TIC TAC TOE GAME USING TKINTER

A MINI PROJECT REPORT

18CSC207J - ADVANCED PROGRAMMING PRACTICE

Submitted by

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

S.R.M. Nagar, Kattankulathur, Chengalpattu District

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Certified to be the bonafide work done by R.J.Ajith Sowmyan of II Year / IV Sem B.Tech Degree course in **ADVANCED PROGRAMMING PRACTICE 18CSC207J** in **SRM INSTITUTE OF SCIENCE & TECHNOLOGY,** Kattankulathur during the academic year 2022-2023

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ABSTRACT

This project involves the implementation of the classic game of Tic Tac Toe using the Python programming language and the Tkinter GUI library. The game is designed to be played by two players, with each player taking turns to place their symbol (either "X" or "O") on a 3x3 grid. The first player to get three of their symbols in a row, either horizontally, vertically, or diagonally, wins the game.

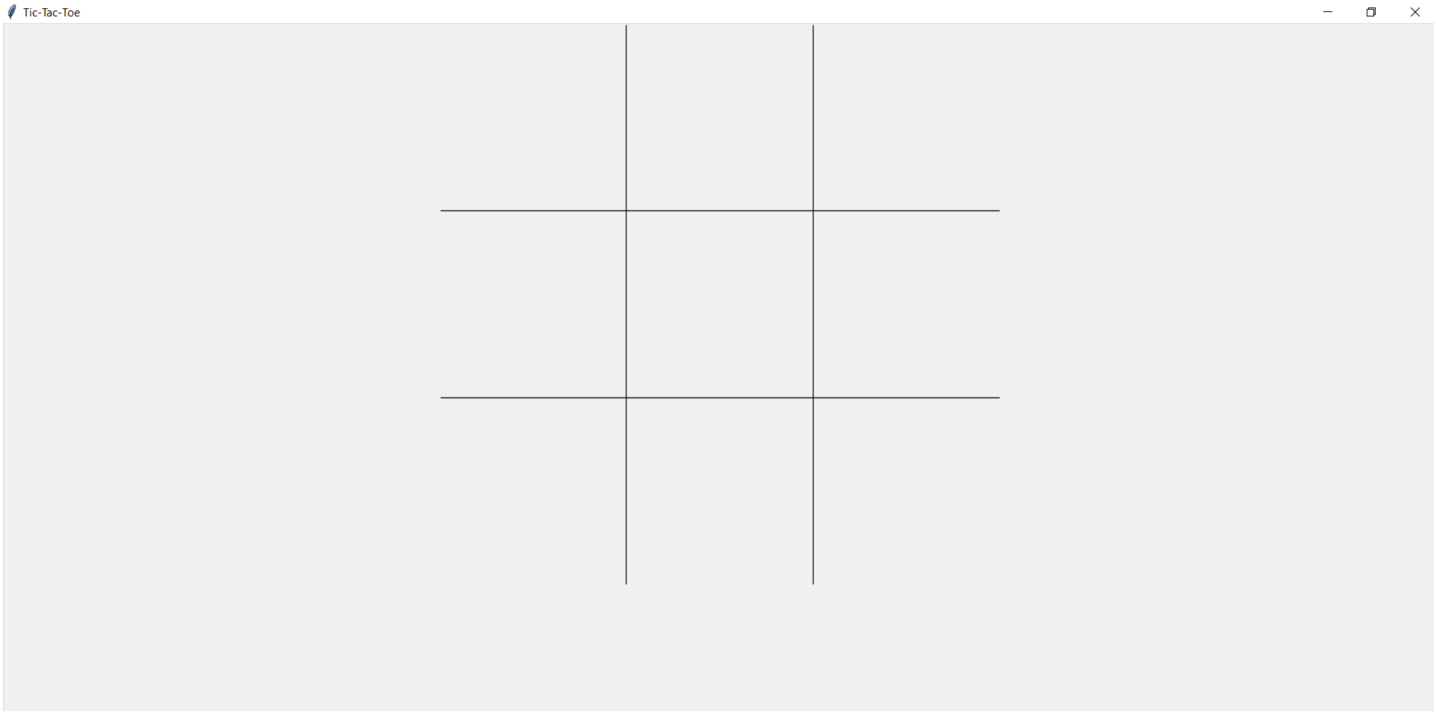
The Tkinter library is used to create the graphical user interface of the game, which includes a main window with a title and a 3x3 grid of buttons. The buttons are used to represent the spaces on the game board, and the player can click on a button to place their symbol in the corresponding space. The game also includes a status bar that displays the current player's turn and the outcome of the game.

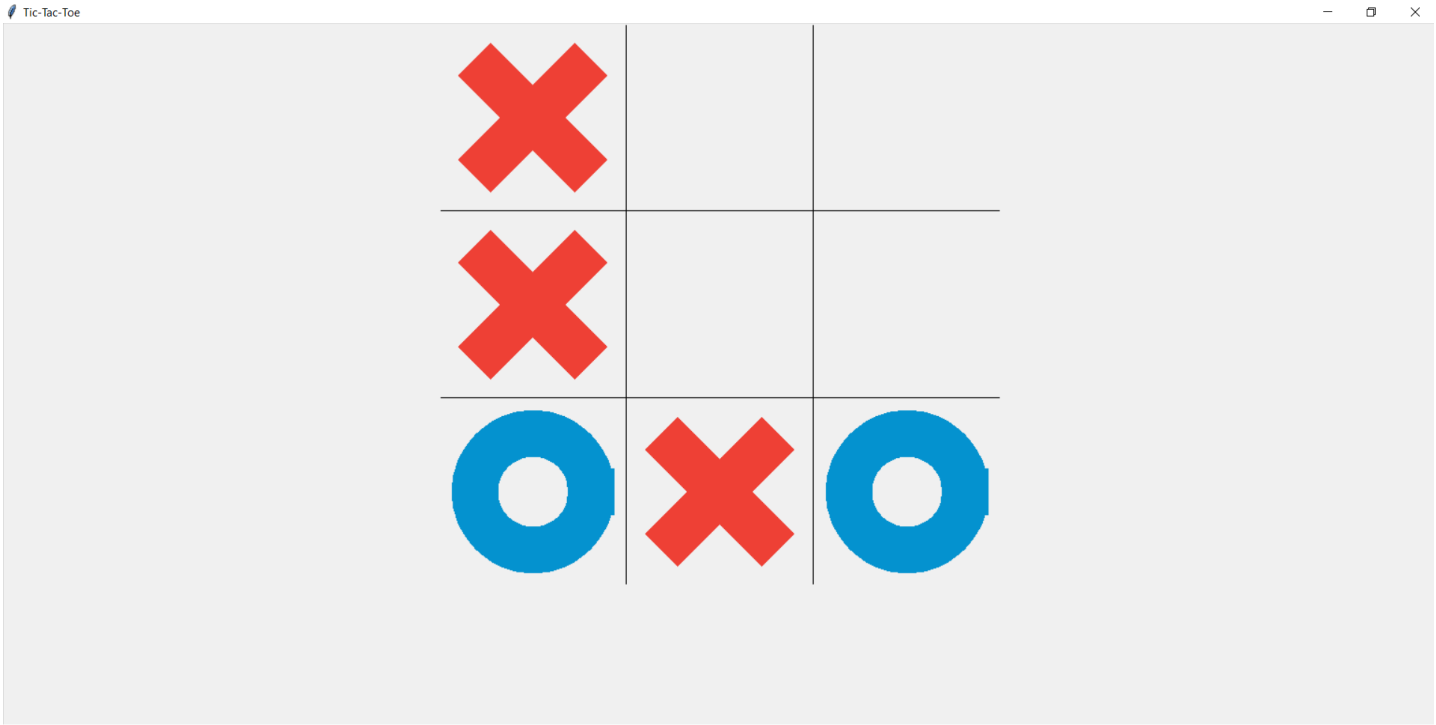
The implementation involves using event-driven programming in Python to handle the user input and update the game board and status bar accordingly. The program also includes logic to check for a winner or a tie, and to display a message box with the result of the game once it has ended. Overall, this project is a fun and interactive way to practice programming concepts in Python and create a simple game using the Tkinter library.

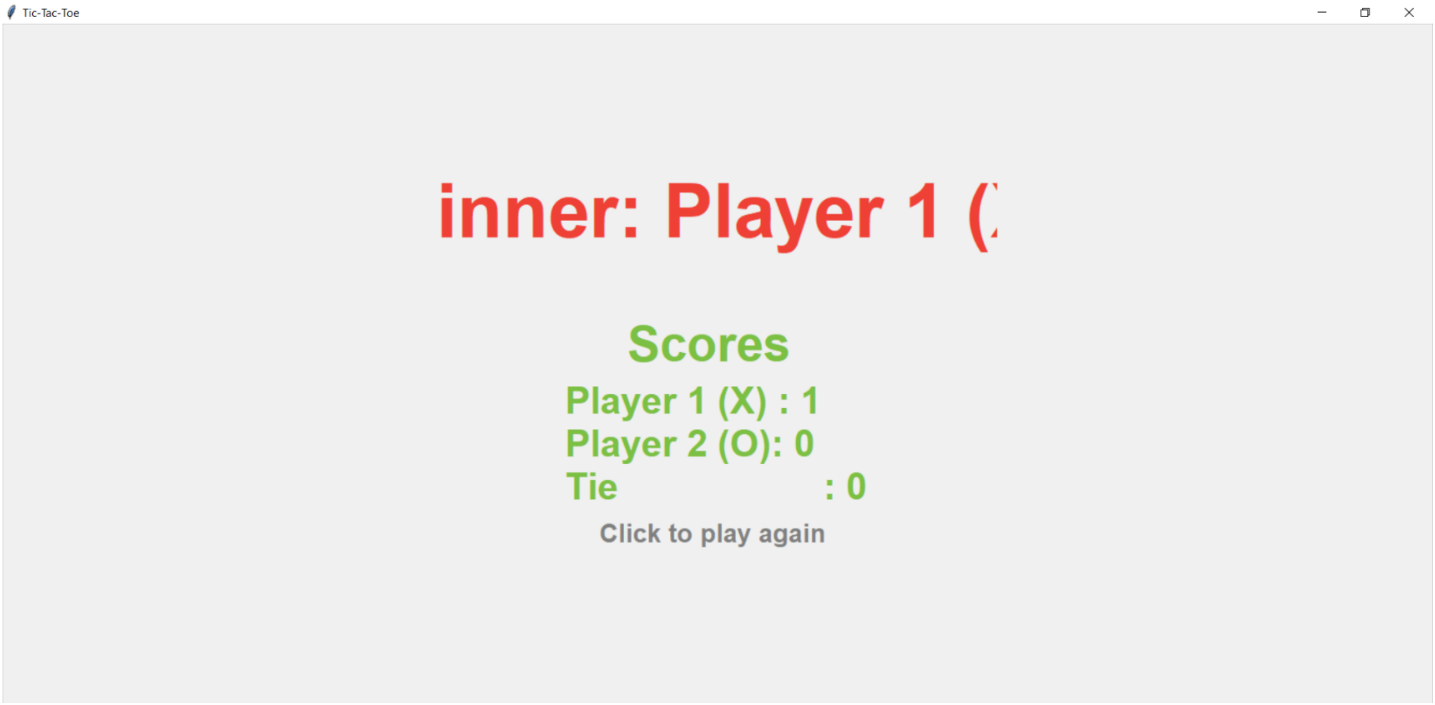
SOURCE CODE

```
from tkinter import *
import numpy as np

size_of_board = 600
symbol_size = (size_of_board / 3 - size_of_board / 8) / 2
symbol_thickness = 50
symbol_X_color = '#EE4035'
symbol_O_color = '#0492CF'
Green_color = '#7BC043'


class Tic_Tac_Toe():
    # ------------------------------------------------------------------
    # Initialization Functions:
    # ------------------------------------------------------------------
    def __init__(self):
        self.window = Tk()
        self.window.title('Tic-Tac-Toe')
        self.canvas = Canvas(self.window, width=size_of_board, height=size_of_board)
        self.canvas.pack()
        # Input from user in form of clicks
        self.window.bind('<Button-1>', self.click)

        self.initialize_board()
        self.player_X_turns = True
        self.board_status = np.zeros(shape=(3, 3))

        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:
    # 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)'
            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


        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

        # 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
        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)

        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()
```

OUTPUT







inner: Player 1 (

Scores

Player 1 (X) : 1
Player 2 (O): 0
Tie : 0

Click to play again

CONCLUSION

In conclusion, the implementation of Tic Tac Toe game using Python and Tkinter library is a great project for beginner-level programmers who want to practice their programming skills and build a simple game. Through this project, one can learn about event-driven programming, graphical user interface design, and game logic.

The game is easy to understand and play, and provides an enjoyable user experience. Additionally, this project can be extended and customized to add new features and functionality, such as different game modes, difficulty levels, and player vs computer options.

Overall, implementing Tic Tac Toe using Python and Tkinter is a great way to develop foundational programming skills, gain experience in GUI design, and have fun while doing so.