Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Lecture with Computer Exercises:
Modelling and Simulating Social Systems with MATLAB

Project Report

Pedestrian dynamics in long, narrow hallways

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Zurich
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Agreement for free-download

We hereby agree to make our source code for this project freely available for download from the web pages of the SOMS chair. Furthermore, we assure that all source code is written by ourselves and is not violating any copyright restrictions.

Name 1 Name 2

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1 Abstract

2 Individual contributions

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5 Implementation

5.1 Simplifications

x All our agents walk on their own, there are no groups of friends, families etc who stand together as much as possible.

? All have the same mean speed, size, ??

? Any other simplifications?

6 Simulation Results and Discussion

6.1 Goals

First, let's have a look at what our goals were. We planned to have a look at the pedestrian flux, how it can be improved and jammings be avoided. We furthermore wanted to have a closer look to what happens during rush-hours and in a situation when much more people are moving in one direction than in the other.
On the agent-based side of our model, we wanted to analyze the influence of aggressive fast people in a rush, slowly moving obstacles (eg. mothers with baby buggies) and the influence of drunkard (more or less randomized walking) on the pedestrian flux.
If everything went well, we also wanted to implement a static obstacle and see what happens.

6.2 Achievements

As soon as we started programming we realized there was a major point of importance about this work we all were aware of, but had forgot to put it in the project proposal. We all did not want to start with an already known program or algorithms, but build something "new". So we started off creating our logic function that would allow the agents to avoid crashing into other agents and not working with repulsive forces as for example Helbing (Quelle angeben, ist das lteste Paper) did.
Quite proudly, we can now say we managed to do this. Our idea of the agents "thinking ahead" by consulting where other agents are and not just being pushed around by repulsive forces worked.
We now are able to play with lots of input variables, the most important being number of agents entering the corridor per time and the agents' characteristics as size, speed and lots more.
A nice thing we built but did not originally plan to is that we planned to and did research on the sitation as explained earlier in the long, narrow corridor in Zurich mainstation. But in our simulation, one can also change dimensions as length and shape of the walls easily.

6.3 Fundamental Questions

Our fundamental research questions were:

- How does the simulation behave in the following situations: rush hour, with obstacle, with very slow/fast agents, random path agent (drunkard)? Does it run smoothly or will ther be jams?

- How will our implementation of a rudimentary kind of ?thinking ahead? affect the simulation? Will it work good or bad? Can we compare it to other implementations?
- Are there any group dynamics evolving as lane or group formation?

6.4 Comparing measurements

Saturday, Nov 17th, we did some quick mesaurements right at Zurich main station to have some data we could compare. Two measurements were taken, only some minutes lay between these, that was when we measured the length and breadth of our corridor. The measurements were:

1 The "boring" measurement: During 2 minutes 14 pedestrians headed tracks 3-18, and 20 pedestrians directed towards tram station "Bahnhofsquai". No problems at all, very fluently.

2 The "crowded" measurement: During 2 minutes, 41 pedestrians headed tracks 3-18, and 33 pedestrians directed towards tram station "Bahnhofsquai". People got stuck, ran into each other, had to walk stop-and-go-like.

7 Summary and Outlook

8 References

9 Want-To-Do-List

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A Appendix