MCAST
Malta College of Arts, Science & Technology

ASSESSMENT AND INTERNAL VERIFICATION FRONT SHEET (Individual Criteria)

(Note : This version is to be used for an assignment brief issued to students via Classter)

Course Title	Bsc. Multimedia Software Development			Lecturer Name & Surname	Gerard Said Pullicino	
Unit Number & Title	ITMSD-506-1604 – Soft Computing for Games					
Assignment Number, Title / Type	Assignment 1					
Date Set	11/12/2020		**Deadline Date**			
Student Name			**ID Number**		**Class / Group**	

Assessment Criteria	Maximum Mark
KU 1 Describe crowd simulation using swarm intelligence	5
KU 2 Describe AI Authoring (5 marks)	5
KU 3 Describe uses of pathfinding in games and navmesh agents	5
KU 4 Outline goal driven autonomy	5
KU 5 Describe the uses of Monte-Carlo Search Tree for strategy games and the use of combat artificial intelligence in FPS games	5
KU6 Describe available readymade AI solutions	5
Total Mark:	30

Notes to Students:

- This assignment brief has been approved and released by the Internal Verifier through Classter.

- Assessment marks and feedback by the lecturer will be available online via Classter (Http://mcast.classter.com) following release by the Internal Verifier

- Students submitting their assignment on Moodle/Unicheck will be requested to confirm online the following statements:

     Student's declaration prior to handing-in of assignment
     ❖ I certify that the work submitted for this assignment is my own and that I have read and understood the respective Plagiarism Policy

     Student's declaration on assessment special arrangements
     ❖ I certify that adequate support was given to me during the assignment through the Institute and/or the Inclusive Education Unit.
     ❖ I declare that I refused the special support offered by the Institute.

Contents

Soft Computing For Games Assignment 1

Overall description

To perform this assignment, you are required to build a Unity project that implements a dynamically sized grid of tiles which are of a fixed size of 1 unit in the Unity game scene. Your project will contain a script attached to the main camera which will have the number of rows and columns of the grid that needs to be generated. At start of the project, the grid will be generated as transparent squares with a green outline. The camera size needs to update to fit the entire grid on the screen at runtime.

Your grid should leave a single clear row at the bottom of the scren which should contain the following buttons:

- Scan (which will rescan the grid for pathfinding purposes)

- Add obstacle (which will place a new 2x2 obstacle in a random location on screen that is not at the edge of the screen)

- Add AI (which will add an AI agent to the scene at a random location on screen that is not in an obstacle).

- Start (which will start the AI moving towards a list of targets as defined in the AI's respective scripts).

You will have the following prefabs in the project:

- AI prefab (with a script that allows you to define a list of waypoints for the AI to follow and a tickbox to determine whether the movements are looped)

- Graph prefab (which determines whether grid or point graphs are being used).

You will also have a gameManager class attached to the main camera which will handle the instantiation of multiple AIs and targets as required.

For the purposes of this assignment, you are to use a camera size of **50** and a **100x100** grid.

Submission Guidelines

- You are required to use Unity 2020.1.5f for your project.

- Your project should be an offline **git** repository with at least **15** commits with **meaningful** commit descriptions explaining the code changes carried out in that specific commit.

- Your submission should be posted as a compressed **.zip** file containing the contents of the **Assets** folder as a git repository including all the commits as described above.

- All the material, sprites and assets used in your application should be available in the assets folder.

- Before submitting, test your application by copying the assets folder into a new Unity project and ensuring that it loads all the required libraries.

- Your lecturer may ask you for a quick call if the content of your submission is corrupted. You are however **strongly** encouraged to ensure that your submission works.

- If there are issues with your submission, you will be asked to provide a satisfactory explanation of your testing prior to submission.

- A note will be taken of your explanation and you may lose marks if your explanation highlights the fact that you have not taken all the reasonable steps to ensure that a correctly formatted submission has reached your lecturer.

- The name of the compressed file you submit should be in the form of [Name/Surname/Group] – example [Gerard_Said_MSD_6.2A]

- Credit will be given for neatness and correctly organized work.

Task 1

KU 2 Describe AI Authoring (5 marks)

- Add the custom move script that moves your AI one block at a time. Post **just** this code to your git project as a commit marked **KU2** with a clear comment explaining what is happening step by step. (2 marks)

- Generate 5 random obstacles at runtime and update the path according to the obstacles. Explain the sequence your code needs to take to update any paths depending on the obstacles generated. (3 marks)

Task 2

KU 1 Describe crowd simulation using swarm intelligence (5 marks)

- Implement as above with 10 randomly located AI bots heading towards the same target. The bots should avoid each other. (4 marks)

- A* pathfinding pro implements this functionality using a specific feature. Explain what this feature is (You may write your answer as a comment in your code). (1 mark)

Task 3

KU 3 Describe uses of pathfinding in games and navmesh agents (5 marks)

To perform this task, please provide the answers below in a correctly formatted pdf inside the Assets folder of your project.

- What is the difference between a grid graph, point graph and a navmesh? (3 marks)

- What is the biggest computer bottleneck for AI pathfinding? Use the Unity profiler to determine this (2 marks)

Task 4

KU 4 Outline goal driven autonomy (5 marks)

Create a patrol behaviour for one AI with 10 waypoints. Update your example to contain at least **3** moving obstacles which get in the way of your AI at various points in the patrol behaviour. Thess behaviours should be implemented as a separate 'KU4PatrolBehaviourScript' attached to an instantiated AI prefab. The waypoints should be stored in a public list of transforms. Note how the AI finds its way **autonomously** (5 marks)

Task 5

KU 5 Describe the uses of Monte-Carlo Search Tree for strategy games and the use of combat artificial intelligence in FPS games (5 marks)

Please include your answer to the above question in the PDF available in the assets folder.

Find out what a search tree is and explain the kind of search tree that is being used for pathfinding. Are the same algorithms used for combat AI? (5 marks)

Task 6

KU6 Describe available readymade AI solutions (5 marks)

A* pathfinding is a popular AI plugin for the Unity game engine. Compare it with one other pathfinding plugin you find on Github based on 5 points (1 mark per comparison).