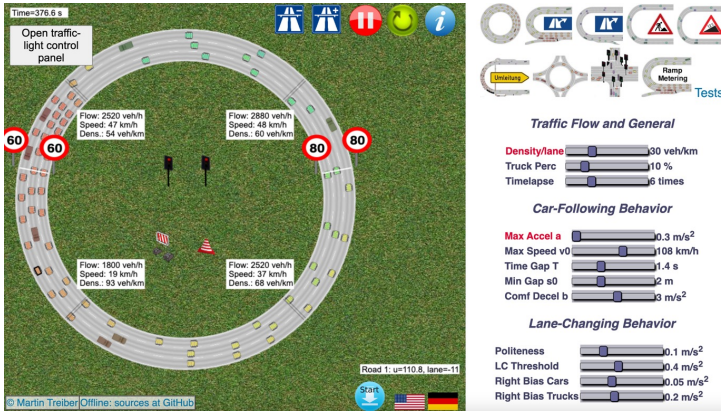
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Overview

- Traffic wave
  - Also known as traffic jams or congestion
  - Occur in high-traffic areas
  - Stop-and-go pattern



- Work with TDOT (Tennessee Department of Transportation) on statewide radar traffic sensor data
  - Develop ways to manage data sources and reduce congestion
  - Implement better traffic control measures
  - Find ways to deal with missing data as well as lane-level data

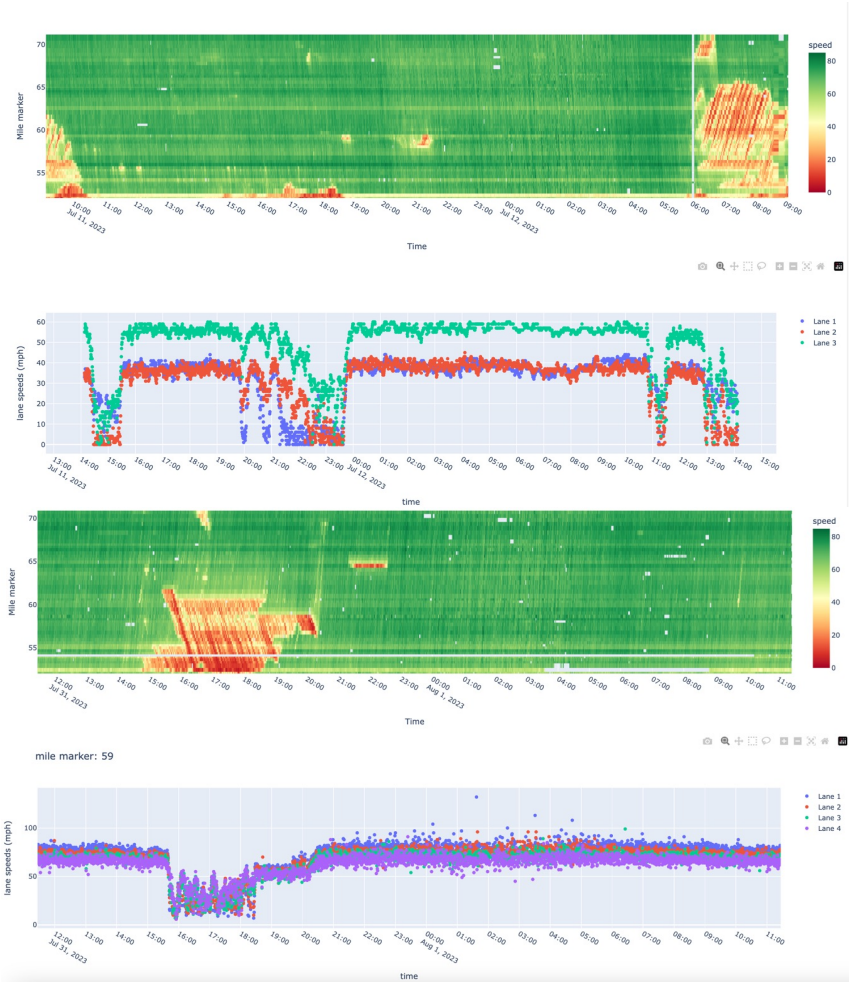
TN TDOT Department of Transportation

I-24 MOTION

- 4-mile section of I-24 in Nashville-Davidson County Metropolitan area with 294 ultra-high definition cameras
- Purpose: provide environment for testing advanced traffic management in real freeway traffic
- RDS data—placed along the road
  - Calculates current speed of traffic and sends to system, warning and giving time to slow down

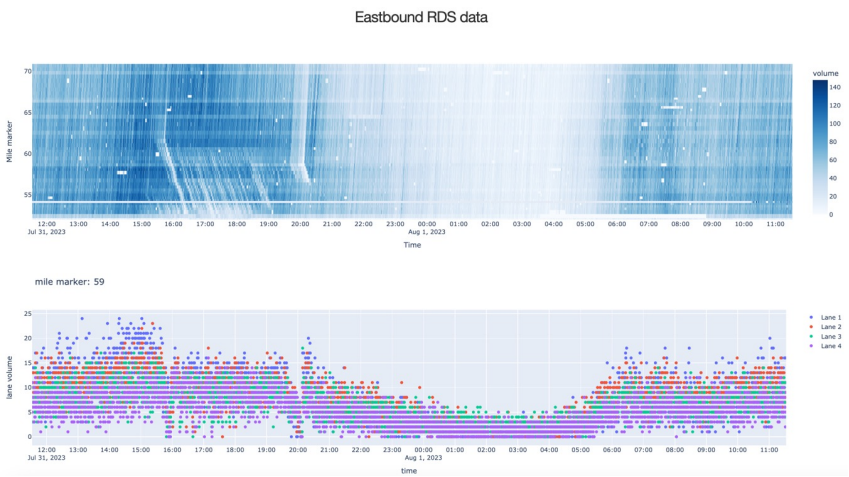


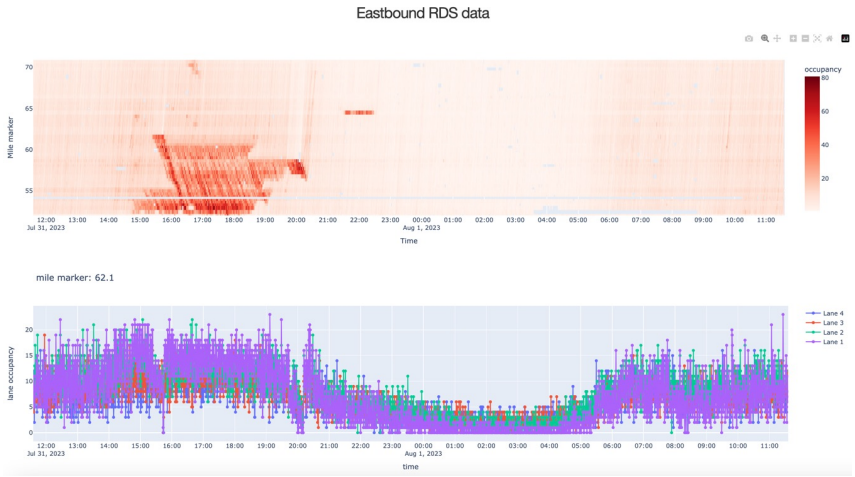
Lane Level Visualization

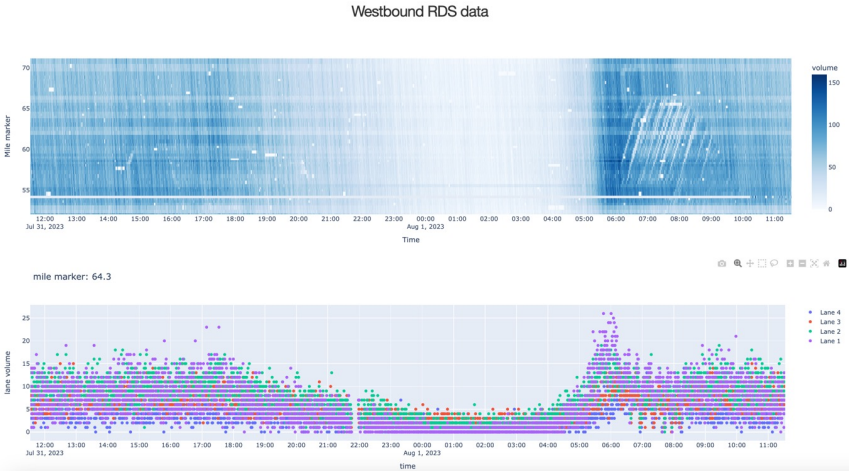


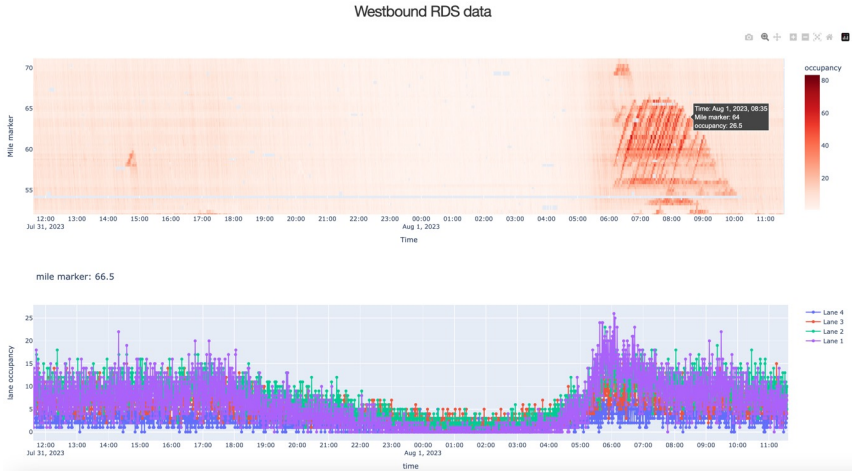
- Used to understand traffic patterns
- Provides information about movement within individual lanes
  - Helps with accurate traffic analysis
  - Identify congestions
  - Assess lane capacity
  - Future transportation planning

Velocity, Occupancy of Traffic Lanes



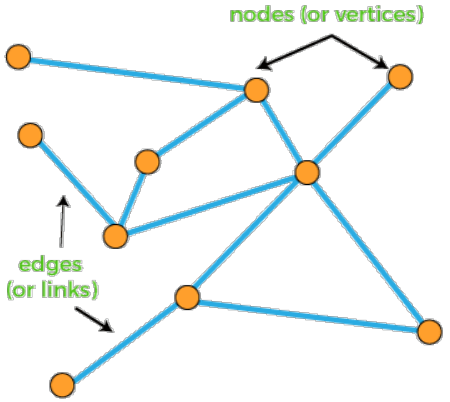




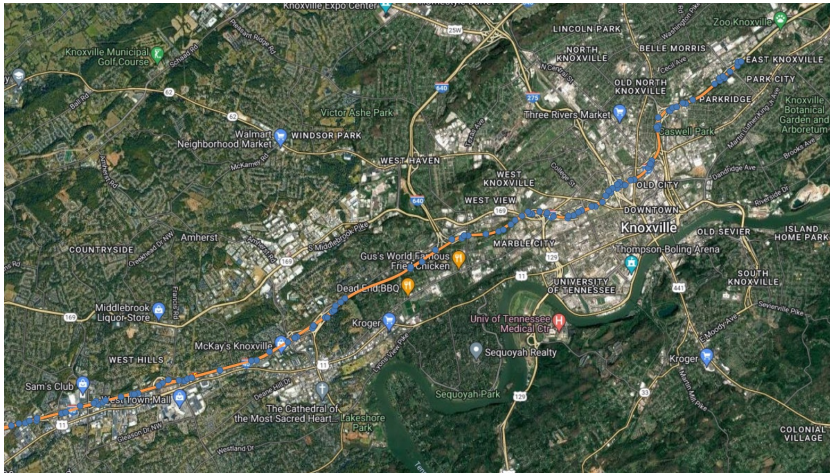


Interstate-40

- QGIS
  - Used for GIS analysis, mapping, visualization
  - Mile markers, nodes, edges



Knoxville (TDOT region-1)





Conclusion

- **Lessons learned**
  - Real life application to coding
  - Interpret tons of different data and encode to graphs to visualize
  - Better understanding of transportation system in large scales
- **Challenges faced**
  - Unexpected Workflow Errors
  - Time management
- **What went well**
  - Made new connections
  - Gained skills in research and learned new system software in analyzing data