

Research Title:

Using Network-Based and Agent-Based Approaches for Modeling Pedestrian Flows in the Urban Network

Primary Investigator:

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Information about pedestrian flows over the urban road network could inform transportation and urban planning. However, comprehensive data about pedestrian flows is not available, making a useful tool for estimation. The overall goal of this project is to evaluate, for the first time, the relative performance of two pedestrian flow models: Network-Based Models (NBMs), which rely on the structure of the network, and Agent-Based Models (ABMs) that simulate pedestrian flows. Such a comparative study is essential for understanding the factors affecting the volume and distribution of pedestrian flows in the urban network, and for improving the predictive performance of pedestrian flow models.

In the first year of the project, the NBMs and ABMs were constructed for the city of Tel Aviv by using data of urban environment characteristics, walking behavior and pedestrian volume observations. Comparing the performance of the models, show that both types of models exhibit similar predictive power at the city level, but when these models are applied to each urban area separately, the ABM exhibits a significantly higher predictive power. Hence, the ABM has an advantage over NBM when the model is constructed for the entire city: it can be applied to any urban area in the city without the need to collect additional data for that area.

Based on the comparative analyses between pedestrian flow models, which will continue into the second year of the project, we intend to suggest guiding principles for applying pedestrian flow models in urban environments. This potential contribution is in accordance with the Zero Transportation Externalities vision of ISTRC.