Machine Learning Mini Project

ML-BOY

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1. Introduction

In this project the main goal is to create a video game using the Unity game engine and putting an agent to the video game that can learn how to play that video game using machine learning.

2. Problem Definition

Goal in the game is to collect the presents (Fig1) while avoiding the obstacles (Fig2) and traps (Fig3) by controlling the character called the "boy" (Fig4) in the game area (Fig5). If the boy can collect all the presents without failing the area turns green and game resets (Fig6) and if the boy fails to collect all the gifts and hit into a trap, than the game will fail and game area will blink in red (Fig7).

So the goal is to train the boy (agent) without any data (reinforcement learning) and make it learn how to play the game properly.
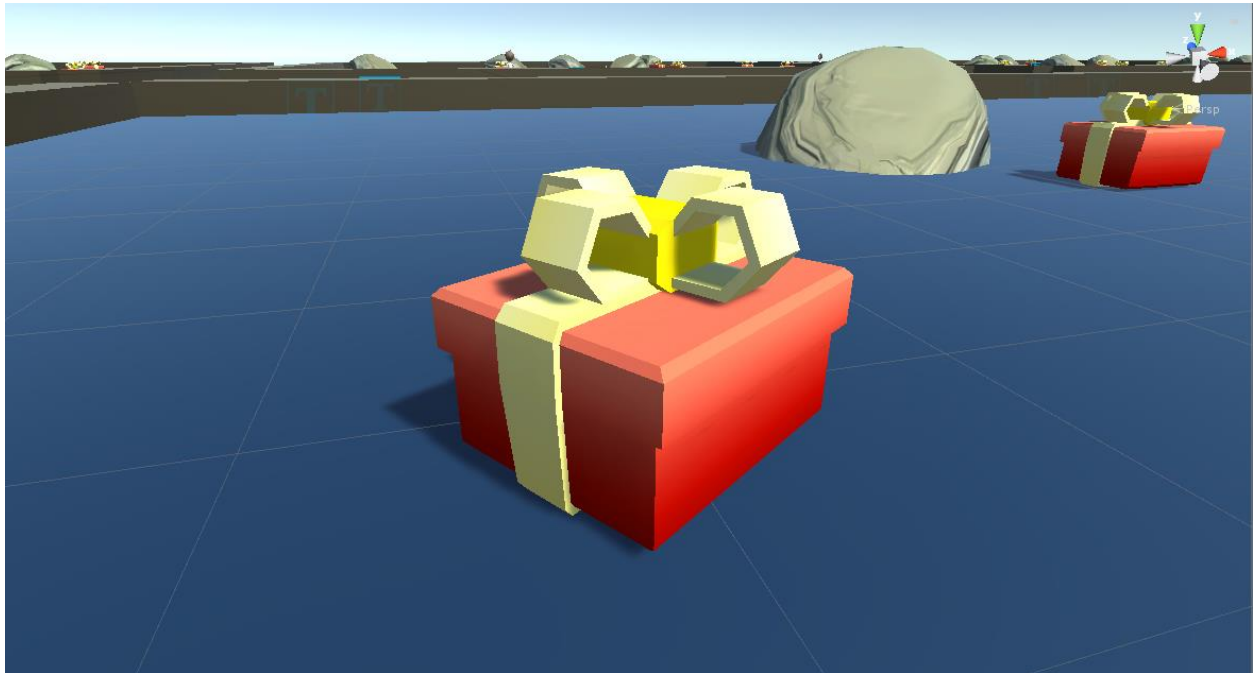

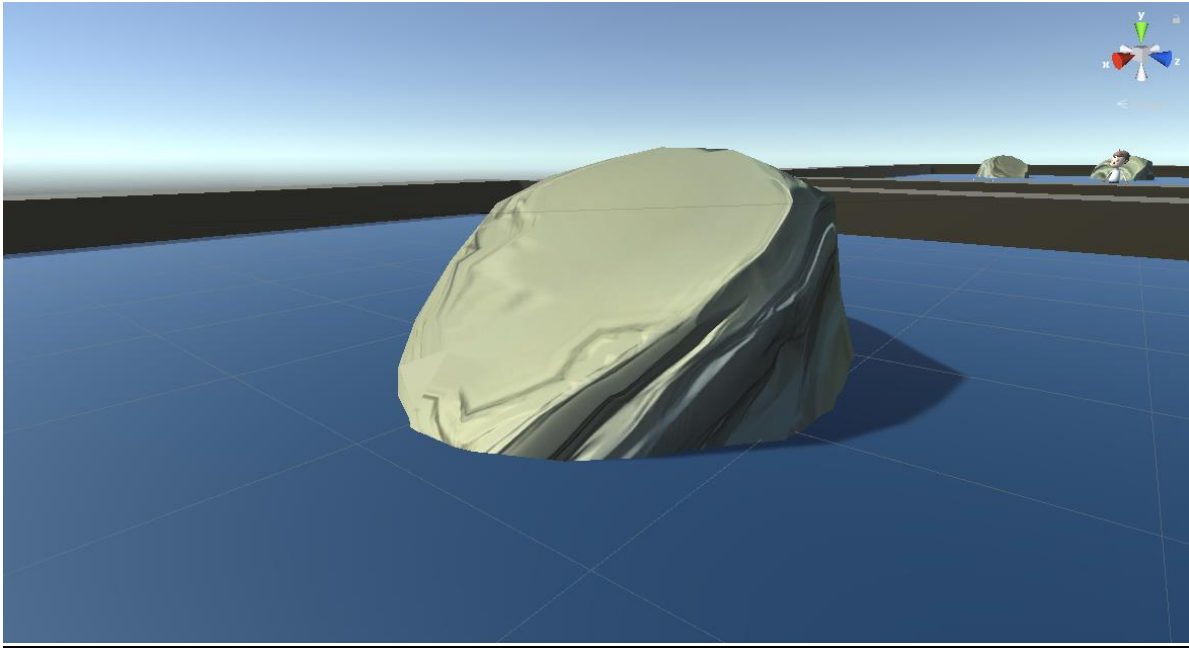Figure 1 : A Present (They should be collected to earn points)

Figure 2 : Obstacle (they block the view and stand in the way of agent.)
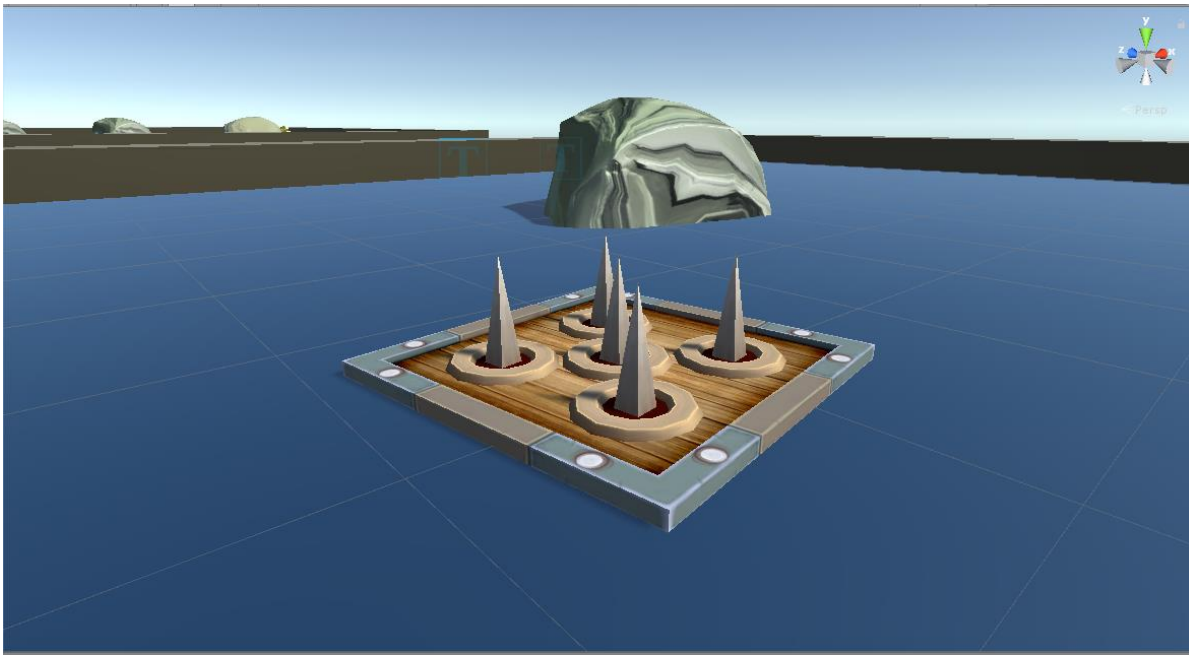

Figure 3 : Traps (They reduce the score and fails the current game restarting the game table)

Figure 4 : Meet with our agent the "BOY". (Boy has 4 inputs which are move forward move backward rotate clockwise and rotate counter clockwise.)

Figure 5 : Game Arena consisting of traps obstacle and presents. This is the overall look of the area where the game is played.

Figure 6 : Arena blinking in green   Figure 7: Arena Blinking in red.

3. Methodology

I will be using Unity ML-Agent for training and testing which is based on Tensorflow. This was a project which I started on my own to learn to create agents and artificial intelligence to use in the video games I develop. I've even trained it before too. But with this course now I have an better understanding and grasp on the machine learning topic. So I want to try on different learning algorithms Tensorflow is providing and I also want to test on curriculums to see how they effect. As of the date I am writing this report I did not finish the training part, once I finish and test I will share my results.

4. Experiments and Results

Since this is not a project which can be evaluated numerically, in order to have an understanding of the "boy's performance I will also be creating a human version of the game which can be played by human players. We will be seeing the world from the eyes of the boy and we will be playing the game with same rules. Where we will

fail if we touch to the traps and earn points if we collect gifts. So, in order to evaluate how well the boy is playing we can compare the boy's score with our score.