Traffic Simulation of Peachtree Street - Atlanta

Ankit Srivastava, Chengwei Li & Vishnupriya Pradeep
Georgia Institute of Technology

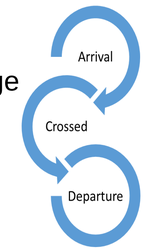
Introduction

Our simulation studies the effect of unsynchronized versus synchronized signals on the Atlanta Peachtree Street by studying the travel time distribution from the 10th street to 14th street. Influence of aggressive on the traffic was also studied to provide an insight into the real life scenarios. This could be used for analyze the traffic conditions in other street and also to help improve the current traffic conditions in Atlanta by modifying the parameters.

Priority queues and central simulation engine was used to recreate the traffic conditions along the Peachtree street. Simulation engine was triggered by three events such as arrival, departure and crossed state at the intersection.

Research Questions

- Influence of unsynchronized versus synchronized traffic signals on the average travel time?
- What is the average waiting time ?
- Influence of aggressive drivers on the flow of traffic?



Methods and Materials

- The model incorporates the left and through travelling of the vehicle and also right turn based on an estimated queue joining time.

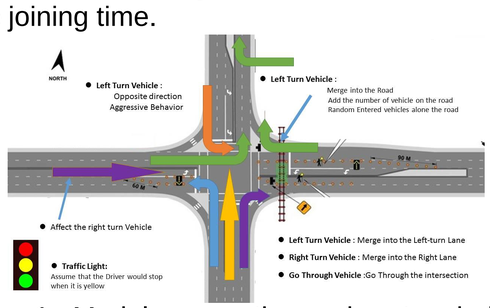


Figure 1 : Model assumption and system behavior

Simulation Architecture

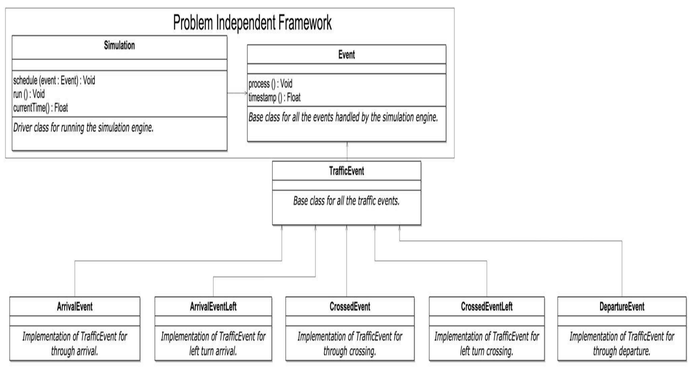


Figure 2: UML process diagram for the simulation engine

Travel time distribution

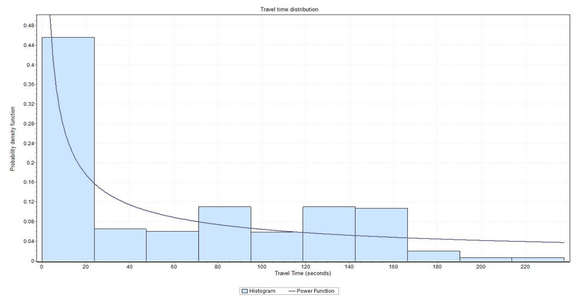


Figure 3 : Travel time distribution for the NGSM dataset

Waiting time for random seeds

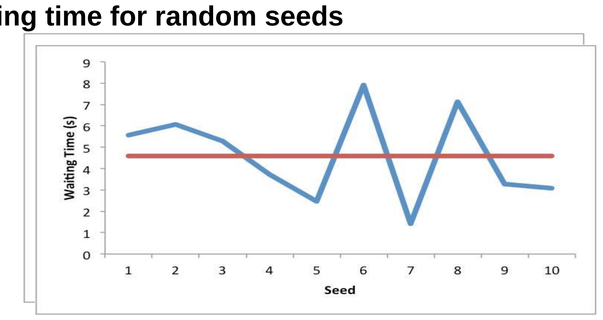


Figure 4: Average waiting time for unsynchronized random seeds

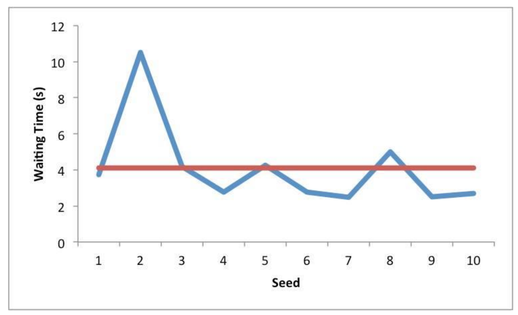


Figure 5: Average waiting time for synchronized random seeds

Parameters influencing the average waiting time

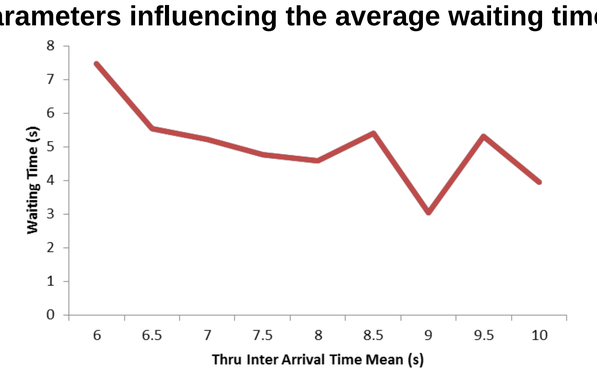


Figure 6: Average waiting time variation as a function of inter arrival times in straight through traffic

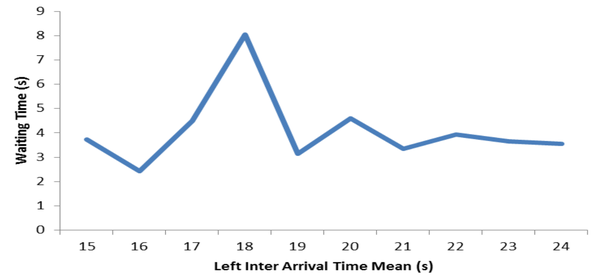


Figure 7 Average waiting time variation as a function of left Inter arrival time

Vehicle exiting the system

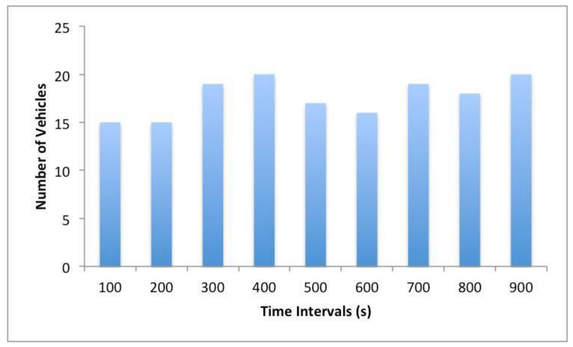


Figure 7: Total number of vehicle exited within 900 Seconds time frame

Influence of aggressive driver

- Increasing the aggressiveness of the driver over a short period did not cause a significant change in the travel time after 10%.
- Increased simulation period, could help in studying aggressive driver behavior.

Conclusion

- The arrival time distribution for the NGSM dataset had similar distribution pattern compared to the results published by university of Idaho.
- Waiting time indicated great variation across different simulations
- Synchronized signal gives lower waiting time than unsynchronized traffic signals.
- Waiting time shows a declining trend with increase in through inter arrival time. Waiting time remains relatively unaffected on changing left inter arrival time.
- A total of 159 vehicles exited the simulation system within 900 seconds time frame.
- Analysis of the aggressive driver behavior is not conclusive, as the waiting time becomes constant after increasing the aggressive driver percentage by 5%.

Contact

<your name>
<your organization>
Email:
Website:
Phone:

Traffic System behavior