Stuck in Traffic
Intermediate Report

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1 INTRODUCTION

In this intermediate report we will present our initial idea about the traffic management simulation software we will design and build. Road traffic management is a well known problem in such big city like London. In the last few years a lot of research has been driven by the importance of improving traffic management in the best way possible. Our idea is to ultimately create a simulation platform that will be fully customizable by the users and will allow them to simulate the scenarios of their preference. We will be using Java in Eclipse IDE as our main programming language and Photoshop for the creation of the graphics.

2 PROJECT DESCRIPTION

The aim of this project is to develop a simulation engine, which could be utilized for testing scenarios and potentially improve the well known issue of traffic management and optimization. Our goal is to have abstract concepts that will allow us to simulate certain scenarios but also become an easy adaptive platform to build on top for future ideas. Our first level aim is to develop a platform which loads a map, identifies possible paths for the cars, supports two way vertical and horizontal roads, as well as intersections. The map has entry points and exit points; upon arrival to an exit point the car object will be deleted. Our initial model will have a car, which is going to follow all the possible paths of our sample map. The next step will be to add more cars onto the map, as well as traffic lights to control the traffic. If time allows it, we are planning to have multi-lane roads and support scenarios of different driving behaviors such as reckless driving, too slow driving and cases of "polite" drivers that give way to other cars in order to help the road's decongestion. Furthermore ideas for future implementation also include parking spots, emergency lanes and vehicles, as well as pedestrians crossing the road.

2.1 Technical Challenges

Since we decided to use Java, we also had to think about the animation which requires repaint of the graphics so that the movement of the cars is smooth. To avoid performance issues and large memory consumption we will have to write a function which takes as a parameter the size and number contents of the grid and decides what's the optimal repaint time threshold. Additionally, in order to avoid implementing car to car communication algorithms and A.I, we decided to follow a predefined-path approach for the cars in the simulation. That way we allow the users to customize the simulation according to their needs instead of simulating a specific pseudorandom scenario that would be limited by the efficiency of our algorithms. Apart from that, we considered implementing more sophisticated methods infeasible for the timeframe given for this project.

3 STRATEGY, TIMETABLE, AND PROGRESS

Stuck in traffic will use the expertise of each member in each phase of the project in order to complete all required tasks. Our goal is to exchange knowledge and build not only a great traffic simulator but also develop teamwork skills.

3.1 Team Member Roles

The lead of each phase is listed below, although all members will collaborate during all phase of this project.

- Project coordinator: Filippos Raditsas
- Analysis: Filippo Mariani
- Software Architecture Design/Development: Maxim Vasilishin
- Graphics and GUI Design & Development: Maximimilian Nicolaidis, Antria Dimitriou
- QA: Antria Dimitriou

Analysis: The analysis phase included a feasibility assessment in which possible technologies, programming languages and solution approaches were evaluated. During this process all members collaborated and brought their thoughts and opinions to the table in order to finalize our idea and further proceed with the project.

Software Architecture Design/Development: This team is responsible for the high level design of the project, assisting in the transition from requirements to technical specifications leading to the development. They will take up tasks broken down by the lead developer. During the initial stage of our project our lead developer has managed to build an initial version of our simulation platform upon which we'll build the rest of the functionality.

Graphics and GUI Design: This team will work on the GUI that we will integrate to our platform in order to make it interactive. The design team also provided the graphics that are used in our simulator including but not limited to roads, cars and traffic lights.

QA Testing: The responsibilities of the Quality Assurance team will be testing the simulator to ensure all components work smoothly are and consistent with the specifications and requirements. All the bugs found will be reported to the development team and if changes are necessary they will be handed over to the analysis team to perform a requirements analysis.
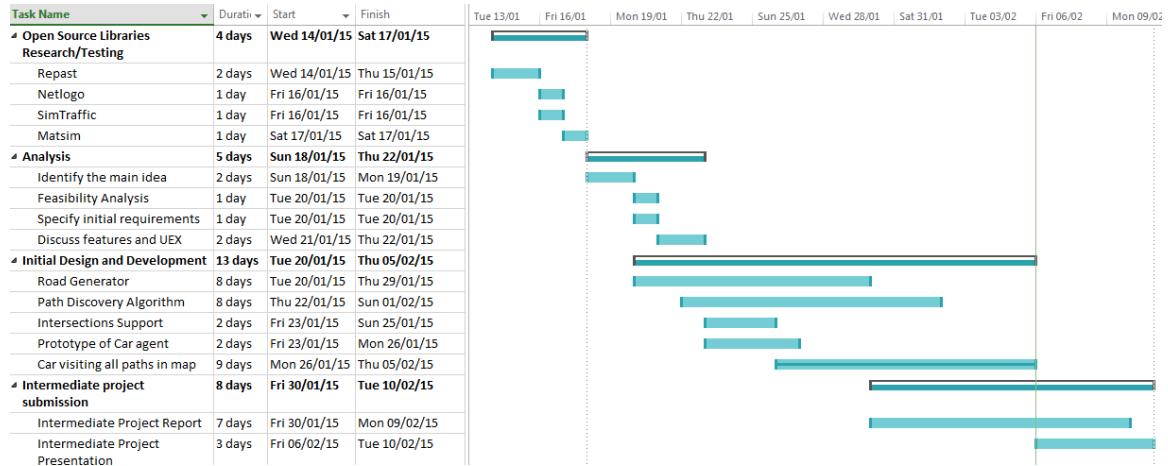

Task Name	Duration	Start	Finish
⊿ Open Source Libraries Research/Testing	4 days	Wed 14/01/15	Sat 17/01/15
Repast	2 days	Wed 14/01/15	Thu 15/01/15
Netlogo	1 day	Fri 16/01/15	Fri 16/01/15
SimTraffic	1 day	Fri 16/01/15	Fri 16/01/15
Matsim	1 day	Sat 17/01/15	Sat 17/01/15
⊿ Analysis	5 days	Sun 18/01/15	Thu 22/01/15
Identify the main idea	2 days	Sun 18/01/15	Mon 19/01/15
Feasibility Analysis	1 day	Tue 20/01/15	Tue 20/01/15
Specify initial requirements	1 day	Tue 20/01/15	Tue 20/01/15
Discuss features and UEX	2 days	Wed 21/01/15	Thu 22/01/15
⊿ Initial Design and Development	13 days	Tue 20/01/15	Thu 05/02/15
Road Generator	8 days	Tue 20/01/15	Thu 29/01/15
Path Discovery Algorithm	8 days	Thu 22/01/15	Sun 01/02/15
Intersections Support	2 days	Fri 23/01/15	Sun 25/01/15
Prototype of Car agent	2 days	Fri 23/01/15	Mon 26/01/15
Car visiting all paths in map	9 days	Mon 26/01/15	Thu 05/02/15
⊿ Intermediate project submission	8 days	Fri 30/01/15	Tue 10/02/15
Intermediate Project Report	7 days	Fri 30/01/15	Mon 09/02/15
Intermediate Project Presentation	3 days	Fri 06/02/15	Tue 10/02/15

Figure 1: *Gantt Chart depicting main tasks and rough timetable for intermediate report*

3.2 Methodology

Our team follows the Spiral model which is a risk driven process. We believe that the spiral model is more appropriate for this kind of project, as it will help us mitigate risks such as steep learning

curve during the development phase, limited time, individual member's unforeseen circumstances and enable us to add features and ideas to the project. We have divided the spiral model in 4 main phases:

- Requirements Analysis: We investigated available open source libraries and formed our idea.
- Risk Analysis: We will constantly evaluate the risk during the different phases of the project.
- Development: After the initial risk analysis we start developing our project divided in tasks.
- Evaluation: We will maintain proper documentation and implementation requirements of each task.
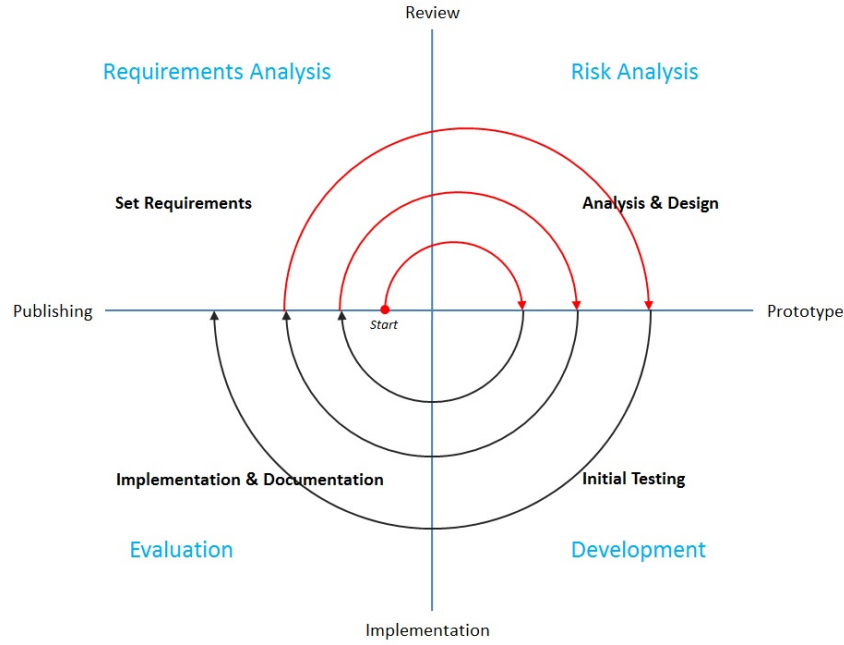
Figure 2: *Spiral Model*

4   Conflict resolution procedure

The resolution will contain three phases which will be executed linearly.

Phase 1: Group members will make every effort to resort minor disputes in a civilized manner, discussing their issue with the team, individual. Team members do have other responsibilities, schedules outside of this project and members need to take that into consideration and respect each other. However if the issue is not resolved then the issue will be escalated to phase 2.

Phase 2: The group member with the issue will at this point fill out a conflict resolution form, which will be provided by the team with the intent of helping resolve any issue. The form includes the members name, issue with certain member or aspect of the group, and how this issue will be resolved. The member will then email the form to all other members of the group to arrange a meeting discussing the issue. Meeting minutes are going to be kept for further proof, at this point if the issue is not then resolved the member can further escalate it to phase 3.

Phase 3: In Extreme cases of fraud or ill reference allegation towards any group member, the member has the right to be in correspondence with the professor on behalf the individual. The member with the issue **must** contact the professor via email and cc every group member in the email. Depending on the response of the professor the team will then once again meet with the member to resolve the issue as quickly as possible. This process will be recorded on a conflicted resolution form, a copy will be sent to all individuals in the team.

Peer Assessment Dispute Form	
Name of individual	
Description of dispute	
Actions taken	

Conflict Resolution form	
Name of individual	
Name of individual with whom dispute lies	
Description of issue	
Actions taken	

Figure 3: *Conflict Resolution and Peer Assessment*

5   Peer assessment

The peer assessment takes place to ensure a fair distribution of points for each member upon completion of the project. The amount of points awarded to a particular member may alter based on their contribution to the project and amount of work they put towards helping other members. Since there are five members in the team and there are 100 points to give accordingly the ultimate goal of our team is to evenly distribute the points assuming that we will all contribute the same amount of work and will collaborate smoothly and efficiently.

In the event that a team member wishes to dispute their given peer assessment, they would need to raise the issue with the whole team. The individual would fill out a Peer Assessment Dispute Form, which includes the individuals name, brief description of dispute and the actions taken. After the team has decided the outcome of the individual, the new assessment for that individual will be regarded as final, no further disputes can be made.

5.0.1   Team file management

We are required to work as team for the whole time of the project. For code sharing we have a Github repository. For our internal communication purposes:

- Slack Framework: https://slack.com/ We have created a group account to communicate and exchange files.

- Skype Conference: http://www.skype.com/en/ We have created an internal schedule for on-line meetings.

- Physical Meetings:We also all meet once a week to discuss any issues.