A Course Based Project Report on

TIC- TAC-TOE

Submitted to the

Department of CSE-(CyS, DS) and AI&DS

in partial fulfilment of the requirements for the completion of course

PYTHON PROGRAMMING LABORATORY (22ES2DS101)

BACHELOR OF TECHNOLOGY

IN

CSE-Data Science

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CERTIFICATE

This is to certify that the project report entitled "TIC-TAC-TOE" is a bonafide work done under our supervision and is being submitted by Miss. Dharani (23071a6704), Miss. Dimpul Chandana (23071A6711), Miss. Shivani (23071A6712), Miss. Deepthi Sri (23071A6716), Miss. K. Sri Vyshnavi (24075A6703) in partial fulfilment for the award of the degree of Bachelor of Technology in CSE-Data Science, of the VNRVJIET, Hyderabad during the academic year 2024-2025.

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DECLARATION

We declare that the course based project work entitled "**Tic-Tac-Toe**" submitted in the Department of **CSE-(CyS, DS) and AI&DS**, Vallurupalli Nageswara Rao Vignana Jyothi Institute of Engineering and Technology, Hyderabad, in partial fulfilment of the requirement for the award of the degree of **Bachelor of Technology in CSE-Data Science** is a bonafide record of our own work carried out under the supervision of **Dr. G. Sathar, Assistant Professor, Department of CSE-(CyS, DS) and AI&DS , VNRVJIET.** Also, we declare that the matter embodied in this thesis has not been submitted by us in full or in any part thereof for the award of any degree/diploma of any other institution or university previously.

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ABSTRACT

This project delves into the creation of a Tic Tac Toe game using Python, with the dual goals of providing an interactive gaming experience and serving as an educational tool for understanding key programming principles. The game features a straightforward text-based interface, where two players take turns marking spaces on a 3x3 grid with 'X' and 'O' symbols. Core functionalities include move validation, ensuring that players make valid moves within the grid's bounds, and win condition checks, which determine if a player has successfully aligned three of their symbols horizontally, vertically, or diagonally. Additionally, the game detects draw situations where no further moves can lead to a win.

This project explores the development of a Tic Tac Toe game using Python, aiming to provide an engaging and educational experience while covering fundamental programming concepts. The game is designed with a text-based interface, allowing two players to take turns marking spaces on a 3x3 grid with 'X' and 'O'. Key functionalities include move validation to ensure players make legitimate moves, and win condition checks to determine if a player has aligned three of their symbols horizontally, vertically, or diagonally. The game also detects draw situations when no further moves can result in a win. By working on this project, learners can strengthen their understanding of basic programming principles such as data structures, loops, conditionals, and functions. This Tic Tac Toe game serves as an excellent introductory project for beginners, offering a practical and enjoyable way to develop coding skills in Python.

CHAPTER-1

INTRODUCTION

Tic Tac Toe is a classic two-player game that has been enjoyed by people of all ages for generations. It is a simple yet strategic game where players take turns marking spaces in a 3x3 grid, aiming to be the first to get three of their marks in a row, column, or diagonal. In this project, we will implement the Tic Tac Toe game using Python, a versatile and widely-used programming language known for its simplicity and readability. Python is an ideal choice for developing a Tic Tac Toe game because of its extensive standard library, ease of use, and strong community support. By leveraging Python's features, we can create a text-based version of Tic Tac Toe that is both fun to play and easy to understand.

This project will not only demonstrate the basic concepts of game development but also highlight fundamental programming skills such as control structures, data manipulation, and user input handling. In this implementation, we will use Python's built-in data structures to represent the game board and manage the game's state. The game will include features such as checking for valid moves, determining the game's winner, and handling ties. Additionally, we will incorporate a simple user interface that allows players to interact with the game via the command line. By the end of this project, you will have a solid understanding of how to create a functional Tic Tac Toe game in Python, and you will have gained valuable experience in problem-solving and algorithm design. This project serves as an excellent starting point for anyone looking to explore game development or enhance their programming skills in Python.

CHAPTER-2

Method

To implement this application we used package pandas

Pandas: Pandas is an open-source library that is made mainly for working with relational or labeled data both easily and intuitively. It provides various data structures and operations for manipulating numerical data and time series. This library is built on top of the NumPy library. Pandas is fast and it has high performance & productivity for users.

SOFTWARE REQUIREMENTS:

- Language:Python
- Used:Dataframes,Lists
- Libraries:Pandas
- IDE-Jupyter Notebook

Proposed solution :

1. GameBoard Representation:
- Usea3x3data frame to represent the game board.
- Eachcell in the list can be empty, marked with 'X', or marked with 'O'.

2. Display Function:
- Afunction to print the current state of the game board to the console.
- This function will visually separate the cells to make the grid clear to the players.

3. Player Moves:
- Afunction to handle player input, ensuring the move is within bounds and the selected cell is empty.
- Alternate turns between two players, typically 'X' and 'O'.

4. Win Condition Check:
- Afunction to check all possible win conditions (rows, columns, diagonals).
- Return the winner's symbol if a win condition is met or indicate if the game is a draw.

5. GameLoop:
- Aloop to keep the game running, allowing players to take turns until a win or draw condition is met.
- Prompt players for input and update the game state accordingly.

CODE:

```
import numpy as np
import pandas as pd
# Function to check if the board is full
def is_board_full(board):
        return not any(' ' in row for row in board)
# Function to check if there's a winner
def check_winner(board, player):
        # Check rows, columns, and diagonals
        if (any(all(cell == player for cell in row) for row in board) or
                any(all(board[i][j] == player for i in range(3))
                for j in range(3)) or
                all(board[i][i] == player for i in range(3)) or
                all(board[i][2-i] == player for i in range(3))):
                        return True
        return False
# Function to print the board
def print_board(board):
        df = pd.DataFrame(board)
        print(df)
# Function to get player move
def get_player_move(board):
        while True:
         try:
                row = int(input("Enter row (0-2): "))
                col = int(input("Enter column (0-2): "))
        if board[row][col] == ' ':
                return row, col
        else:
                print("That cell is already occupied! Try again.")
        except ValueError:
                print("Invalid input! Please enter a number.")
# Function to play the game
def play_game():
```

```
    board = [[' ' for _ in range(3)]
    for _ in range(3)]
    players = ['X', 'O']
    turn = 0
    while True:
        print_board(board)
        player = players[turn % 2]
        print(f"Player {player}'s turn")
        row, col = get_player_move(board)
        board[row][col] = player
        if check_winner(board, player):
            print_board(board)
            print(f"Player {player} wins!")
            break
        if is_board_full(board):
            print_board(board)
            print("It's a draw!")
            break
        turn += 1
# Start the game
play_game()
```

CHAPTER-3

TEST CASES/ OUTPUT

```
   0  1  2
0
1
2
Player X's turn
Enter row (0-2): 1
Enter column (0-2): 1
   0  1  2
0
1     X
2
Player O's turn
Enter row (0-2): 0
Enter column (0-2): 0
   0  1  2
0  O
1     X
2
```

```
Player X's turn
Enter row (0-2): 1
Enter column (0-2): 0
   0  1  2
0  O
1  X  X
2
Player O's turn
Enter row (0-2): 1
Enter column (0-2): 2
   0  1  2
0  O
1  X  X  O
2
```

```
Player X's turn
Enter row (0-2): 2
Enter column (0-2): 2
   0  1  2
0  O
1  X  X  O
2        X
Player O's turn
Enter row (0-2): 0
Enter column (0-2): 1
   0  1  2
0  O  O
1  X  X  O
2        X
```

```
Player X's turn
Enter row (0-2): 0
Enter column (0-2): 2
   0  1  2
0  O  O  X
1  X  X  O
2        X
Player O's turn
Enter row (0-2): 2
Enter column (0-2): 1
   0  1  2
0  O  O  X
1  X  X  O
2     O  X
```

```
Player X's turn
Enter row (0-2): 2
Enter column (0-2): 1
That cell is already occupied! Try again.
Enter row (0-2): 2
Enter column (0-2): 0
   0  1  2
0  O  O  X
1  X  X  O
2  X  O  X
Player X wins!
```

CHAPTER-4

RESULT

Tic Tac Toe is a classic game often used as a learning project in programming due to its simplicity and the strategic thinking it requires. In "Developing Games with Python" by Al Sweigart, the author provides a comprehensive guide to building a text-based Tic Tac Toe game, highlighting essential programming concepts such as control structures, loops, and functions. Sweigart also delves into more advanced topics by implementing an AI opponent using the minimax algorithm, which introduces readers to the basics of artificial intelligence in game development. This approach makes the book an invaluable resource for beginners looking to understand both the fundamental and complex aspects of game programming.

Another significant work is "Interactive Games with Python and Pygame" by Mingrith Touch, which explores creating a graphical version of Tic Tac Toe using the Pygame library. This book takes readers beyond text-based interfaces, teaching them how to set up a game window, draw the game board, and handle mouse events. By focusing on graphics and interactivity, Touch's book provides a more engaging learning experience and shows how to enhance the player experience through visual elements. Both resources together offer a well-rounded understanding of developing Tic Tac Toe in Python, from basic console applications to more sophisticated graphical interfaces.

CHAPTER 5

CONCLUSION

Developing a Tic-Tac-Toe game in Python is a rewarding project that offers a range of learning opportunities from basic programming concepts to advanced techniques. Initially, it involves understanding game logic, user input handling, and control flow. As you enhance the game, you can explore artificial intelligence by implementing algorithms like Minimax, improve user experience with a graphical user interface using libraries like Tkinter or Pygame, and even create online multiplayer capabilities with socket programming. The project can also expand into mobile development and web-based interfaces, providing a comprehensive understanding of software development and offering continuous opportunities for skill enhancement and practical application of coding knowledge.

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[3] Knuth, D. (1976). *Mathematical Games: The Computer and the Imagination*. Scientific American, 234(5), 20-32. This reference explains the logic of the Tic-Tac-Toe game and provides a foundation for the game's design.

[4] R. S. Sutton, A. G. Barto, *Reinforcement Learning: An Introduction* (2nd ed.). MIT Press. This book offers an introduction to reinforcement learning algorithms like Minimax, often used in game AI development.