

Traffic Tune POC Presentation

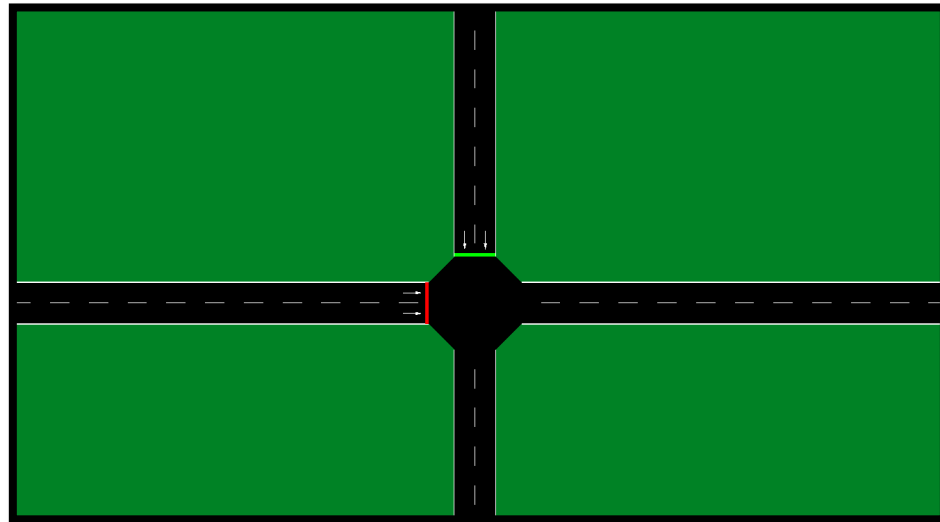
Demonstrating AI-driven Traffic Signal Control

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POC Overview

- Objectives:
 - Demonstrate the efficacy of an AI-driven traffic agent
 - Optimize traffic flow and reduce vehicle waiting times
- Approach:
 - Comparative demonstration at a single intersection
 - Fixed Time Policy vs. AI-driven Policy



Scenario Description

- Fixed Time Policy:
 - GGrr: Lane A green, Lane B red (42s)
 - yyrr: Lane A yellow, Lane B red (2s)
 - rrGG: Lane A red, Lane B green (42s)
 - rryy: Lane A red, Lane B yellow (2s)
 - According to SCOOT and SCATS policies (default for 2 lanes)
 - The convention is defined by the simulator
- AI-driven Policy:
 - Agent makes real-time decisions
 - Adaptable to traffic conditions
- The simulation includes about 2500-2600 vehicles in average and running for 1 hour

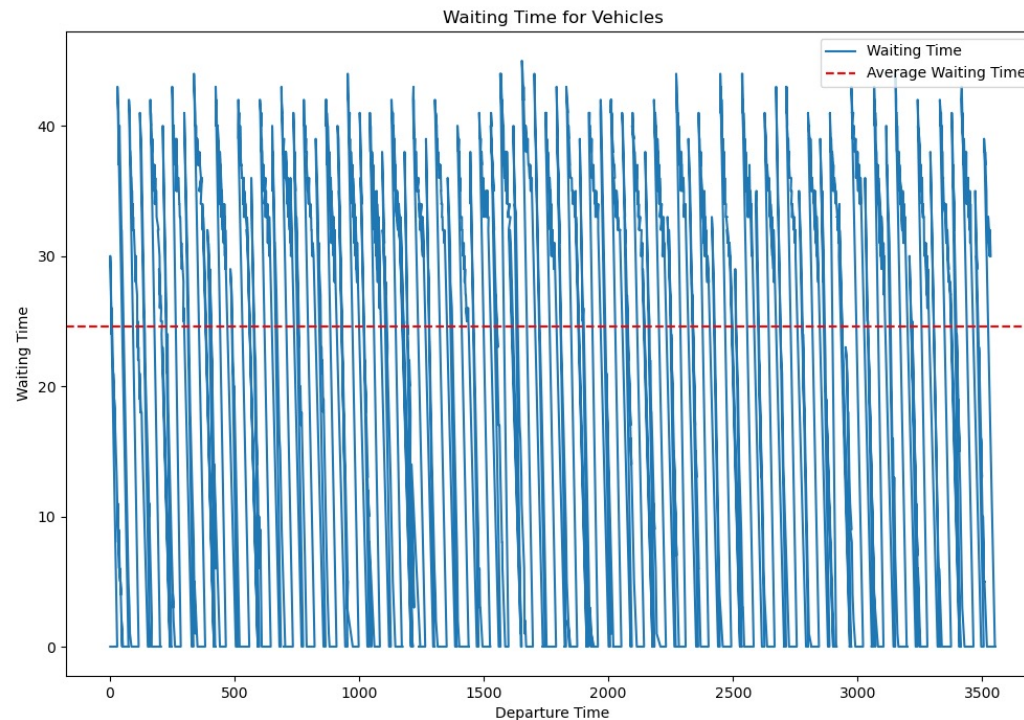
SUMO Environment Setup

- Environment:
 - SUMO (Simulation of Urban Mobility)
 - Configured for both Fixed Time and AI-driven policies
- Tools:
 - Jupyter Notebook
 - TraCI (Traffic Control Interface)
 - Gymnasium
 - SUMO-RL kit (Gym Wrapper)

Notebook preview

Performance Metrics

- Fixed Time Policy Results:
 - Mean Waiting Time: 24.59 seconds

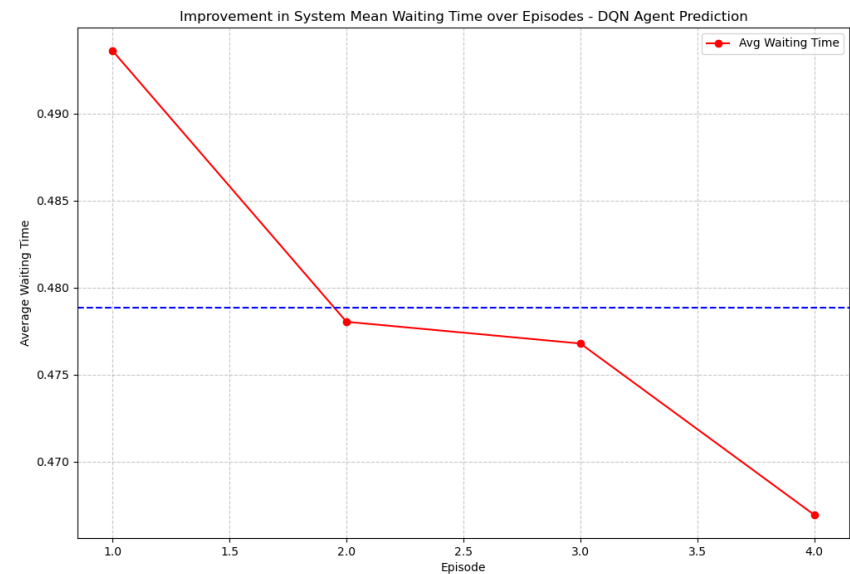
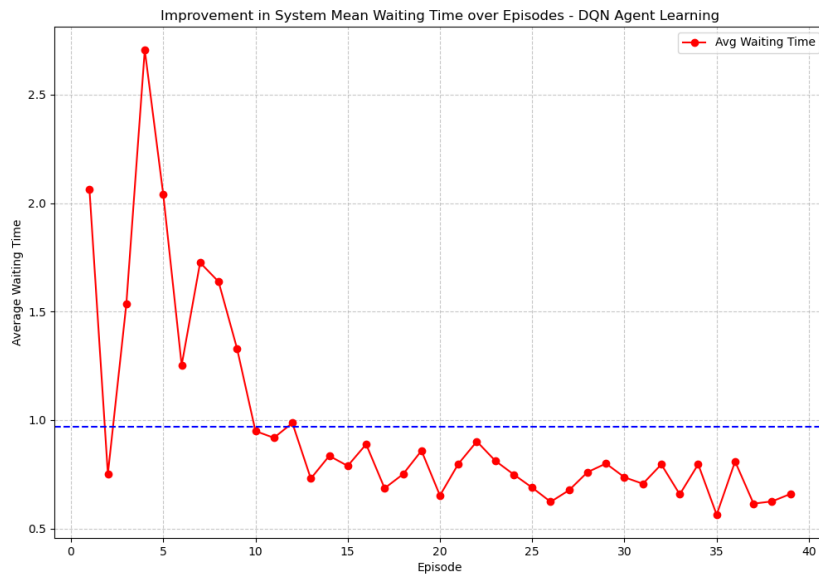


Fixed Time Policy

Performance Metrics

- Fixed Time Policy Results:
 - Mean Waiting Time: 24.59 seconds
- AI-driven Policy Results:
 - Mean Waiting Time: 0.48 seconds

24x improvement



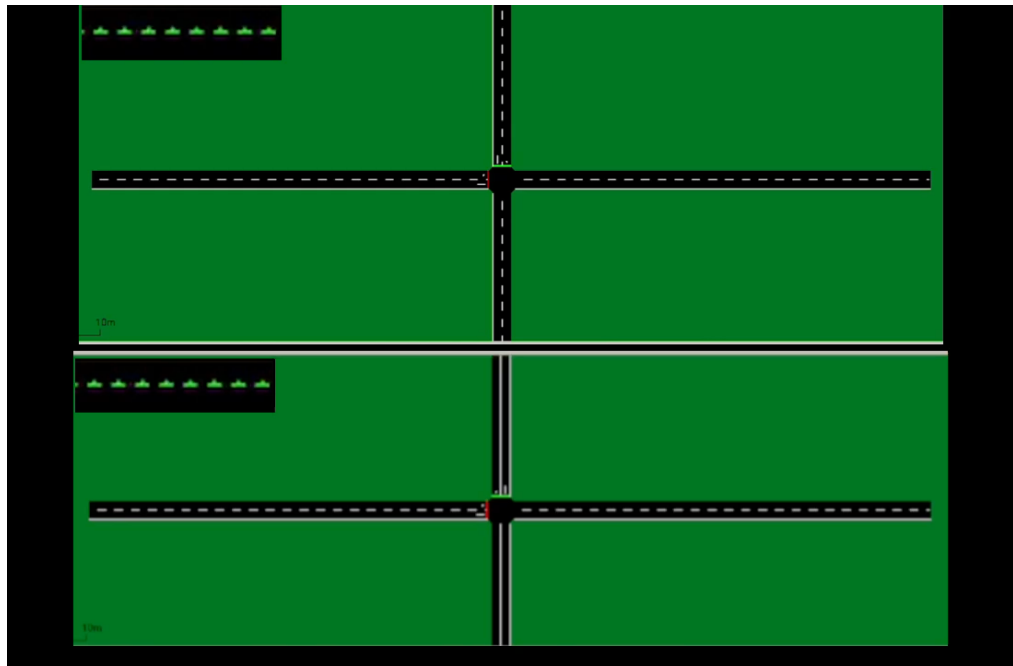
AI-driven Policy

Reward Improvement



Video Demonstration

- For illustration only



Conclusion

- Success Criteria Met:
 - Reduced average waiting time
 - Improved traffic flow
 - Positive feedback on adaptability
- Future Work:
 - Expanding the agent to more complex intersections
 - Expanding to multi agent approach
 - Experiments with different RL algorithms and various parameters changes