2. The Social Force Model (SFM) (Dirk Helbing, 1995)
Forces introduced in the SFM to reflect pedestrian behaviour are the sum of:
- Driving force \( f_{\text{att}} \) motivates each agent to walk towards his destination.
- Interaction forces with other pedestrians \( \sum f_{\text{inter}, \text{other}} \) keep a certain distance from nearby pedestrians.
- Attractive interactions \( \sum f_{\text{inter}, \text{attractive}} \) reflect the change of behaviour caused by an attraction.
- Joining behaviours for pedestrians is included by \( \sum f_{\text{inter}, \text{join}} \).
- Fluctuation force \( f_{\text{soc}} \) presents velocity fluctuation due to diverse behaviours.

3. The Social Force Model for Cars
Forces introduced in the SFM for cars are the sum of:
- Driving force \( f_{\text{att}} \) motivates each driver to move to his destination.
- Interaction force with other drivers \( \sum f_{\text{inter}, \text{other}} \) keeps a certain distance from nearby drivers.
- Interaction force with boundaries \( \sum f_{\text{inter}, \text{boundaries}} \) keeps a certain distance from nearby boundaries.
- Fluctuation force \( f_{\text{soc}} \) presents velocity fluctuation due to diverse driving behaviours.

1. Introduction & Motivation
Shared Space
A new design concept, often delivered by means of a shared surface street, aimed at integrated use of public spaces: The ‘civic’, versus the ‘traffic’ function of a street.

Aim & Objectives
Develop a mathematical model and a traffic simulation tool capable of representing pedestrian and vehicle behaviour in any shared space layout:
- Identifying a path for each individual pedestrian and vehicle behaviour pattern.
- Handling potential interactions between agents.
- Describing data analysis and model calibration process.

5. Calibration Method
Input:
- Starting point
- Goal point
- Desired velocity

Output:
- Simulation
- Observation

The best possible values of the fitness for different A & B

5. Obstacle Avoidance and Way-finding Simulation
It is essential that the direction of the desired velocity in the SFM is to the direction of the shortest path to the destination. A distance map is calculated by the flood fill algorithm for agent’s navigation. This is achieved by calculating flood fills based on a combination of Manhattan and Chessboard metric:

\[
D^* = \frac{1}{2} D + D', \text{where} D = \sum \max(|x_i|, |y_j|) \quad \text{and} \quad D' = D - D
\]