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Title of the project: **Pedestrian Flow Optimization in a Public Facility**

Project Category: Application / Network flow optimization

In this project, we aim to study and optimize pedestrian movement inside a public space, such as a train station, university campus, or airport terminal. The idea came from observing how people often cluster around certain corridors or exits, while other paths remain underused. These imbalances can create congestion, longer travel times, and even safety risks during rush hours or emergency situations. We thought it would be interesting to see if we could use some optimization tools to model and improve the way people move through such environments.

Our main goal is to represent pedestrian circulation as a kind of “flow network,” where corridors are edges and intersections or rooms are nodes. Each edge could have a certain capacity, representing how many people can walk through it comfortably per unit of time. We then want to find how pedestrian flows could be distributed across the available paths to minimize congestion and total travel time. We’re not trying to simulate exact human behavior, but rather to get an overview of how space could be used more efficiently with some simple assumptions.

For the moment, we are considering using Python for the implementation, since we are currently learning it in class. Libraries like *NetworkX* or *PuLP* might be useful to model networks and solve optimization problems, but we will first start by representing a small example, maybe a simple map of a station or a building with a few corridors. Once we understand how to translate our problem into mathematical form (nodes, capacities, flows), we’ll try to compute an “optimal” flow distribution. If we have time, we could visualize the results with a small graph or schematic, where thicker lines represent more crowded paths.

For experiments, we plan to test different situations. For instance, the morning rush hour, or a corridor being closed for maintenance, to see how pedestrian distribution changes. Comparing the results between a “normal” uncontrolled flow and our optimized scenario could highlight potential improvements, like better signage or path design.

Overall, this project will allow us to combine what we are learning in operations research with a very concrete, everyday example. It’s not about creating a perfect simulation, but about understanding how optimization models can help solve real spatial and organizational problems. We believe it’s an original and realistic topic that fits well with our current level while still leaving room for exploration and creativity.