FACULTY OF ENGINEERING AND TECHNOLOGY

SCHOOL OF COMPUTING

DEPARTMENT OF COMPUTING TECHNOLOGIES

18CSC301T FORMAL LANGUAGE AND AUTOMATA

MINI PROJECT REPORT

PROJECT TITLE: Tic Tac Toe using GUI

SRM INSTITUTE OF SCIENCE & TECHNOLOGY
Deemed to be University u/s 3 of UGC Act, 1956

TEAM MEMBER

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3. RA2111003010214 - LIKHITA
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Objective:

The Objective is to create a Tic Tac Toe game using a graphical user interface (GUI) in Python. The objective is to design a user-friendly interface where players can interact with the game by clicking on the game board cells represented as buttons. The GUI should visually update to display the moves made by each player and determine the winner or a draw condition.

The Tic Tac Toe game follows these rules:

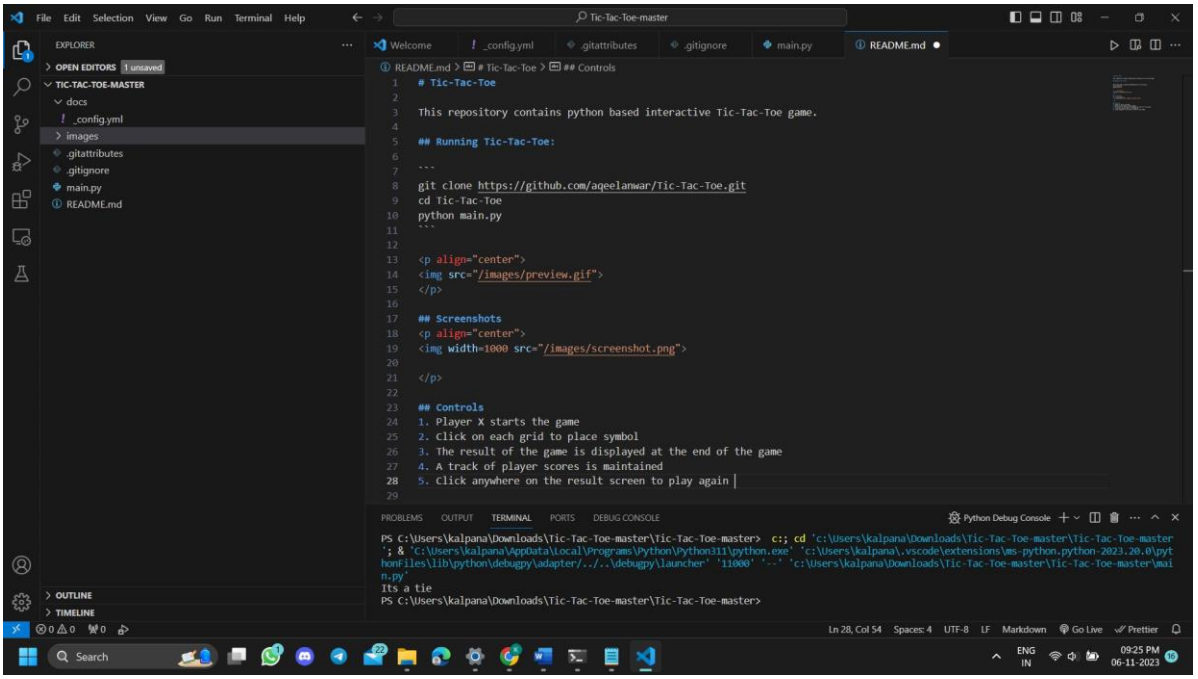
1. The game is played on a 3x3 grid.
2. Two players take turns, one marking "X" and the other marking "O" in empty cells.
3. The game continues until there is a winner or all cells are filled without a winning combination.
4. A player wins if they have three of their symbols in a row, column, or diagonal.
5. If no player achieves a winning combination and all cells are filled, the game ends in a draw.

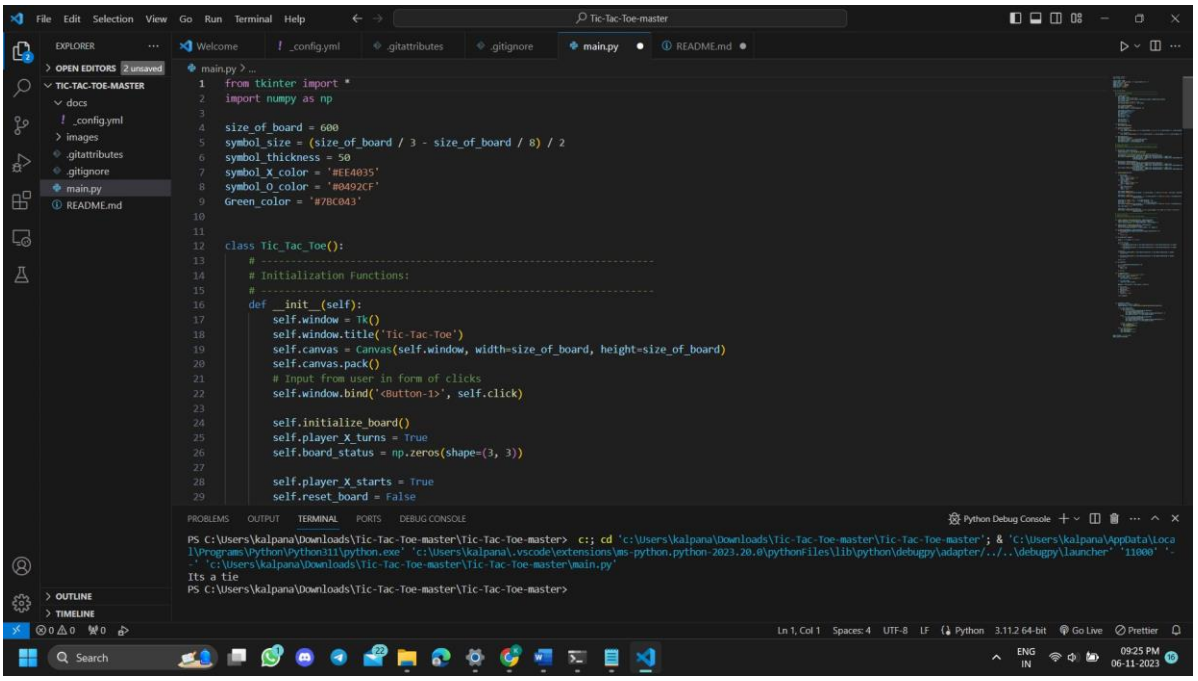
The GUI should provide an intuitive and visually appealing interface to represent the game board and allow players to make their moves easily. It should update the game state and display the outcome of each game, offering options to restart the game or exit the application.

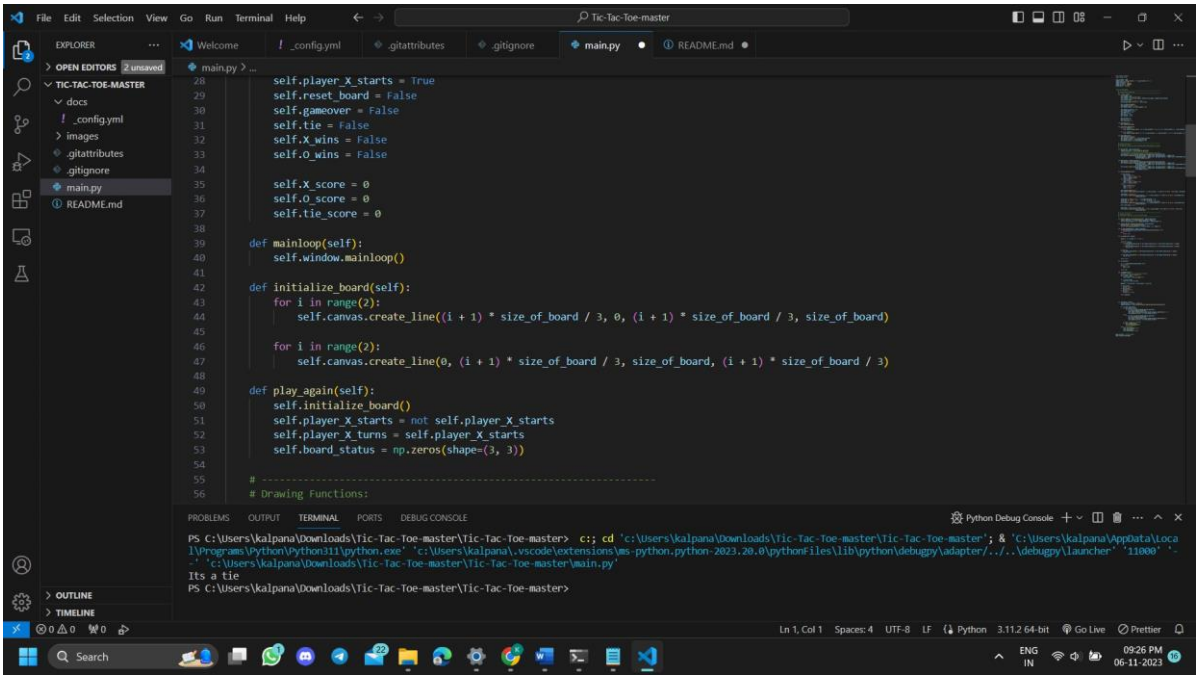
Overall, the problem involves integrating the game logic, GUI design, event handling, and game flow to create an interactive and enjoyable Tic Tac Toe game using a GUI in Python

Software Used: Visual Studio Code

Screen Shots:



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self.player_X_starts = True
self.reset_board = False
self.gameover = False
self.tie = False
self.X_wins = False
self.O_wins = False
self.X_score = 0
self.O_score = 0
self.tie_score = 0
def mainloop(self):
self.window.mainloop()
def initialize_board(self):
for i in range(2):
self.canvas.create_line((i + 1) * size_of_board / 3, 0, (i + 1) * size_of_board / 3, size_of_board)
for i in range(2):
self.canvas.create_line(0, (i + 1) * size_of_board / 3, size_of_board, (i + 1) * size_of_board / 3)
def play_again(self):
self.initialize_board()
self.player_X_starts = not self.player_X_starts
self.player_X_turns = self.player_X_starts
self.board_status = np.zeros(shape=(3, 3))
# ----------
# Drawing Functions:
PROBLEMS OUTPUT TERMINAL PORTS DEBUG CONSOLE
Python Debug Console
PS C:\Users\kalpana\Downloads\Tic-Tac-Toe-master\Tic-Tac-Toe-master> c:; cd 'c:\Users\kalpana\Downloads\Tic-Tac-Toe-master\Tic-Tac-Toe-master'; & 'C:\Users\kalpana\AppData\Local\Programs\Python\Python311\python.exe' 'c:\Users\kalpana\.vscode\extensions\ms-python.python-2023.20.0\pythonFiles\lib\python\debugpy\adapter/../..\debugpy\launcher' '11000' '-' 'c:\Users\kalpana\Downloads\Tic-Tac-Toe-master\Tic-Tac-Toe-master\main.py'
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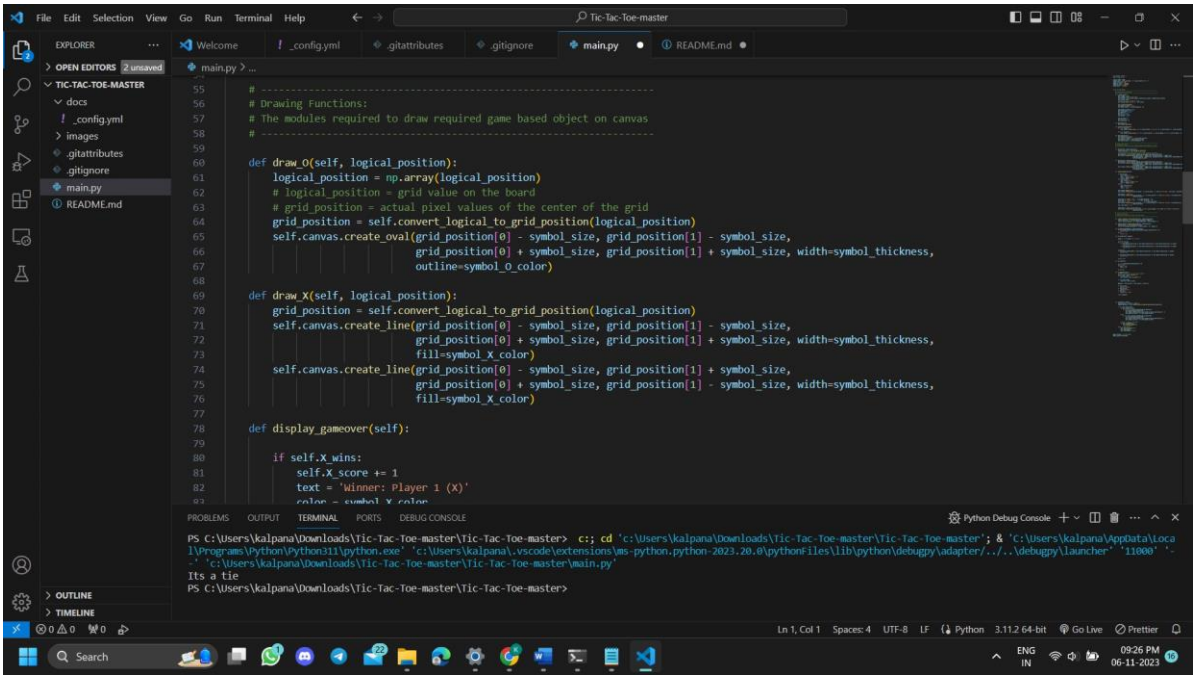
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# ----------
# Drawing Functions:
# The modules required to draw required game based object on canvas
# ----------
def draw_O(self, logical_position):
logical_position = np.array(logical_position)
# logical_position = grid value on the board
# grid_position = actual pixel values of the center of the grid
grid_position = self.convert_logical_to_grid_position(logical_position)
self.canvas.create_oval(grid_position[0] - symbol_size, grid_position[1] - symbol_size,
grid_position[0] + symbol_size, grid_position[1] + symbol_size, width=symbol_thickness,
outline=symbol_O_color)
def draw_X(self, logical_position):
grid_position = self.convert_logical_to_grid_position(logical_position)
self.canvas.create_line(grid_position[0] - symbol_size, grid_position[1] - symbol_size,
grid_position[0] + symbol_size, grid_position[1] + symbol_size, width=symbol_thickness,
fill=symbol_X_color)
self.canvas.create_line(grid_position[0] - symbol_size, grid_position[1] + symbol_size,
grid_position[0] + symbol_size, grid_position[1] - symbol_size, width=symbol_thickness,
fill=symbol_X_color)
def display_gameover(self):
if self.X_wins:
self.X_score += 1
text = 'Winner: Player 1 (X)'
PROBLEMS OUTPUT TERMINAL PORTS DEBUG CONSOLE
Python Debug Console
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```python
    def display_gameover(self):

        if self.X_wins:
            self.X_score += 1
            text = 'Winner: Player 1 (X)'
            color = symbol_X_color
        elif self.O_wins:
            self.O_score += 1
            text = 'Winner: Player 2 (O)'
            color = symbol_O_color
        else:
            self.tie_score += 1
            text = 'Its a tie'
            color = 'gray'

        self.canvas.delete("all")
        self.canvas.create_text(size_of_board / 2, size_of_board / 3, font="cmr 60 bold", fill=color, text=text)

        score_text = 'Scores \n'
        self.canvas.create_text(size_of_board / 2, 5 * size_of_board / 8, font="cmr 40 bold", fill=Green_color,
                                text=score_text)

        score_text = 'Player 1 (X) : ' + str(self.X_score) + '\n'
        score_text += 'Player 2 (O): ' + str(self.O_score) + '\n'
        score_text += 'Tie                  : ' + str(self.tie_score)
        self.canvas.create_text(size_of_board / 2, 3 * size_of_board / 4, font="cmr 30 bold", fill=Green_color,
                                text=score_text)
        self.reset_board = True
```

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Its a tie
PS C:\Users\kalpana\Downloads\Tic-Tac-Toe-master\Tic-Tac-Toe-master>
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```python
        self.reset_board = True

        score_text = 'Click to play again \n'
        self.canvas.create_text(size_of_board / 2, 15 * size_of_board / 16, font="cmr 20 bold", fill="gray",
                                text=score_text)

    # ----------------------------------------------------------------
    # Logical Functions:
    # The modules required to carry out game logic
    # ----------------------------------------------------------------

    def convert_logical_to_grid_position(self, logical_position):
        logical_position = np.array(logical_position, dtype=int)
        return (size_of_board / 3) * logical_position + size_of_board / 6

    def convert_grid_to_logical_position(self, grid_position):
        grid_position = np.array(grid_position)
        return np.array(grid_position // (size_of_board / 3), dtype=int)

    def is_grid_occupied(self, logical_position):
        if self.board_status[logical_position[0]][logical_position[1]] == 0:
            return False
        else:
            return True

    def is_winner(self, player):

        player = -1 if player == 'X' else 1
```


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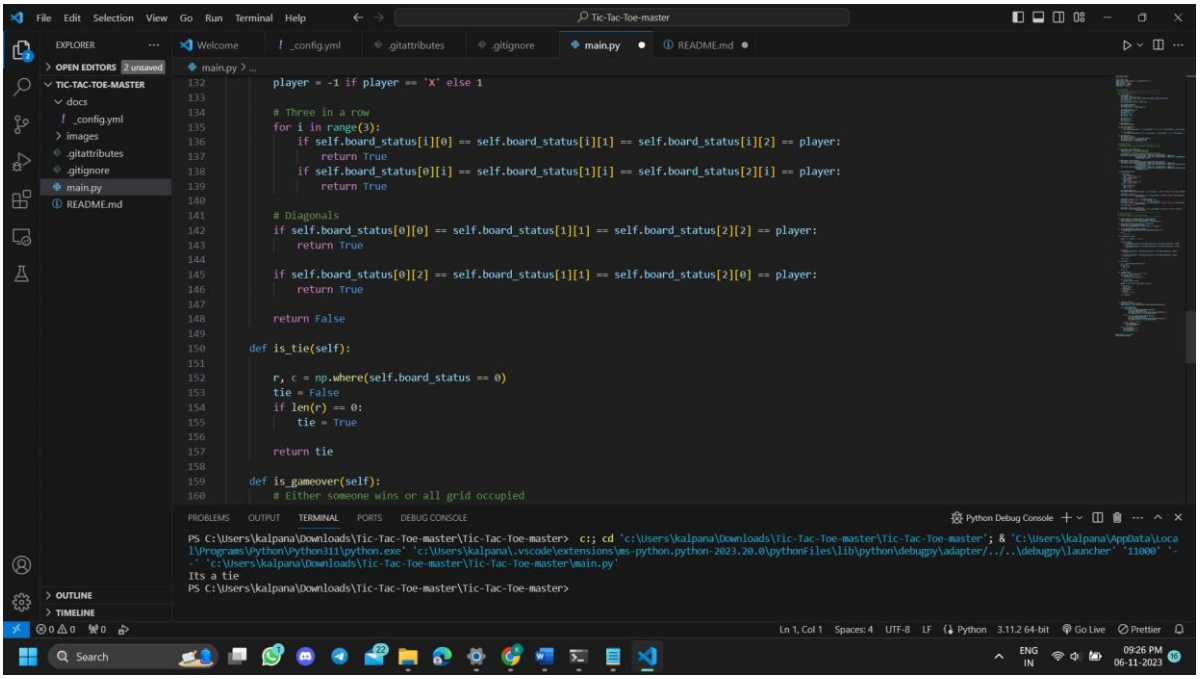
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player = -1 if player == 'X' else 1
# Three in a row
for i in range(3):
if self.board_status[i][0] == self.board_status[i][1] == self.board_status[i][2] == player:
return True
if self.board_status[0][i] == self.board_status[1][i] == self.board_status[2][i] == player:
return True
# Diagonals
if self.board_status[0][0] == self.board_status[1][1] == self.board_status[2][2] == player:
return True
if self.board_status[0][2] == self.board_status[1][1] == self.board_status[2][0] == player:
return True
return False
def is_tie(self):
r, c = np.where(self.board_status == 0)
tie = False
if len(r) == 0:
tie = True
return tie
def is_gameover(self):
# Either someone wins or all grid occupied
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Python Debug Console
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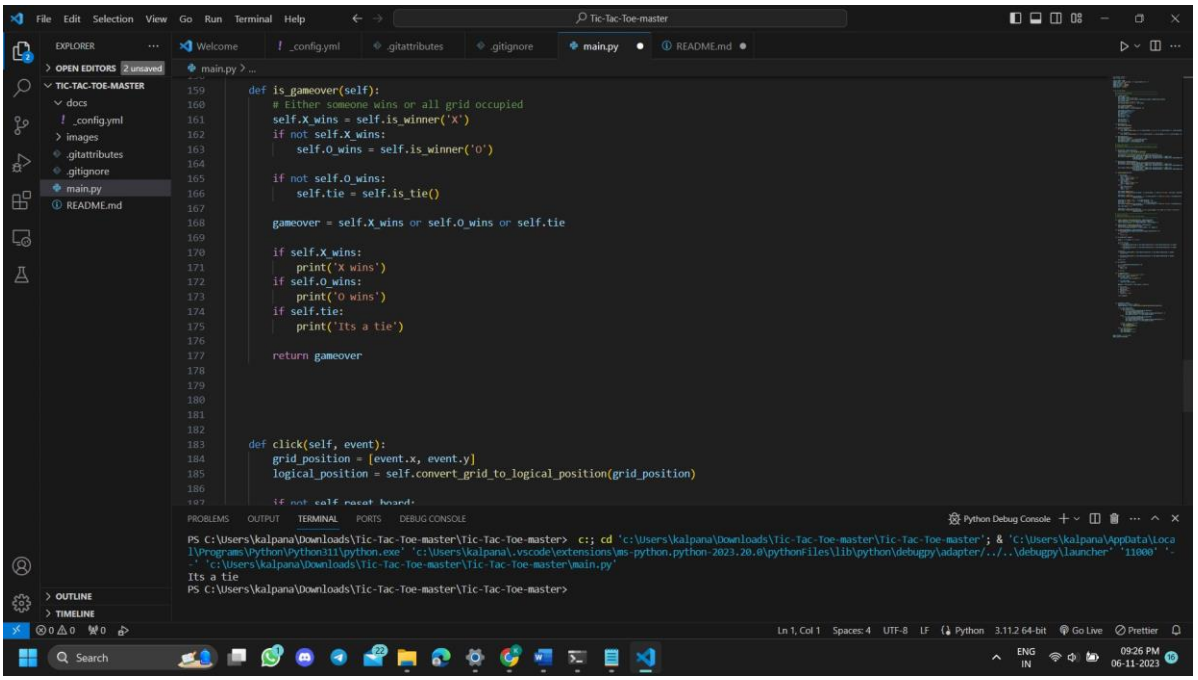
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def is_gameover(self):
# Either someone wins or all grid occupied
self.X_wins = self.is_winner('X')
if not self.X_wins:
self.O_wins = self.is_winner('O')
if not self.O_wins:
self.tie = self.is_tie()
gameover = self.X_wins or self.O_wins or self.tie
if self.X_wins:
print('X wins')
if self.O_wins:
print('O wins')
if self.tie:
print('Its a tie')
return gameover
def click(self, event):
grid_position = [event.x, event.y]
logical_position = self.convert_grid_to_logical_position(grid_position)
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Python Debug Console
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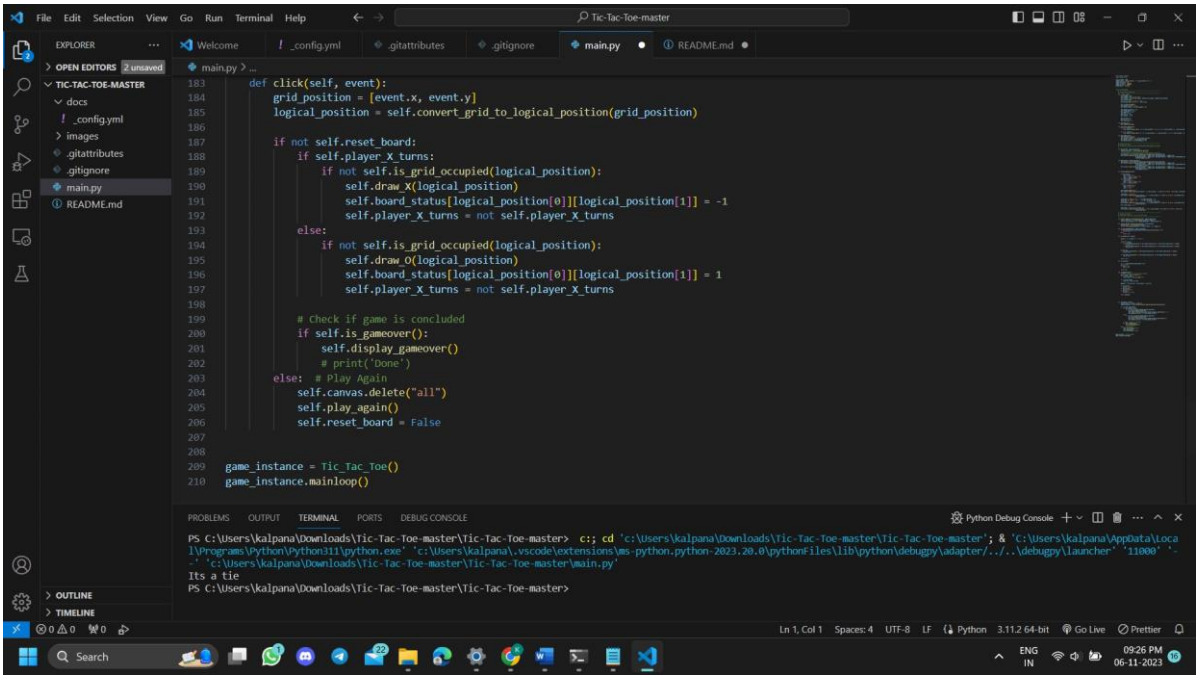
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def click(self, event):
grid_position = [event.x, event.y]
logical_position = self.convert_grid_to_logical_position(grid_position)
if not self.reset_board:
if self.player_X_turns:
if not self.is_grid_occupied(logical_position):
self.draw_X(logical_position)
self.board_status[logical_position[0]][logical_position[1]] = -1
self.player_X_turns = not self.player_X_turns
else:
if not self.is_grid_occupied(logical_position):
self.draw_O(logical_position)
self.board_status[logical_position[0]][logical_position[1]] = 1
self.player_X_turns = not self.player_X_turns
# Check if game is concluded
if self.is_gameover():
self.display_gameover()
# print('Done')
else: # Play Again
self.canvas.delete("all")
self.play_again()
self.reset_board = False
game_instance = Tic_Tac_Toe()
game_instance.mainloop()
PROBLEMS OUTPUT TERMINAL PORTS DEBUG CONSOLE
Python Debug Console
PS C:\Users\kalpana\Downloads\Tic-Tac-Toe-master\Tic-Tac-Toe-master> c:; cd 'c:\Users\kalpana\Downloads\Tic-Tac-Toe-master\Tic-Tac-Toe-master'; & 'C:\Users\kalpana\AppData\Local\Programs\Python\Python311\python.exe' 'c:\Users\kalpana\.vscode\extensions\ms-python.python-2023.20.0\pythonFiles\lib\python\debugpy\adapter/../..\debugpy\launcher' '11000' '-' 'c:\Users\kalpana\Downloads\Tic-Tac-Toe-master\Tic-Tac-Toe-master\main.py'
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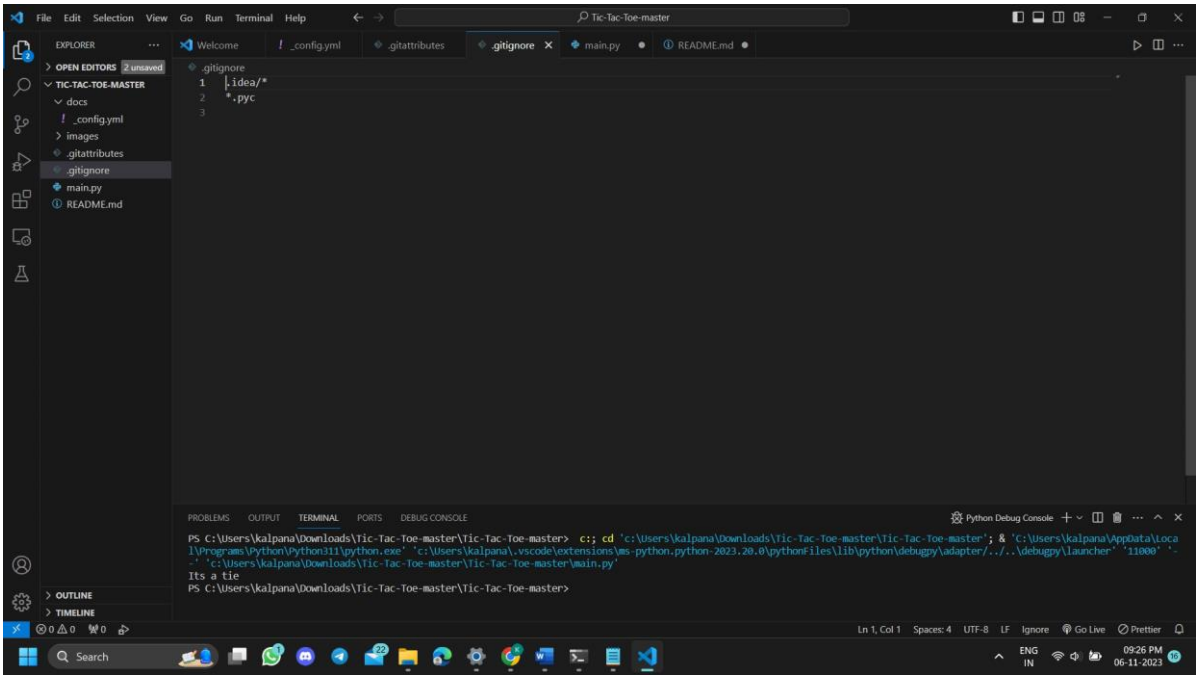
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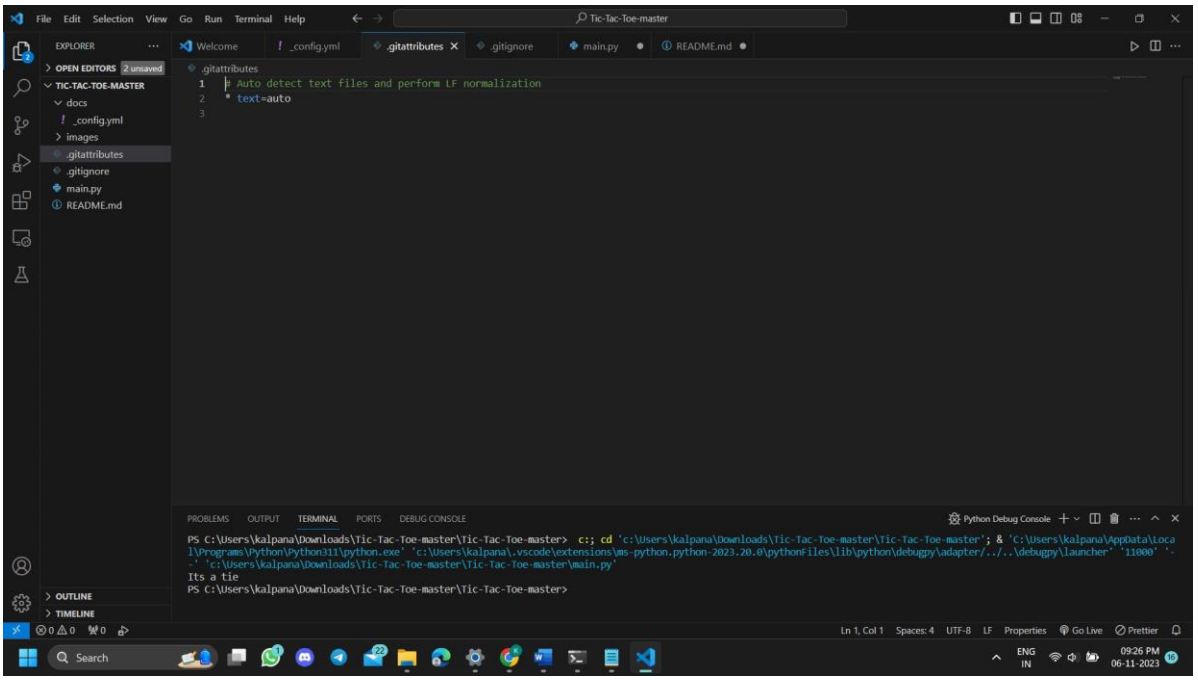
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Auto detect text files and perform LF normalization
* text=auto
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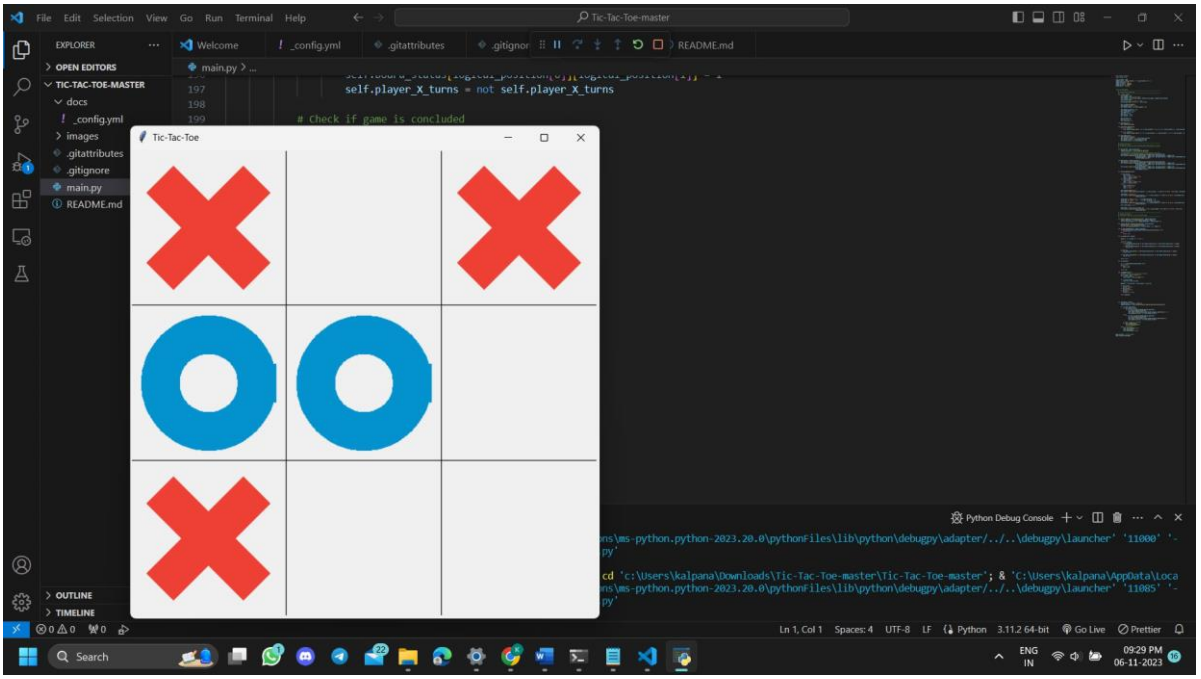
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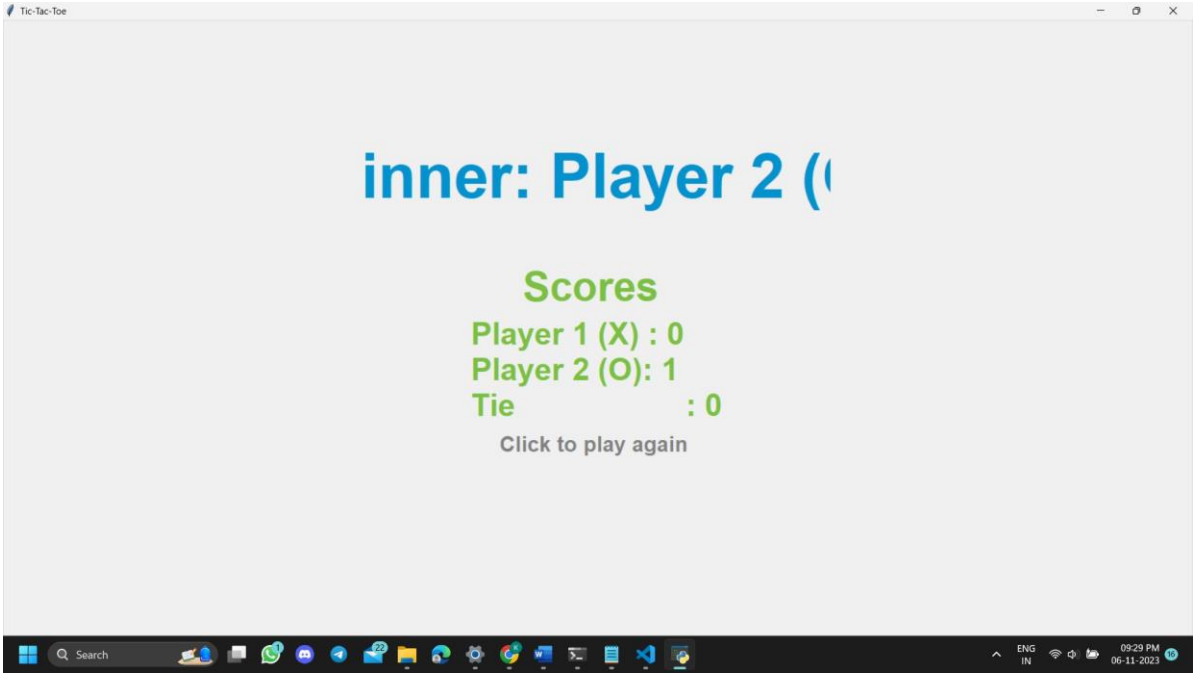
Tic-Tac-Toe
inner: Player 2 (
Scores
Player 1 (X) : 0
Player 2 (O): 1
Tie : 0
Click to play again
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Video Link (Make it Public):

https://drive.google.com/file/d/1QbQSKF-ZlwFM8ZMl6omRFDZ_MKkmGCj0/view?usp=drivesdk

GitHub Link: https://github.com/kattakalpana/tic-tac-toe

Contribution of the author:

We've studied about the related topics and collected the data required and designed the analysis. We've developed the code and executed it in VSCode successfully. We also used geeksforgeeks, javatpoint and shiksha for reference and data collection.