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CALIBRATION OF THE PEDESTRIAN INGRESS MODEL IN THE VACCINATION CENTER

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Introduction

- COVID-19 - high workload of medical facilities.
- *The use of modern technologies for the collection of complex data.*
- Optimization of the operation of objects and its sub-phases.
- The possibility of increasing the input flow.
- Verification of the possibility of extracting model parameters with the aim of refining the model of occupant's movement.

Data description

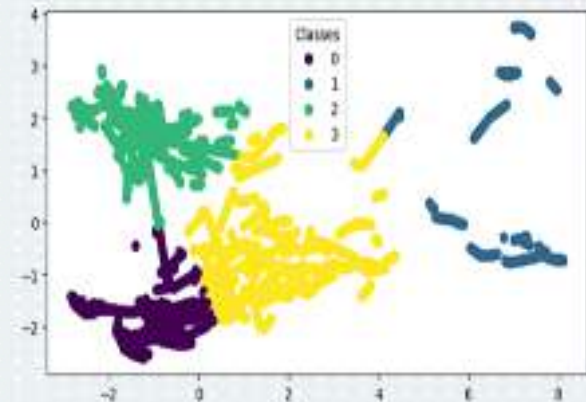
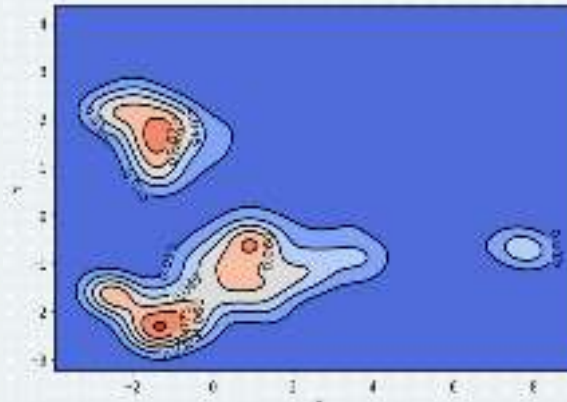
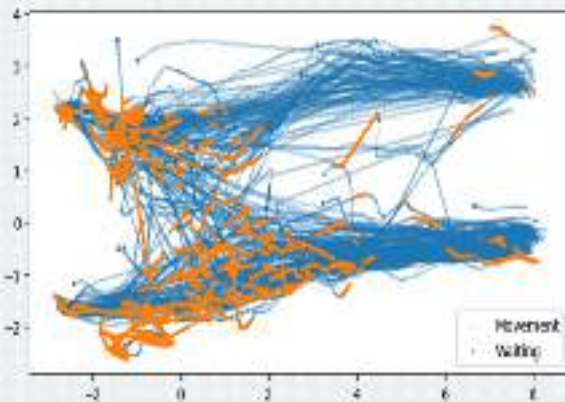
- Vaccination center waiting room from August 6, 2021.
- 400 trajectories extracted from video recording.
- 226 trajectories after cleaning and filtering.
- Perspective transformation based on local coordinate system.



Extraction of data for calibration

Waiting points extraction

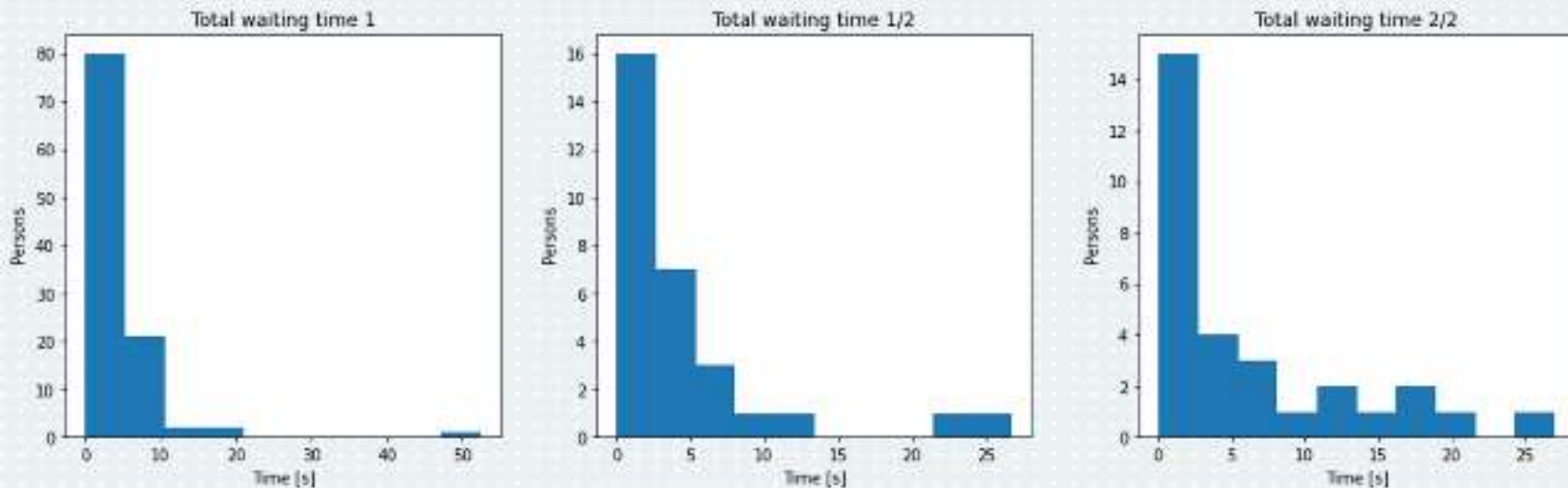
- Instantaneous walking speed is less than 0.4 m/s and the distance from the position 1 s ago is less than 0.4 m.
- K-means clustering to determine the distribution of people to individual waiting areas.



Extraction of data for calibration

Waiting times extraction

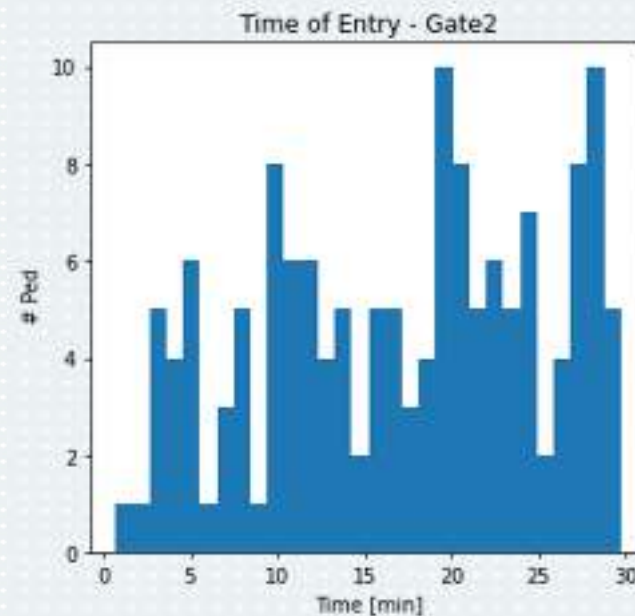
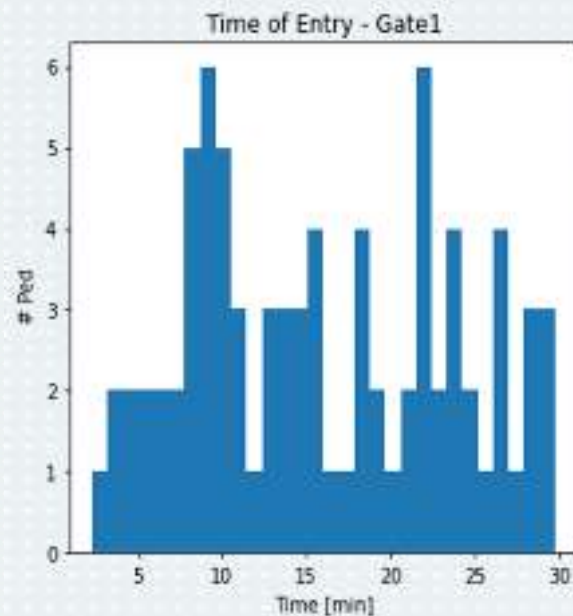
- 63 % of occupants stopped once or twice in waiting room and 37 % of occupants just walked.
- 3 histograms of waiting times.



Extraction of data for calibration

Input flow extraction

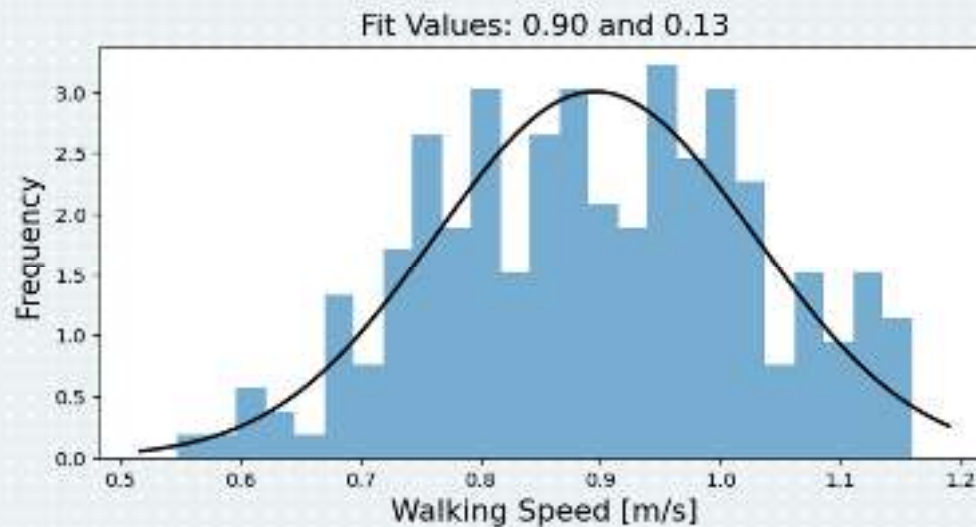
- Flow of occupants for two entrances.



Extraction of data for calibration

Walking speed analysis

- Average speed determined for each occupant.
- For the model, walking speed approximated by a normal distribution.



Model design

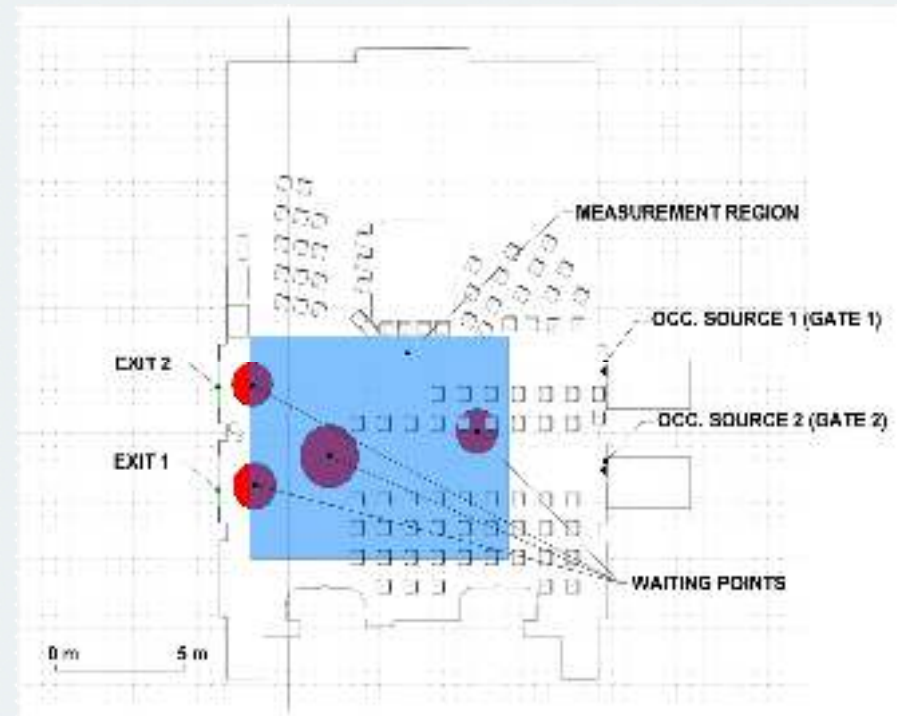
- Pathfinder (v. 2022.2.0803).

Model A (basic calibration)

- Input flow parameters.
- Walking speed parameters.

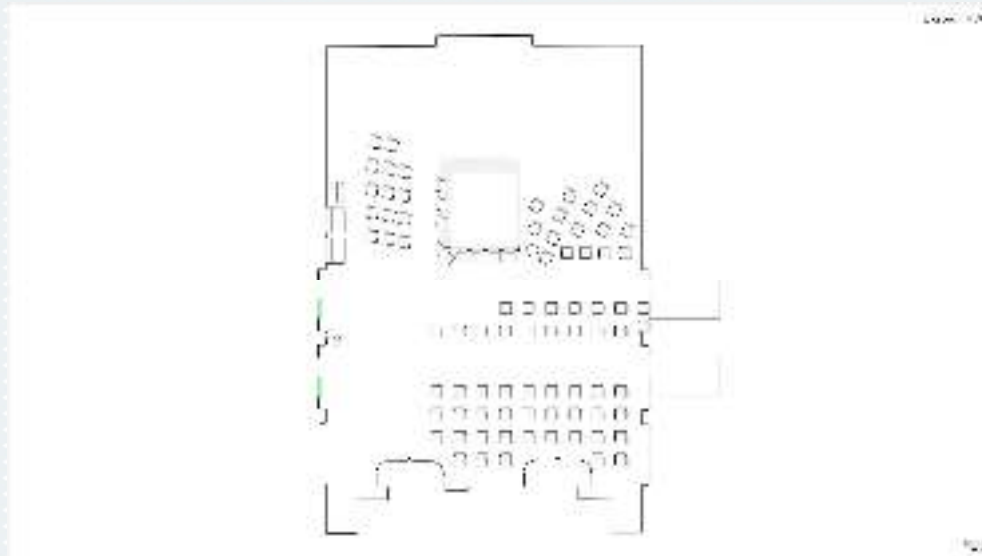
Model B (advanced calibration)

- Input flow parameters.
- Walking speed parameters.
- Waiting points parameters.
- Distribution of waiting times.



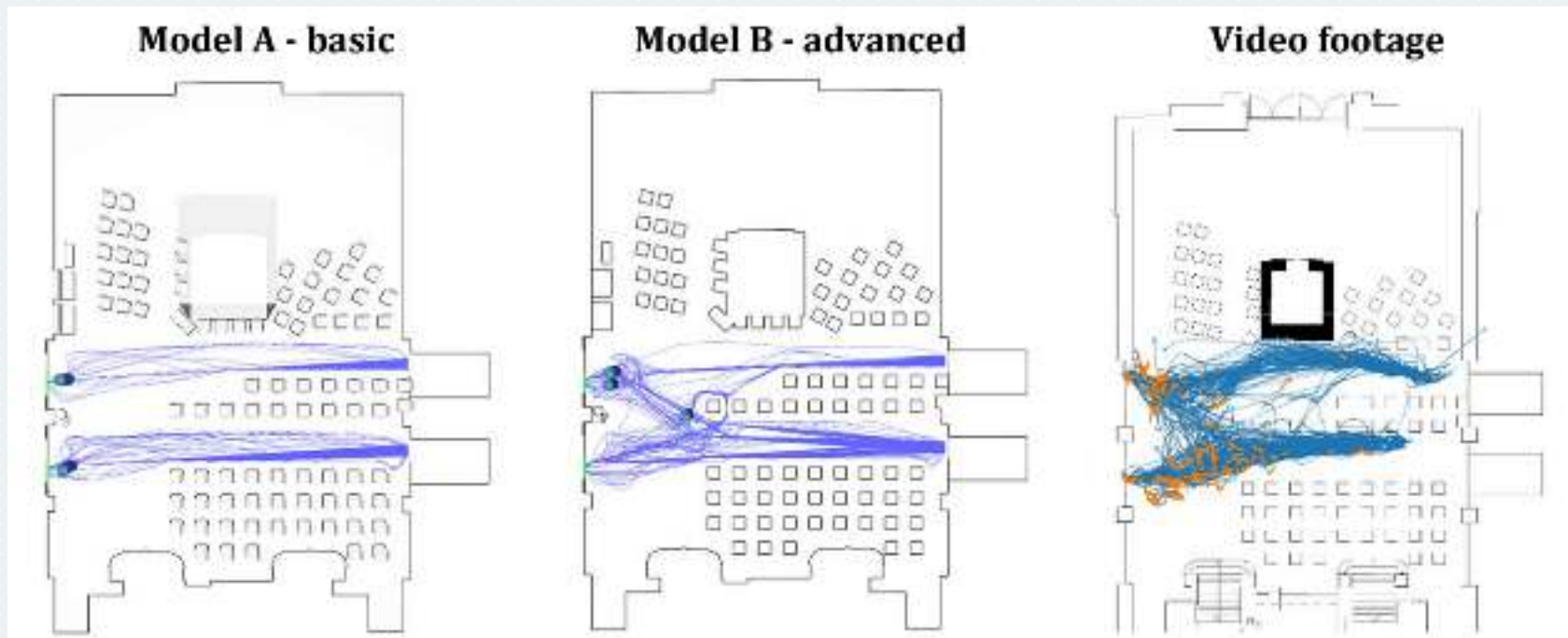
Results

- 3 validation tests used for evaluation of waiting points impact.
- Sample of 132 trajectories that start in front of measurement region and end behind it were used for validation tests 2 and 3.



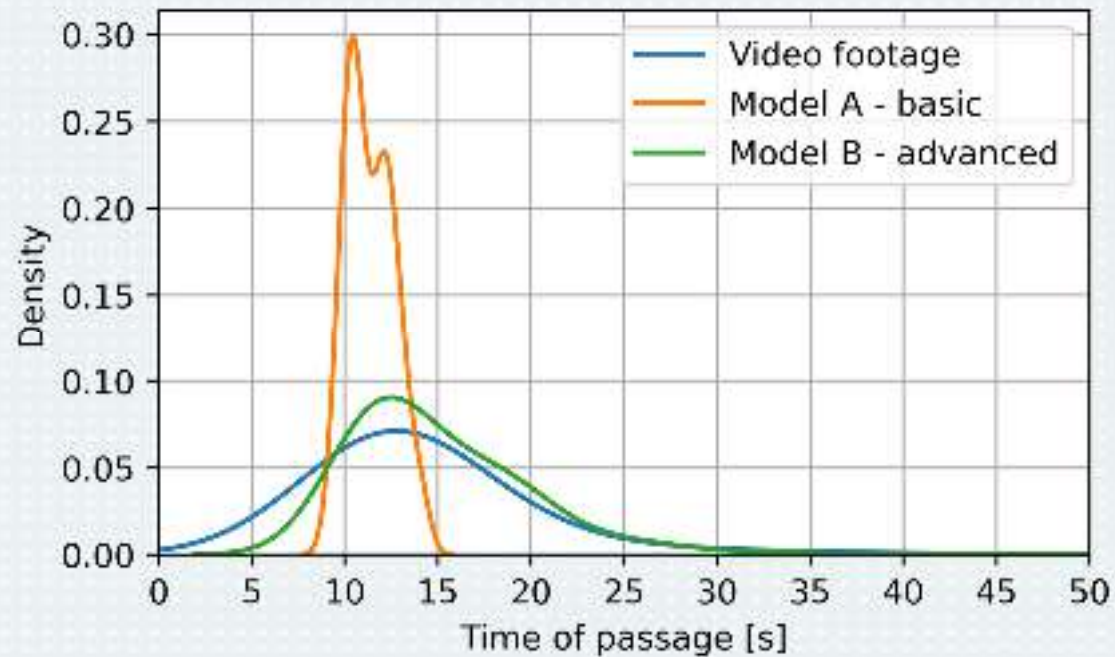
Validation test 1

- Visual qualitative validation of trajectory shapes.



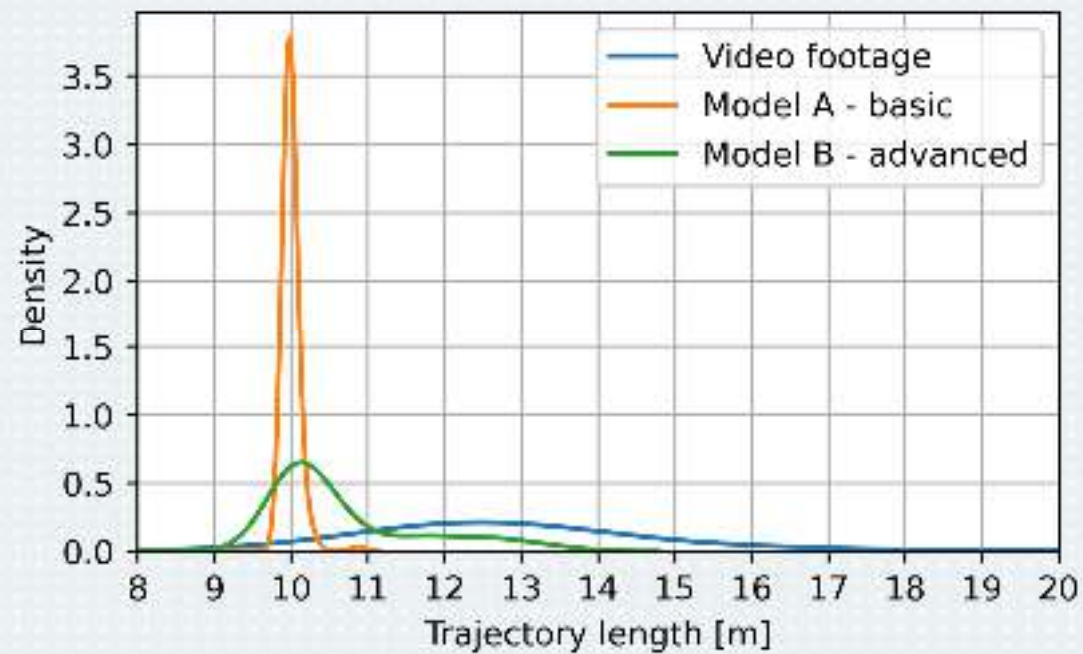
Validation test 2

- Quantitative validation of time of passage through measurement region.



Validation test 3

- Quantitative validation of trajectory lengths in measurement region.



Conclusions

- More sophisticated data collection methods are needed to calibrate the ingress models.
- The possibility of optimizing the logistics of operation.
- Further research: Geometric similarity of bundles of trajectories.

Thank you for your attention.

