Repulsion Force of other agents

Since agents try to keep a distance and especially attempt not to have physical contact to other agents, there is a repulsion force between each agent. This force is based on a potential field with elliptic equipotential lines with the agent in the centre. The semi major axis is parallel to the agent’s direction to its destination.

To have an exact simulation it would be necessary to calculate the potential at every moment because the agents move. That would require massive computer power. Therefore Helbing et al. (2005) tried to find a simplification of this complex problem and made following purpose, which we finally used in our simulation.



For the implementation there is a for loop which calculates and adds the repulsing force of every other agent. As this force is decreasing exponentially it is only calculated if the distance is smaller than two meters.

Repulsion force of walls

As well as agents do, walls repulse agents. This repulsion force is decreasing with increasing distance, too.



First using the fast marching algorithm a distance map was calculated. This was followed by the calculation of a normalised gradient field of this distance map. Finally, the force at every point of the map which is constant in time was computed.

Random force (additional force to destination)

In order to improve the model, we inserted a random element of agent’s behaviour. Every time when the vector in direction to the goal is read, it is slightly rotated to simulate people walking on the right side of a path. The angle has a static portion which makes it turning right and a Gauss distributed portion which brings a random element to our simulation model.