Master's thesis

AUTOMATIC DATA EXTRACTION FROM EVACUATION EXPERIMENTS

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FACULTY OF INFORMATION TECHNOLOGY CTU IN PRAGUE

Assignment of master's thesis

Title:	Automatic data extraction from evacuation experiments
Student:	Bc. Vít Pospíšil
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Study program:	Informatics
Branch / specialization:	Knowledge Engineering
Department:	Department of Applied Mathematics
Validity:	until the end of summer semester 2025/2026

Instructions

Crucial part of evacuation experiments is the data extraction from records gathered during the experiment, which are usually (but not exclusively) in the form of video records. An evacuation experiment was conducted in June 2023 in cooperation with Faculty of Civil Engineering (FCE) and Image Processing Laboratory (ImproLab). There are two main goals of the thesis: 1) processing the data from the experiment for further analysis, and 2) investigation of computer vision methods appropriate for further experiments addressing the shortcomings identified in processing the experimental data.

The assignment is divided into following tasks:

1) Make a survey of computer vision methods of pedestrian tracking and detection used for evacuation experiments analysis. Start with exploration of methods in OpenCV and methods used by Pedestrian Dynamics groups from Forschungszentrum Jülich.

2) Make a survey of quantities measured in pedestrian and evacuation dynamics and methods of there extraction from experimental data.

3) Perform the data mining from the experimental data from 2023 experiment (data are provided by organizers of the experiment in agreement with the ethical approval) and identify shortcomings in the design of the recording methods applied in the experiment.

4) Investigate alternative options of experiment data capturing, as for example depth sensor camera, optimization of camera positions, pre-experimental calibration. Conducting a series of mini-experiments investigate the suitability of these methods for better extraction of desired data. Focus on proper extraction of evacuation times, pedestrian occupation area, and trajectories.

Electronically approved by Ing. Magda Friedjungová, Ph.D. on 20 June 2024 in Prague.

5) In cooperation with researchers from FCE and ImproLab prepare a setup of the recording methods and data extraction methods to be used in larger-scale experiment.
6) Perform the data extraction of the records gather during the future experiment, provided the experiment is conducted before submission of the thesis (conducting the experiment is responsibility of researchers at FCE in autumn 2024).

Electronically approved by Ing. Magda Friedjungová, Ph.D. on 20 June 2024 in Prague.

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