

‘Sims’ for Pedestrian Behavior **Project Specification**

DD143X: Degree Project in Computer Science, First Level
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Group 9

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1. Introduction

The general subject for this project is artificial intelligence. This is a subject that has a lot of potential, e.g. if one were to simulate human behaviour correctly and convincingly then the need for human tests might be reduced, which is good from both an economical and ethical perspective. Another example of usage would be in so called *social robots*, i.e. robots designed to provide social company or attend to varying psychological needs for human beings. This could be used in e.g. elderly care and hospitals. Finally, a well executed artificial intelligence would, once inserted into a robot, be able to handle more advanced assignments and reduce the need for human employees; we could for example imagine a robot delivering mail.

This is the initial version. Note that the problem statement was changed significantly after discussions with the supervisor. See main report.

2. Problem statement

The problem is to try to (graphically) simulate human behavior for pedestrians in a city environment. By looking at the artificial intelligence algorithms' parameters we want to examine how these affect the achieved human likeness in the simulated pedestrians' behaviour. Enclosed in this problem is also the problem of classifying what humanlike behaviour really is.

3. Approach

We will be given a spatial database (XML) from OpenStreetsMap that contains information such as buildings, streets and other urban elements in Stockholm. Firstly we need to find out how to use this data to graphically render and simulate an urban environment. We will then need to research on which AI algorithms that we need, how they work and how to make use of this data to simulate the pedestrians. Typically, since this project is about walking along routes, we will need a path-finding algorithm, e.g. Dijkstra's algorithm. We also need to work on how to represent the pedestrians' behavior, i.e. their needs, knowledge about the city and other attributes. Finally, we need to think about what programming language we want to use for the AI.

An important part of the project is to think about how to represent the simulation graphically, what graphical engine/library we should use and if one should be able to interact with the simulation while it runs (is there a need for a GUI?).

The first basic version of the AI should only simulate pedestrians walking from one point to another. The focus in this version is just to get the pedestrians to take routes that remind one about human behavior.

Depending on how well and fast the project goes there are several possible extensions to it that could be added to simulate a more realistic scenario. For example, one could include car traffic so that it also becomes a part of the situation. Another extension would be to model different preferences and needs, so that a pedestrian who likes food might get hungry during his walk and decide to change his/her priorities to make a detour to, for example, a diner.

4. References

Glaiel, Tyler, 2012, *Some experiments in path-finding + AI*.

http://www.gamasutra.com/blogs/TylerGlaiel/20121007/178966/Some_experiments_in_pathfinding_AI.php

An interesting idea on how using path-finding with a dynamic update of tile cost can provide a sense of intelligent behaviour.

[Accessed 29th of January]

Amit Patel, 2012, *Amit's A* Pages*

<http://theory.stanford.edu/~amitp/GameProgramming/>

Contains lots of information about why and how A works.*

[Accessed 31th of January]

Jiang, Bin, 1999, *SimPed: Simulating Pedestrian Flows in a Virtual Urban Environment*

http://publish.uwo.ca/~jmalczew/gida_5/Jiang/Jiang.htm

A paper on simulating pedestrians in a virtual urban environment in 2D.

[Accessed 31th of January]

5. Time Plan

We will try to get the graphical things in place first (so that algorithms can be visually represented from the start). Thereafter focus will be on getting a simple algorithm in place so that we later on can fine tune and improve this either by modifications or by new algorithm implementations. During the project a log will be kept so that we with ease can use this when writing the essay.

[See Figure 1 for a detailed time plan]

Figure 1. Time plan

