

COS498

Video Game AI

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Attached is my submission for homework 4. I started by attempting to modify the least amount of game engines possible but found soon that my idea for the project would require large scale changes to how the engine handles interactions. I set out with the goal of creating an infection Esque game, where units would “infect” others with the cure or zombie fever and expand their influence. As the default engine is configured for battles, with units living or dying at the end, I had to modify the unit structure to account for this and modify all references to it to follow this new schema. I extended the Unit class as well with an “infect” method that allows another unit to infect that unit to convert it to its side and to allow it to “remember” what its current objective is from the previous turn. This new method also required logic changes to the game over calculations, and the map. I’ll detail everything below where I will go over the specific story modifications.

For my game modifications, I have made a zombie apocalypse simulation where there are three possible outcomes. The survivors can win, the zombies can win, or everyone can be cured. As such, there are three factions: Survivors, Zombies, and Cured. Zombies start with a random number of possible units but only one city, denoted by a set amount of “money” at the beginning. Since zombies are unable to reproduce naturally, this is fixed until they infect other units. Survivors start with a random number of cities and a quick reproduction rate. This is largely in line with the original project parameters as that fits their use case most closely. Finally, the cured starts with a single city, but with a high reproduction rate and no units to start. This is to simulate researchers working to develop a cure and how the infection will spread widely before the introduction of the cure. Once the first cured unit is created, it can convert any city to a cured city, thereby increasing the production and spread rate of the cure. Survivors cannot reconvert a cured city, as it goes against their best interests. Zombies can at any time convert to either city, but a zombified city is basically dead and does nothing for anyone.

Movement for the units is dependent largely on the other units. Zombies, much like their mental state, wander aimlessly and do not react to objectives. This behavior is essentially identical to the basis for the assignment. Survivors are the most complex, choosing to defend their cities and the cured city at the beginning. There is an act of randomness to their action too, to prevent mass blockages from occurring. Survivors are mostly concerned with their own survival and do not actively seek to capture new cities. Due to the nature of this behavior, clumps of surviving cities survive better than far,

disconnected cities further augmenting the desired behavior of the dependability of cities. If cities are lost, the survivors will flee to other owned cities, but if those are also gone, the survivors will simply flee. Cured units are dispatched to any uncured city immediately, with a small degree of randomness to prevent blockages. Once all cities are cured, they switch to engaging and “curing” both survivors and the infected until everything is cured. Unit interactions are as detailed below

Combination 1	Combination 2	Outcome of Battle	Impacts
Zombie	Survivor	Survivor Dies	Survivor -> Zombie
Zombie	Survivor	Zombie Dies	Zombie Unit Removed
Survivor	Cured	Always the Same	Survivor -> Cured
Cured	Zombie	Zombie Dies	Zombie -> Cured
Cured	Zombie	Cured Dies	Cured Unit Removed

To add additional leverages into the battle, the terrain was adapted into shadow areas and open areas. Open areas reduce the effectiveness of the Zombies, whereas shadows increase that effectiveness. I also modified the game end behavior, as now there can be a “survivor/cured” win if all remaining units are one or the other. Without zombies, survivors don’t necessarily need to be cured. Rolls are also completely randomized now, as the benefits and drawbacks come from terrain or health.

With all of this, there are three real outcomes to the simulation. Zombies can infect all of the survivors but must do so quickly before the cure comes out. Survivors can kill all of the zombies, but to do so usually requires surviving cities to be close, and a low number of zombies. High zombie counts typically result in mobbing and a reduction in the ability of the survivors to kill all the zombies in time. Finally, if the cured city survives and starts creating units, not soon after the cure rips through the remaining survivors and results in the end of the game.