

Initial Plan: Multiplayer Strategy Game

Project Description

The goal of my project is to design and develop a multiplayer, turn based strategy game. The game will be playable locally by two players, or by a single player against an artificial intelligence controlled opponent.

The game will involve each player controlling a small number of units (an upper bound of around 10) around a predesigned or randomly generated two dimensional arena (from an overhead perspective). The goal is for each player to use their units to eliminate the other team's units. There will be several unit types; each should complement the other to ensure the game is fair – some units will be able to move large distances but only attack at short ranges, while others will only be able to move short distance but attack at long ranges. This should also allow me to develop an AI engine which is more tactical.

The AI engine will have numerous difficulty settings in order to make sure the game is entertaining for players. Difficulty will be handled in a number of ways, such as the number of turns ahead the AI engine will consider, and a chance of deliberately choosing a sub-optimal move.

Project Aims and Objectives

The game will feature the following core components:

- A two dimensional grid on which units move around
 - Several types of grid cells with different costs to move through
 - Grids can be generated according a predesigned map or a randomly generated one
 - Grid squares should be visually distinctive
- Several types of unit
 - Each unit type balanced against each other – a unit that moves large distances should only be able to attack at long range, and a unit that can attack at long range should only be able to move short distances
- Multiplayer functionality
 - Allow two players to take turns to attempt to defeat each other's units
 - A rematch system that keeps track of which player has won the most matches
 - A few tracked statistics per game, such as units destroyed, and total squares moved
- Robust pathfinding
 - A pathfinding system/algorithm is necessary to ensure that moves are valid, as some squares will have a greater cost to move through than others, whilst some routes could be blocked off by walls or other units
 - The pathfinding must be compatible with the artificial intelligence
- Artificial intelligence
 - The AI should have multiple difficulty settings
 - The AI should be able to 'think' several moves ahead
 - The AI should have human traits, such as a chance to make mistakes that increases on easier difficulties

- The AI should be entertaining to play against
- AI should be situationally aware – becoming more aggressive when at a clear advantage, and more defensive when on the back foot

Optional Objectives:

- Units should be visually distinctive
- The game's interface should be as user friendly as possible
- Allow users to generate their own maps using an interface

Report Deliverables:

- The interim report will contain research of the algorithms I have implemented, and those I intend to implement, such as the A* pathfinding algorithm. There will also be a more in-depth design document and testing methodology to evaluate AI performance.
- The final report will contain full documentation of the implementation process, a full evaluation of the results of my testing, as well as possible future improvements.

Work Plan

Some work was already completed over the summer, such as an initial grid generation and movement system and some research into pathfinding, giving me a useful springboard into the project at the start of this semester.

Week	Date (Week Beginning)	Task - Documentation	Task - Technical
1	01/10/2012	General research	
2	08/10/2012	Draft Initial report	
3	19/10/2012	Submit initial report	
4	22/10/2012	Document initial game implementation	Implement map generation
5	29/10/2012	Research min-maxing for AI	Implement map generation
6	05/11/2012	Document map generation	Implement map generation
7	12/11/2012	Research pathfinding	Implement pathfinding
8	19/11/2012	Research pathfinding	Implement pathfinding
9	26/11/2012	Document Pathfinding / Draft Interim Report	Implement pathfinding
10	03/12/2012	Draft Interim Report	Ensure two-player mode implemented
11	14/12/2012	Submit interim report	Ensure two-player mode implemented
12	17/12/2012	Catchup week / AI research	
13	24/12/2012	AI research	

14	31/12/2012	Draft Final Report Abstract	Implement basic Artificial Intelligence features (a functional opponent)
15	07/01/2013	Draft Final Report Introduction	Implement basic Artificial Intelligence features (a functional opponent)
16	14/01/2013	Draft Final Report Introduction	Implement basic Artificial Intelligence features (a functional opponent)
17	21/01/2013	Draft Final Report Design Section	Implement more advanced Artificial Intelligence features (min-max, behaviour patterns)
18	28/01/2013	Draft Final Report Design Section	Implement more advanced Artificial Intelligence features (min-max, behaviour patterns)
19	04/02/2013	Draft Final Report Design Section	Implement more advanced Artificial Intelligence features (min-max, behaviour patterns)
20	11/02/2013	Draft Implementation	Implement more advanced Artificial Intelligence features (min-max, behaviour patterns)
21	18/02/2013	Draft Implementation	Implement Artificial Intelligence difficulty settings
22	25/02/2013	Draft Implementation	Implement Artificial Intelligence difficulty settings
23	04/03/2013	Catchup week / AI research	
24	11/03/2013	Draft results and evaluation	General Coding and Improvements
25	18/03/2013	Draft future work and conclusions	General Coding and Improvements
26	25/03/2013	Draft future work and conclusions	General Coding and Improvements
27	01/04/2013	Draft future work and conclusions	General Coding and Improvements
28	08/04/2013	Finalise Report	Complete Report

29	15/04/2013	Finalise Report	
30	22/04/2013	Finalise Report	
31	03/05/2013	Submit final report	