CALIFORNIA SCIENCE & ENGINEERING FAIR
2019 PROJECT SUMMARY

Name(s)

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Project Number

S0823

Project Title

Modeling Intersections as an Asymmetric Non-Zero-Sum Game for Maximin Decision Theory and Traffic Flow Optimization

Abstract

Objectives

Develop a model for traffic flow that aligns with game theory rules. Use a decision rule to optimize and automate intersection lights.

Methods

Laptop with processing.py compiler and Python. Model tested using intersection data from Von Karman Ave crossing Campus, Martin, Dupont, and Michelson provided by the ITRAC (Irvine Traffic Research and Control Center).

Results

The model produced a 0-5% decrease in stopped time for the average car, while remaining autonomous and needing no infrastructure to implement.

Conclusions

My model slightly increased the efficiency of traffic flow by the measure of wait time, and requires no additional data-gathering infrastructure to implement. This is done through modeling intersections using game theory rules, and then applying Wald's Maximin decision theory and numerous pruning strategies to find the best possible light times. While the results show that game theory can be used to solve system-oriented problems, it cannot be used realistically yet due to the unpredictable variables in real traffic.

Summary Statement

I created a model of traffic with game theory and devised an algorithm to increase traffic efficiency.

Help Received

I learned game theory concepts independently using online resources. Information about how traffic is managed and real intersection data was provided by Mark Ha and Chris Lee from the ITRAC (Irvine Traffic Research and Control Center).