DT interim report

Like Chen 16518695 zy18695@nottingham.edu.cn

Content:

The idea of this project is to build an NPC Agent adaptable to many games that have NPCs.

The first idea come to my mind is that I need to build a real AI instead of a long if-chain. I coded player controller script before, what I feel about human scripting is that it is strong and robust for a specific environment, however, script is static, when environment change, script will not dynamic change itself to adapt new environment. Re-enforcement learning is the one that often use in game AI building, since computer game scene can have enough data for the training and it can control the whole environment, hence, when people doing research on re-enforcement learning, their often build game scene for it. So what I think is that I should use re-enforcement learning for my project.

When I do document retrieve, I found that Unity was released a project call Unity Machine Learning Agent(ml-agent) in 2017, this new project connects Unity game scene with TensorFlow, and using PPO which is the advanced re-enforcement learning algorithm release by OpenAI for training.

Hence, I decide to use ml-agent for my project to build the NPC Agent.

The first problem comes up is I need a game environment for training the project, after discussion with my supervisor, I decide to build a protector and thieves game, game scene have three area identify by color, which is point ground, alert ground and outside ground, and there is a treasure in the center of the point ground, when thieves run in to point ground, protector should protect the treasure by thieves, and while the improvement of agent model, I can adding extra component into scene.

While I trying to build up my own scene, I found that ml-agent already have some example scene for beginner, I build up my own basic game scene for testing.

Then I trying to build up my own scene. I try with 10 randomly moving thieves and protector just need to catch them, without any treasure or obstacles in scenes, because I think the game I thought about is too complex for training the first model which is a child without any knowledge before. But the task is too difficult for agent, even I reduced the complexion of the scene. So that I read document again, and I found that agent task should begin with a very simple task like 1 + 1 = 2, then I can go 2x + y = 3, so I rebuild the whole scene with simple cubes and one theft and protector only.

First demo:

Police catching thieves:

My Machine Learning agent will control the Police in game scene, to learn how to catch the thieves, thieves now randomly move inside the game scene.

The training process should begin from simple task to hard task, when I first build up the game scene, there is 10 thieves in game scenes,