

Zombie Vs Tanks

Submitted in partial fulfillment of the requirements

of the degree of

Bachelor of Engineering in

Artificial Intelligence and Data Science

by

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under the guidance of

Supervisor (s):

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Department of Artificial Intelligence and Data Science

Vivekanand Education Society's Institute of Technology

2021-2022



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Department of Artificial Intelligence and Data Science

CERTIFICATE

This is to certify that **Priyanshu Singh, Deepak Prasad, Tejas Patne, Sneha Kadambala** of Second Year of Artificial Intelligence and Data Science studying under the University of Mumbai have satisfactorily presented the Mini Project entitled **Zombie Vs Tank** as a part of the MINI-PROJECT for Semester-III under the guidance of **Mrs. Sangeeta Oswal** in the year 2021-2022.

Date:18/12/2021

(Name and sign)
Head of Department

(Name and sign)
Supervisor/Guide



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DECLARATION

We, **Priyanshu Singh, Deepak Prasad, Tejas Patne, Sneha Kadambala** from **D6AD**, declare that this project represents our ideas in our own words without plagiarism and wherever others' ideas or words have been included, we have adequately cited and referenced the original sources.

We also declare that we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our project work.

We declare that we have maintained a minimum 75% attendance, as per the University of Mumbai norms.

We understand that any violation of the above will be cause for disciplinary action by the Institute.

Yours Faithfully

1. Priyanshu Singh
2. Deepak Prasad
3. Tejas Patne
4. Sneha Kadambala



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Acknowledgment

We would like to express our sincere thanks to **Mrs. Sangeeta Oswal**, for his/her valuable guidance and support in completing our project.

We would also like to express our gratitude towards our HOD and Vice-Principal **Dr. Mrs. M Vijaylakshmi** Madam for giving us this great opportunity to do an AI-Based Game Development project on **Zombie vs Tanks**. As the first AI and DS batch of our college, we are thankful to our Department for helping us to start our learning journey with fun AI game Development. Without their support and suggestions, this project would not have been completed.



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Abstract

Inspired by **Dead Venture: Zombie Survival** game, We have tried to build a Shooting game. In this study, we tried to create a basic structure of a game and a story to implement AI in the game. As of now, Zombies are given basic python instructions like following the Player, to ensure the setup of the game.



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Introduction

Nowadays, shooting games are popular. Zombie survival is one of the crowd-pleasing categories. There are lots of famous 2D as well as 3D Zombie survival games. One of them is Dead Venture: Zombie Survival. Will of humans for survival make these games more engaging. By introducing AI, the gaming ability of players can be improved step by step.

Just like Covid-19 Pandemic, the story of the game starts with the Zombie pandemic. If Zombie baits a normal person then that healthy person also becomes Zombie and does the same. Zombies in our games know only one thing i.e. to bait a normal human and turn him/her into a Zombie. Our user is the only human in the city.

GamePlay:

A player will be given a tank. This tank can fire unlimited shots. The player can kill a Zombie with one shot of canon on a tank. The motive of the player is to keep Zombies away by killing them. For each Zombie kill, the player will be given 2 points. If any Zombie somehow manages to get close enough to tank, then game overs. The score of the player will be displayed whenever the game ends.



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Literature Learning

As of now, the Non-ML approach is used in the game for the moment of Zombies. We found that after playing the game for some time, it becomes boring. As Zombies are approaching only tank. To make it more interesting we want some Zombies to move randomly. But in that case, after some time that would also not be challenging. To keep the player engaged with the game in long run, we should challenge the player at his level. So the game should learn to increase its difficulty level as the player improves in the game. After referring to a lot of articles and youtube videos we found that Reinforcement Learning Algorithm is best suited for our Zombie vs Tanks game.

GA is by definition, an **inter-life algorithm**, which means that the approach requires individuals to 'die' to progress. Since we want AI Zombies to improve as we kill them and not to survive in the environment. In GA, the next generation of Zombies will be better than previous Zombies. Hence increasing difficulty of the game with an increasing number of Zombies killed and so increasing score of the player.

Paper Findings

Non-ML Zombie vs Tanks :

<https://new.pythonforengineers.com/blog/zombies-vs-tanks-a-simple-game-in-python-and-pygame-zero/>

From this blog, we learned to create our game without using any ML concept. Referring to this, we created a structure of our game.

RL Algorithm for Bots:

<http://cs229.stanford.edu/proj2016/report/UdagawaLeeNarasimhan-FightingZombiesInMinecraftWithDeepReinforcementLearning-report.pdf>



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<https://www.aaai.org/Papers/AIIDE/2008/AIIDE08-013.pdf>

These articles are most important, As they helped us to understand how to combine deep Q-learning with reinforcement learning to play games by accomplishing difficult tasks. Specifically, the convolutional neural network allowed us to make meaningful predictions for optimal actions even with extremely high numbers of states.

GA vs RL:

<https://medium.com/xrpractices/reinforcement-learning-vs-genetic-algorithm-ai-for-simulations-f1f484969c56>

This article helped us to decide which algorithm to choose for AI implementation.



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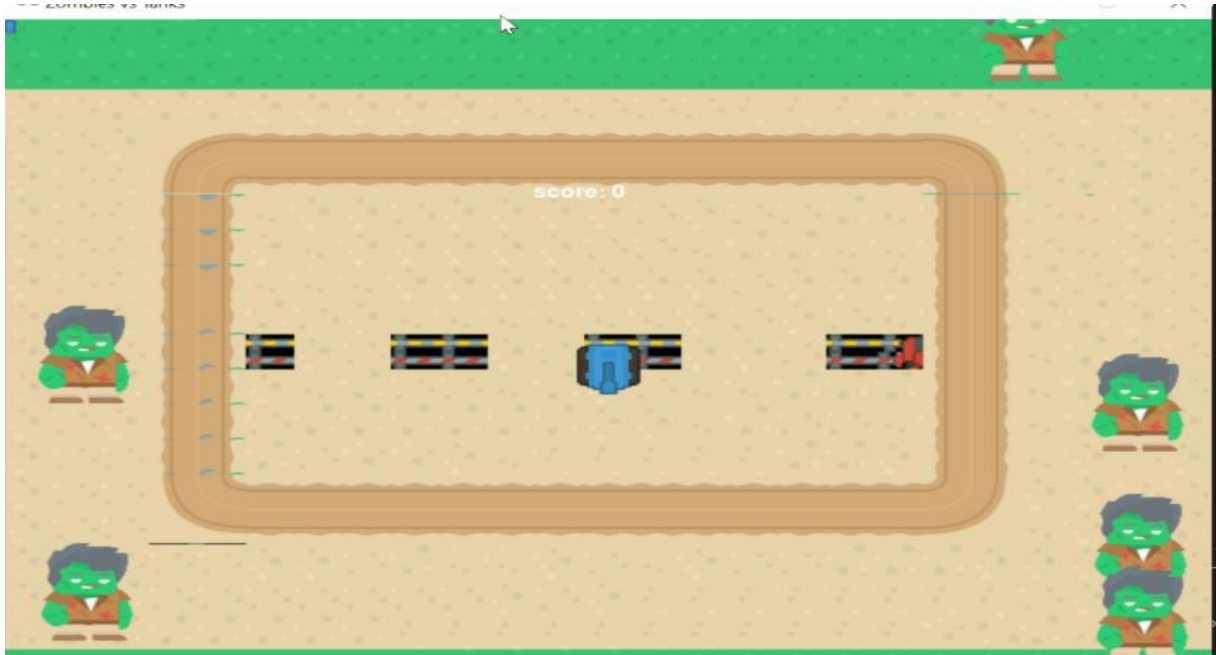
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Approach

We formalize the reinforcement learning task as a Markov Decision Process. The agent interacts with an environment by making observations and actions and receiving rewards. At each iteration, the agent selects an action from the action space, $A = 1, \dots, K$. This action then changes the agent's state and the agent receives rewards based on its new state. The reward indirectly depends not only on the new state it just entered but the entire sequence of actions and observations it made until it entered the new state. Thus, to make an appropriate action in the new state, the agent needs information from previous actions and observations as well as the current observation. We, therefore, consider sequences of actions and observations $s_t = x_1, a_1, x_2, \dots, a_{t-1}, x_t$, where x_t is the pixel values of the visual input from the agent at time t . All such sequences are finite; thus we now have a finite Markov decision process (MDP), where we use the sequence s_t as a distinct state at each time-step t .

GUI

We will try to create our game somewhat similar to shown below



We will also try to create a health bar for player. Also, we will try to create and display a health bar of AI Zombies whenever Zombie gets a shot from the player tank. Unlike normal Zombies, we don't want AI Zombies to die in only one hit.

Result and Discussion

In this semester, we have partially implemented our game. We have implemented this game with the Non-ML approach by giving basic information like the position of the tank to Zombies. Then the instruction was given to Zombies to approach the tank according to their positions. To make the movements of Zombies random, we learned how to implement ML in the game. We decided to use a Reinforcement algorithm to improve the performance of random Zombies.



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Conclusion and Future work

In this Semester, we have created only the basic game structure and implemented it. So that we can start with the game. We have tested the game with a normal approach. We will make the zombies learn from their gameplay using AI. This will increase help to increase uncertainty in the game. So will engage the player.

Future Work:

1. Have an Opening Screen
2. To implement AI for uncertain movements of Zombies
3. To increase the difficulty of the game with the performance of player using AI
4. To add Restart function and main menu in the game