BUILD TIC TAC TOE GAME

V. Sarala[1], Darapureddy Sireesha[2]

[1] **Assistant Professor MCA, DEPT,** Dantuluri Narayana Raju College **, Bhimavaram, Andharapradesh**
Email id:- vedalasarala21@gmail.com
[2]**PG Student of MCA,** Dantuluri Narayana Raju College **, Bhimavaram, Andharapradesh**
Email id:- darapureddysireesha@gmail.com

ABSTRACT

The two players in the paper and pencil game tic-tac-toe, commonly known as noughts and crosses, alternately mark the spaces in a 3 × 3 grid. The game is won by the player who successfully arranges three of their marks in a row that is either horizontal, vertical, or diagonal. It is a perfect information game with zero sum. This indicates that it is deterministic, with fully observable environs, two agents acting alternately, and utility values that are always equal and opposite at the conclusion of the game. Tic-tac-toe is frequently used as a teaching tool in artificial intelligence to deal with exploring game trees because of its simplicity. In this game, the opposition between the utility functions makes the scenario adversarial, necessitating an adversarial search assisted by the minimax algorithm with the alpha beta pruning notion of artificial intelligence. This move can be obtained by utilizing the minimax method.4x4 Tic Tac Toe is used to analyze the minimax algorithm's complexity.

study and use of the alpha-beta pruning idea to speed up the search for the best move in tic-tac-toe.

to investigate heuristic evaluation function-based approaches for alpha-beta pruning optimization.

1 INTRODUCTION

The two players in the paper and pencil game tic-tac-toe, commonly known as noughts and crosses, alternately mark the spaces in a 3 × 3 grid. The game is won by the player who successfully arranges three of their marks in a row that is either horizontal, vertical, or diagonal. It is a perfect information game with zero sum. This indicates that it is deterministic, with fully observable environs, two agents acting alternately, and utility values that are always equal and opposite at the conclusion of the game. Tic-tac-toe is frequently used as a teaching tool in artificial intelligence to deal with exploring game trees because of its simplicity.In this game, the opposition between the utility functions makes the scenario adversarial, necessitating an adversarial search assisted by the minimax algorithm with the alpha beta pruning notion of artificial intelligence. This move can be obtained by utilizing the minimax method.

OBJECTIVES

To create a tic-tac-toe game using artificial intelligence that pits humans against AI by combining the minimax algorithm with the adversarial search concept.

4x4 Tic Tac Toe is used to study the minimax algorithm's complexity.

study and use of the alpha-beta pruning idea to speed up the search for the best move in tic-tac-toe.

to investigate heuristic evaluation function-based approaches for alpha-beta pruning optimization.

1.LITERATURE SURVEY AND RELATED WORK

Researching different game-related topics, such as the game's history, algorithms, AI techniques, implementations, and educational applications, might be part of a literature study for a Tic-Tac-Toe game. Here is a quick summary of what the literature might cover:

1.Background and History

Start by researching the origins and history of tic-tac-toe. Examine its historical development and cultural relevance.

2.Strategy and Game Theory
Examine the game theory elements of tic-tac-toe, such as the best approaches for each player.
Studies on winning tactics, flawless performance, and game complexity analyses can all fall under this category. Tic-Tac-

3.Toe with artificial intelligence (AI)
Look into tic-tac-toe with artificial intelligence. Look into several AI Tic-Tac-Toe strategies, including minimax, alpha-beta pruning, and reinforcement learning.

4. Tic-Tac-Toe Competitions Between Humans and AI
To comprehend the developments in AI, read about well-known human vs. AI Tic-Tac-Toe challenges or competitions, such the chess match between Deep Blue and Garry Kasparov.

5. Applications in Education
Examine the literature to learn how Tic-Tac-Toe is used in the classroom, particularly to teach pupils programming, logic, and problem-solving techniques.

6. Different Tic-Tac-Toe Games
Study how different Tic-Tac-Toe variants effect gameplay and strategy by looking into things like 3D Tic-Tac-Toe, bigger grid sizes, and games with various win conditions.

7. Implementations and Source Code for Tic-Tac-Toe
To learn how the game is written in various languages and platforms, look for open-source Tic-Tac-Toe implementations, code samples, and tutorials.
8. Tic-Tac-Toe Psychology
Investigate the psychology of tic-tac-toe, including studies on player behavior, decision-making, and cognitive biases.

9. Tic-Tac-Toe in Education and Research Examine how Tic-Tac-Toe is used in a variety of academic disciplines, such as computer science, mathematics, and psychology, as a test case or model problem.

10. Tic-Tac-Toe Communities Online
Look for online forums or groups where players share implementations, discuss strategy, and work together on Tic-Tac-Toe-related projects.

11. Tic-Tac-Toe Games on Mobile and the Web
Investigate the design and user experience facets of Tic-Tac-Toe game creation for mobile and web platforms.

Gather pertinent research papers, articles, books, and internet resources that offer insights into the various aspects of Tic-Tac-Toe while you do your literature review. You will be better able to comprehend the game and its larger consequences after reading this material.

3. PROPOSED WORK AND ALGORITHM

A suggested method for a game of tic tac toe might comprise improving the user interface and including more features. This may consist of.
Interactive graphics
individual player mode
several players

Reverse and repeat

STATE SPACE REPRESENATION

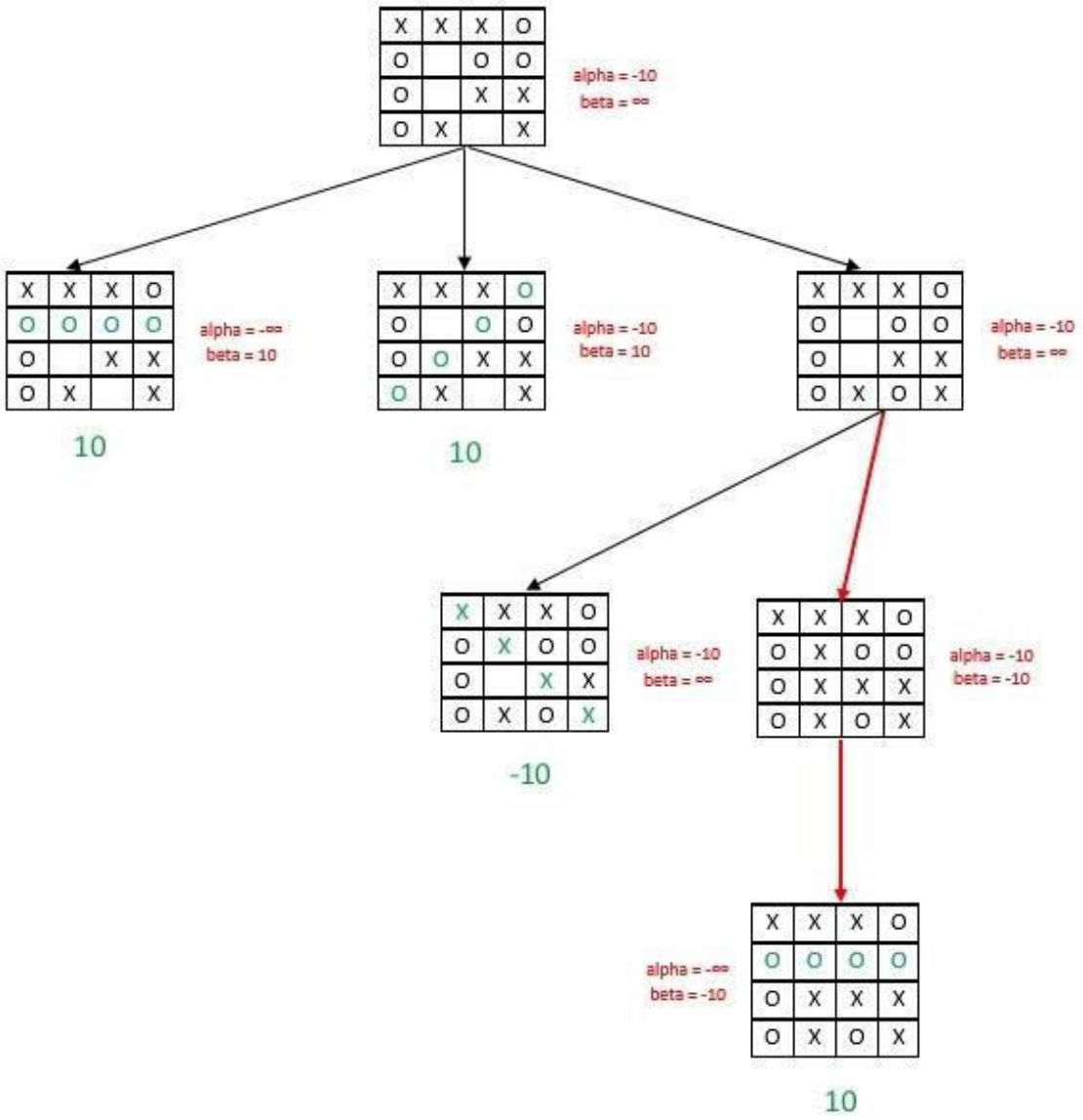


Fig 1 : **STATE SPACE REPRESENATION**

4. METHODOLOGIES

You can divide the code for a conventional Tic-Tac-Toe game into a number of modules or components to make it more streamlined and simple to create. When creating a game of tic-tac-toe, you might take into account the following typical modules:

1.Game Board Module

The game board is represented by this module as a 3x3 grid.

The functions it offers should setup the board, update it with player movements, and check for game-ending

2.Player Module

Make a module for each player (for instance, Players X and O).

This module should deal with player actions like choosing a cell on the board to move to.

3.Module for Game Logic

The main game logic is managed by this module.

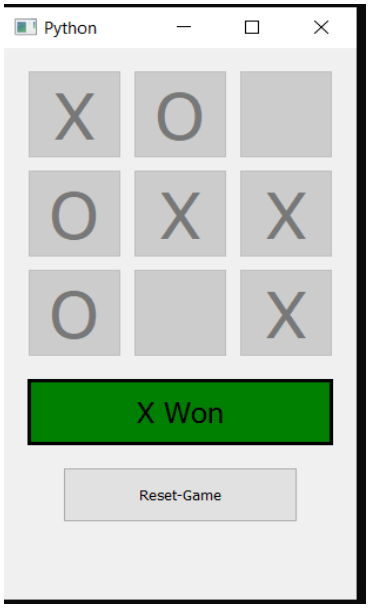
It ought to monitor who is playing at any given time, verify moves, and determine if a player has won or drawn.

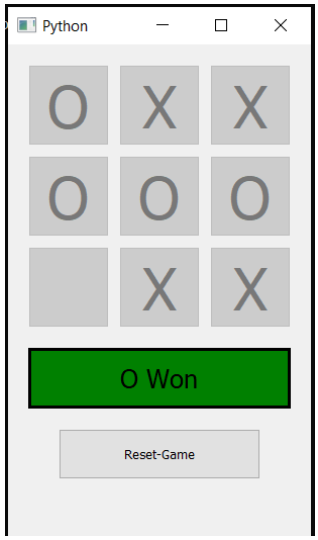
4. Module for User Interface (UI)

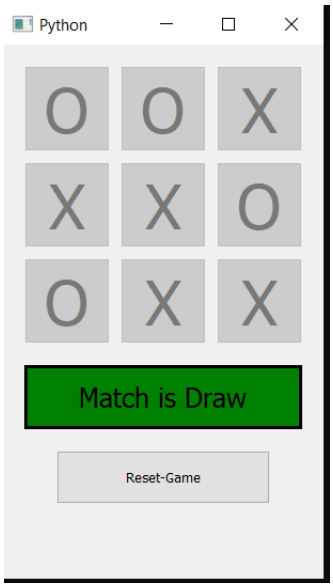
This module takes care of showing the game board and recording user input if you're making a graphical game.

It takes care of printing the board and reading user input for a command-line version.

5.RESULTS AND DISCUSSION SCREENSHOTS


Python
X O
O X X
O X
X Won
Reset-Game


Python
O X X
O O O
X X
O Won
Reset-Game


Python
O O X
X X O
O X X
Match is Draw
Reset-Game

6.CONCLUSION

The 4x4 tic tac toe game was created utilizing the minimax algorithm as the foundation, combined with the alpha beta pruning approach to speed up calculation and heuristic functions to optimize the utility function. We investigated whether a 4x4 version of tic tac toe, an artificial intelligence adversary search methodology game, could be created using these methods. With the same algorithm and techniques, expanding the size of this game will result in significant time complexity issues, necessitating more investigation into other logics.

7.REFERENCES AND BIBILOGRAPHY

It can be difficult to make a bibliography for a Tic-Tac-Toe game because it's a straightforward game that frequently doesn't
call for outside sources or references. However, you might need to cite pertinent sources if you're writing a research paper or an article about the background, gameplay, or programming of Tic-Tac-Toe. Here is an example bibliography for several Tic-Tac-Toe topics:

1.Game Rules and History

Bell, R. C. (1979). "Board and Table Games from Many Civilizations." Oxford University Press.

Parlett, David (1999). "The Oxford History of Board Games." Oxford University Press.

2.AI and Tic-Tac-Toe

Russell, Stuart J., and Norvig, Peter (2020). "Artificial Intelligence: A Modern Approach." Pearson.

Littman, Michael L. (1994). "Markov games as a framework for multi-agent reinforcement learning." In Machine Learning Proceedings 1994.

3.Tic-Tac-Toe Programming

Resnick, Mitchel (2015). "Scratch Programming for Kids." No Starch Press.

Silver, David et al. (2016). "Mastering Chess and Shogi by Self-Play with a General Reinforcement Learning Algorithm." arXiv preprint arXiv:1712.01815.

4.Strategy and Analysis

Berlekamp, Elwyn R., Conway, John H., and Guy, Richard K. (2001). "Winning Ways for Your Mathematical Plays." A K Peters/CRC Press.

Allis, Victor (1994). "Searching for Solutions in Games and Artificial Intelligence." Ph.D. Thesis, Universiteit Maastricht.

5.Educational and Recreational Books

Love, Tanya (2018). "Hello Ruby: Journey Inside the Computer." Puffin Books.

. References

1. K. Kask. [Online]. Available: https://www.ics.uci.edu/~kkask/Fall-2016%20CS271/slides/04-games.pdf. [Accessed 02 01 2020].

2. G. Surma. [Online]. Available: https://towardsdatascience.com/tic-tac-toe-creating- unbeatable-ai-

with-minimax-algorithm-8af9e52c1e7d. [Accessed 20 12 2019].

3. P. G. ,. P. S. P. Sunil Karamchandani, "A Simple Algorithm For Designing An Artificial Intelligence Based Tic Tac Toe Game".

4. 12 09 2019. [Online]. Available: https://www.edureka.co/blog/alpha-beta-pruning-in-ai. [Accessed 20 11 2019].