# Evacuation Model for Supporting Building Spatial Design

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## Abstract:

Existing building design processes often overlook the critical importance of escape routes. Conventional escape simulations, conducted post-building design, restrict modifications to crucial elements such as door placement and corridor dimensions. To overcome this limitation, this study integrates computer simulation into the early design phase. By identifying congestion points and optimizing escape routes, we aim to drastically improve evacuation efficiency and minimize casualties in emergencies. Recognizing the constraints of traditional escape planning, this research introduces a novel design model focused on enhancing evacuation efficiency during the initial planning stages. Leveraging VISSIM 3D simulation software to mimic pedestrian behavior, the model enables the optimization of door locations and passage widths to expedite evacuation and reduce casualties. Planning these routes after construction is completed can be severely constrained by the building's layout. This study proposes integrating escape route planning into the early stages of building design to optimize safety and efficiency. A novel architectural process was developed using simulation and drawing software to assess building designs and escape plans simultaneously. We aim to ensure smooth building operations during normal use and significantly reduce evacuation time and casualties. The methodology involved creating preliminary building models in SketchUp, mapping optimal escape paths for occupants, and then simulating evacuation scenarios using VISSIM 3D. This process identified potential congestion points and bottlenecks, enabling design refinements to improve escape efficiency. Initial simulation results demonstrate that the proposed method effectively shortens evacuation times, thereby reducing the risk of casualties.

## Keywords:

Evacuation, Building design, Simulation.