UIT2502---Data Analytics and Visualization Lab

Ex 1c: Game Application using NumPy

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TIT-TAC-TOE

Importing NumPy: The first line of the code **import numpy as np** imports the NumPy library and assigns it the alias "np." This alias is commonly used to refer to NumPy functions and classes throughout the code.

Creating the Game Board: The game board is created using the **np.full()** function. This function creates a new NumPy array with a specified shape and fills it with a given value. In this case, a 3x3 game board is created with all cells initially filled with a space character (" ").

CODE:

```
import numpy as np

def print_board(board):
    for row in board:
        print(" | ".join(row))
        print("-" * 9)

def check_win(board, player):
    for row in board:
        if all(cell == player for cell in row):
            return True

    for col in range(3):
        if all(board[row][col] == player for row in range(3)):
            return True

    if 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
```

```
def is_draw(board):
    return " " not in board

def main():
    board = np.full((3, 3), " ")
    players = ["X", "O"]
    current_player = 0

    print("Welcome to Tic-Tac-Toe!")
    print_board(board)

    while True:
        player = players[current_player]
        print("Player {}, it's your turn.".format(player))

        row = int(input("Enter the row (0-2): "))
        col = int(input("Enter the column (0-2): "))

        if 0 <= row < 3 and 0 <= col < 3 and board[row][col] == " ":
            board[row][col] = player
            print_board(board)

            if check_win(board, player):
                print("Player {} wins!".format(player))
                break
            elif is_draw(board):
                print("It's a draw!")
                break

            current_player = 1 - current_player  # Switch players

        else:
            print("Invalid move! Try again.")

if __name__ == "__main__":
    main()
```

OUTPUT:

(i) PLAYER "X" WINS

```
Welcome to Tic-Tac-Toe!
  |   |
---------
  |   |
---------
  |   |
---------
Player X, it's your turn.
Enter the row (0-2): 1
Enter the column (0-2): 1
  |   |
---------
  | X |
---------
  |   |
---------
Player O, it's your turn.
Enter the row (0-2): 0
Enter the column (0-2): 0
O |   |
---------
  | X |
---------
  |   |
---------
```

```
Player X, it's your turn.
Enter the row (0-2): 0
Enter the column (0-2): 2
O |   | X
---------
  | X |
---------
  |   |
---------
Player O, it's your turn.
Enter the row (0-2): 1
Enter the column (0-2): 0
O |   | X
---------
O | X |
---------
  |   |
---------
Player X, it's your turn.
Enter the row (0-2): 2
Enter the column (0-2): 0
O |   | X
---------
O | X |
---------
X |   |
---------
Player X wins!
PS C:\Users\B Vasundhara\Documents\Data Analaytics>
```

(ii) IT'S A DRAW

```
Welcome to Tic-Tac-Toe!
  |   |
---------
  |   |
---------
  |   |
---------
Player X, it's your turn.
Enter the row (0-2): 0
Enter the column (0-2): 0
X |   |
---------
  |   |
---------
  |   |
---------
Player O, it's your turn.
Enter the row (0-2): 1
Enter the column (0-2): 1
X |   |
---------
  | O |
---------
  |   |
---------
Player X, it's your turn.
Enter the row (0-2): 2
Enter the column (0-2): 0
X |   |
---------
  | O |
---------
X |   |
---------
```

```
Player O, it's your turn.
Enter the row (0-2): 1
Enter the column (0-2): 0
X |   |
---------
O | O |
---------
X |   |
---------
Player X, it's your turn.
Enter the row (0-2): 1
Enter the column (0-2): 2
X |   |
---------
O | O | X
---------
X |   |
---------
Player O, it's your turn.
Enter the row (0-2): 0
Enter the column (0-2): 1
X | O |
---------
O | O | X
---------
X |   |
---------
```

```
Player X, it's your turn.
Enter the row (0-2): 2
Enter the column (0-2): 1
X | O |
---------
O | O | X
---------
X | X |
---------
Player O, it's your turn.
Enter the row (0-2): 2
Enter the column (0-2): 2
X | O |
---------
O | O | X
---------
X | X | O
---------
Player X, it's your turn.
Enter the row (0-2): 0
Enter the column (0-2): 2
X | O | X
---------
O | O | X
---------
X | X | O
---------
It's a draw!
PS C:\Users\B Vasundhara\Documents\Data Analaytics>
```