Computer Games Development

Project Report

Year IV

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# **Acknowledgements**

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Ross Palmer of Carlow IT who supervised this project.

# **Project Abstract**

# **Project Introduction and Research Question**

# **Background**

# **Literature Review**

The faculty of Computer Science from Universitas Sriwijaya in Indonesia did two things with a combined algorithm consisting of a Dynamic Pathfinding Algorithm and the A\* Algorithm. First they implemented it in a racing game where it was used to guide the npcs. Second they compared its performance with the base A\* Algorithm to see if it was an improvement.

The faculty of Machine learning and Computational Intelligence in China developed two new pathfinding algorithms called KM-A\* and HPLPA\* which are based on two pre-existing algorithms called HPA\* and LPA\*.

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# **Study**

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# **Project Description**

When the program starts up it loads in data from a Yaml file which it uses to construct the map used in the Algorithm. It then opens up to a menu screen. On this screen three options are shown. When an option is selected a new screen is opened showing the map and the car created by the option selected.

If a town is selected the created Algorithm and the A\* Algorithm are then used with their results such as time and paths outputted to the hud. The car uses the path created by the new algorithm to move from the town it is closest to to the target town.

If a road is selected it is turned off and not taken into account when the Algorithms are used. If the selected road is reselected it is turned om.

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# **Project Milestones**

# **Results and Discussion**

# Here is a table showing the results of two different paths created by the created algorithm and the base A\* algorithm.

|  |  |
| --- | --- |
| **Created Algorithm** | **Base A\*** |
| **Time** | **Time** |
| **0.015799** | **0.010643** |
| **Path Nodes and Current Fuel** | **Path Nodes and Current Fuel** |
| **28 Fuel: 1000** | **28 Fuel: 1000** |
| **23 Fuel: 750** | **23 Fuel: 750** |
| **25 Fuel: 500** | **25 Fuel: 500** |
| **18 Fuel: 1300** | **17 Fuel: 250** |
| **14 Fuel: 1100** | **16 Fuel: 50** |
| **8 Fuel: 887** | **8 Fuel: -100** |
| **9 Fuel: 737** | **9 Fuel: -250** |
| **11 Fuel: 537** | **11 Fuel: -450** |
| **13 Fuel: 1387** | **13 Fuel: 400** |

# As seen from the results the created algorithm took longer to create a path than the A\* algorithm however the fuel amount shown on each node that makes up its path remains above zero while the A\* path contains nodes with negative fuel amounts. This means the created algorithm was able to create a viable path while A\* wasn’t.

The time difference between the two algorithms is due to the created algorithm being more complex and searching through more paths then the A\* Algorithm.

# **Project Review and Conclusions**

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# **References**

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| --- | --- | --- |
| **Referenced Publication** | **Citation** | **Reference** |
| Report | *Pathfinding Car Racing Game Using Dynamic Pathfinding Algorithm and*  *Algorithm A\* 2017* | Sazaki, Primanita, Syahroyni. Y.S, A.P, M.S. (2017) *Pathfinding Car Racing Game Using Dynamic Pathfinding Algorithm and Algorithm A\*. Palembang, Algorithm A\** |
| Report | *Multi-Objective Pathfinding in Dynamic Environments 2018* | *Whiston, H.W, (2018), Multi-Objective Pathfinding in Dynamic Environments 2018, Windsor, Ontario, Canada, University of Windsor* |
| Report | *Hierarchical and Dynamic Pathfinding Algorithms in Game Maps 2011* | *Li, Zhao, Zhou, Chen. Y.L, W.X, Z.Z, C.C. Hierarchical and Dynamic Pathfinding Algorithms in Game Maps 2011. Hebei University, Baoding City, 071002, Hebei Province, China. Key Lab. of Machine learning and Computational Intelligence* |

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