# Simulation of Pedestrian Movement Outside Football Stadium

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## 1 Problem Description

## 2 Literature review

## 3 Conceptual model

Cellular automata divides the simulation domain into regular cells. Each cell can be labeled as **allowed** or **forbidden** corresponding to the street and off-street area respectively. We build models for pedestrians and the floor and update the their status based on the interaction between these two objects.

### 3.1 Inputs

In order to simulate the pedestrian flow outside Georgia Tech's Bobby Dodd Stadium, we need some real physical data about the stadium, pedestrians and street configuration around the stadium. Even though, variables like pedestrians' speed, space needed by people with different body sizes should vary individually, we use average value instead to simply our simulation.

**Velocity** Follow reference ** and our own daily experience, we propose the average pedestrian speed is $1.34m/s$.

**Cellular space** Different people may occupy different size on the street. In order to take this fact into consideration, we take a square cellular configuration, in which each cell has edge length $0.3m$. And a pedestrian who requires more space will have empty cells round them. We generate a distribution of the empty cells by each pedestrian.

$$p(n) = e^{-\alpha n} \tag{1}$$

**Map construction** The stadium area is shown in Fig. 1. Using Google Map distance service, we get the west-east distance 483 meters and north-south distance 466 meters. [todo: insert a simplified map here]. The 4 main streets around the stadium has an average width 4.8 meters. So we use a $1610 \times 1553$ matrix to represent the whole map and we set each street has 16 cells along the transverse direction.

**Space of each pedestrian** We know that different people may

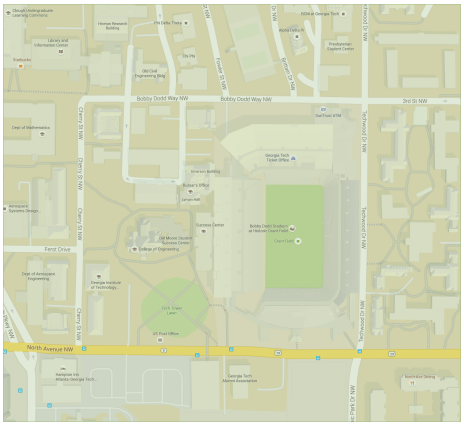


Figure 1: Stadium area from Google Map.

## 3.2 Outputs

## 3.3 simulation components and rules

**Floor model** Static floor field:
dynamic floor field.
pedestrian field (transition matrix): Euclidean distance formula.
occupation matrix

**Pedestrian model** target variable
exit variable
group id (generator generates groups.)
happy/unhappy variable
consecutive jam time variable

**Transition matrix**

**Resolving conflicts**

**update strategy**