CS4632 Model Implementation

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1 Implementation Goals

This project focuses on developing a simulation model for pedestrian traffic on a college campus, using inferred building occupancy to predict movement patterns. The primary objectives include:

- Accurate Campus Representation: Model pathways, buildings, and high-traffic areas based on occupancy data.
- Simulation of Pedestrian Flow: Implement and evaluate algorithms that simulate pedestrian movement patterns.
- Scalability and Extensibility: Ensure the simulation framework can be expanded to incorporate additional variables such as time-dependent occupancy changes and environmental factors.
- Validation and Testing: Assess the accuracy of the simulated pedestrian flow compared to real-world observations.

2 Overall Plan for the Simulation

2.1 Campus Data Modeling:

- Construct a digital representation of the campus layout, including walkways, intersections, and entry/exit points. The base model can be imported from Open Street Maps and modified to increase accuracy of roadways, pathways, and sidewalks.
- Integrate inferred building occupancy data to estimate pedestrian density at different times of the day. This inferred occupancy data may be generated using public data such as Fire Marshal occupancy limits.

2.2 Pedestrian Flow Simulation:

- Develop movement models that incorporate factors such as building occupancy, day of week, and time of day.
- Simulate pedestrian interactions, bottlenecks, and peak traffic conditions.
- Introduce dynamic elements such as events, class changes, and weather conditions.

2.3 Simulation Testing and Validation:

- Conduct controlled test cases to verify pedestrian flow accuracy.
- Compare simulated traffic patterns with real-world observational data.

2.4 Documentation:

- Maintain comprehensive documentation of the simulation modeling process.
  - Project Proposal (January 24, 2025)
  - Literature Review, Rev. 0 (February 12, 2025)
  - Literature Review, Rev. 1 (March 8, 2025)
  - UML Diagram (Database and Activity), Rev. 0 (February 19, 2025)