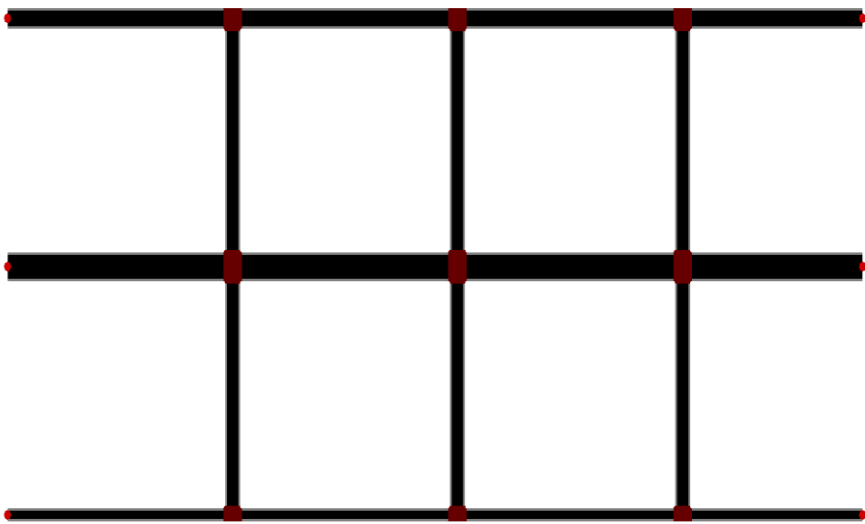# IMPLEMENTATION OF A MAX PRESSURE CONTROL FOR URBAN NETWORKS

Master's Thesis of Loay Mahmoud

Mentoring:
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3x3 Urban Grid Simulation Network

•The simulation uses a simplified 3x3 intersection grid to represent a typical urban network.

•The nodes are arranged top-to-bottom and left-to-right as follows:
Top Row: N1 – N2 – N3
Middle Row: N4 – N5 – N6
Bottom Row: N7 – N8 – N9

•The setup allows analysis of both local (node-level) and network-wide traffic dynamics under different control strategies.

•Vehicles arrive based on a Poisson distribution to reflect realistic traffic variability.

This flowchart describes the real-time control process of the Max-Pressure algorithm within the SUMO simulation, which is applied through Python as a programming language. It outlines when traffic and pedestrian data are retrieved, pressures are calculated, and signal phases are adaptively selected and timed at each simulation step to ensure responsive and balanced intersection control.
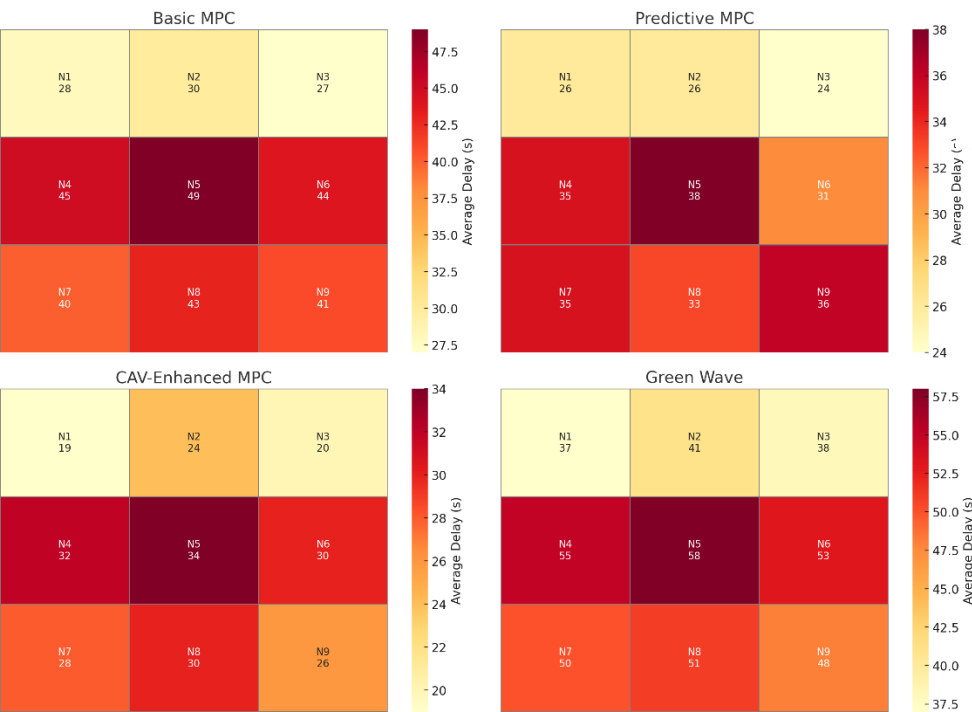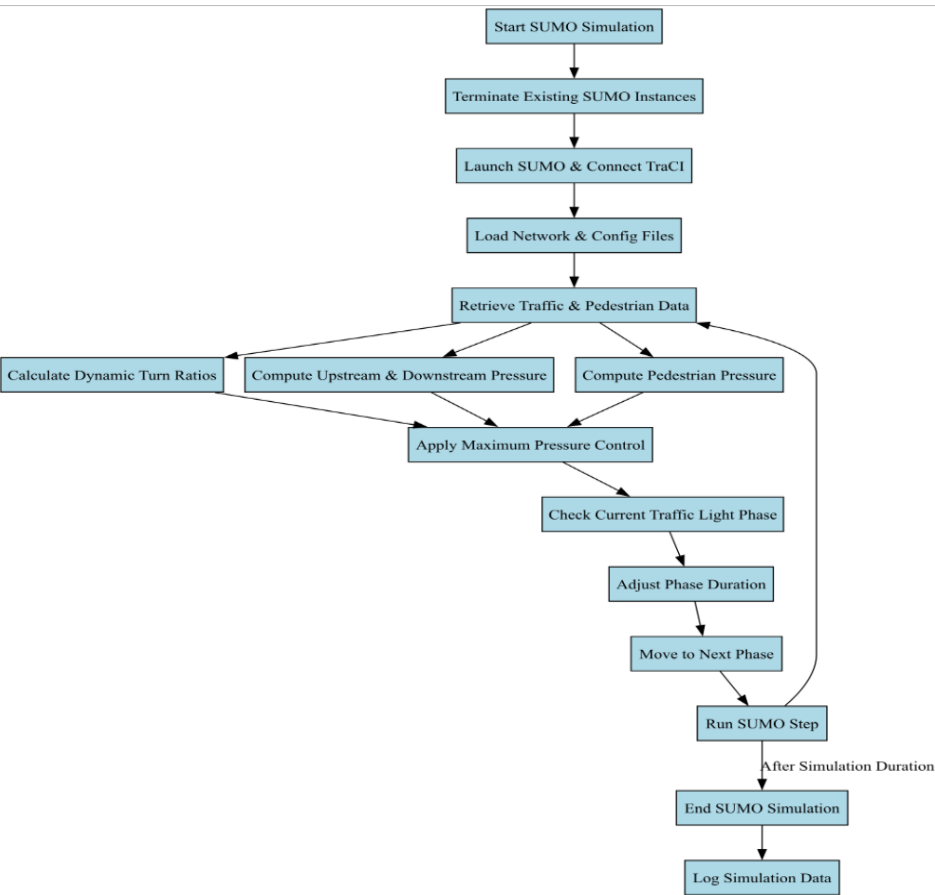
Heatmaps showing the average delay (in seconds) across all intersections under the four control strategies. The values are based on a 2-hour simulation of the 3x3 grid network.

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