AMERICAN INTERNATIONAL UNIVERSITY-BANGLADESH

Spring 2021-2022

Project Report

Project Name : Tic-Tac-Toe Games

Programming Language : Python

Course: Programming In Python
Section : A
Faculty: Akinul Islam Jony

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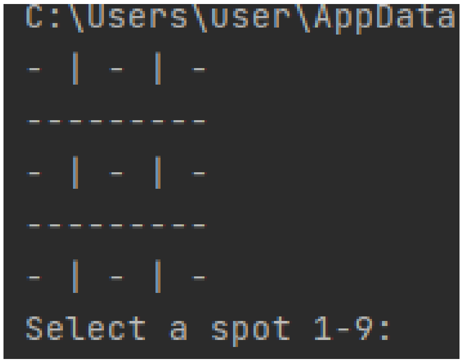
1. Objectives:

Our project name is Tic-Tac-Toe game. This game is very popular and is fairly simple by itself. It is actually a two player game. In this game, there is a board with *n* x *n* squares. In our game, it is 3 x 3 squares.
The goal of Tic-Tac-Toe is to be one of the players to get three same symbols in a row - horizontally, vertically or diagonally - on a 3 x 3 grid.

2. Overview:

This game can be played in a 3x3 grid (shown in the figure 2.1) .The game can be played by two players. There are two options for players:

(a) Human (b) Computer



```
C:\Users\user\AppData
- | - | -
---------
- | - | -
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- | - | -
Select a spot 1-9:
```

Figure: 2.1

2.1 Players:

For the option human, both the players are human and for the option computer, the first player is human and the second player is computer.

2.2 Theory of Game:

A player can choose between two symbols with his opponent, usual games use “X” and “O”. If first player choose “X” then the second player have to play with “O” and vice versa.

A player marks any of the 3x3 squares with his symbol (may be “X” or “O”) and his aim is to create a straight line horizontally or vertically or diagonally with two intensions:

a) Showing a message the game is tie or who is win.

b) Restrict his opponent from creating a straight line first.

In case logically no one can create a straight line with his own symbol, the game results a tie.

Hence there are only three possible results – a player wins, his opponent (human or computer) wins or it’s a tie.

1	**2**	**3**
4	**5**	**6**
7	**8**	**9**

Figure: 2.2

If any player is able to draw three Xs or three Os in the following combinations then that player wins. The combinations are:

a) 1, 2, 3

b) 4, 5, 6

c) 7, 8, 9

d) 1, 4, 7

e) 2, 5, 8

f) 3, 6, 9

h) 1, 5, 9

i) 3, 5, 7

3. Core Logic - AI:

There are two core logics in this game – when both players are human, and when one is computer. Suppose the player use X and the computer use O . The logic used for the AI is as follows:

3.1 First move:

a) If the center is free, get the center. (Figure: 3.1)
b) Otherwise, get any of the corners. (Figure: 3.2)

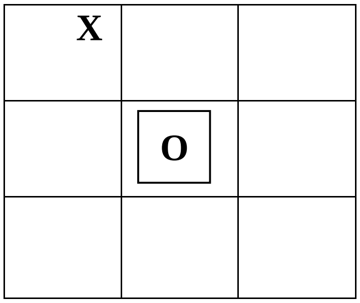

Figure: 3.1

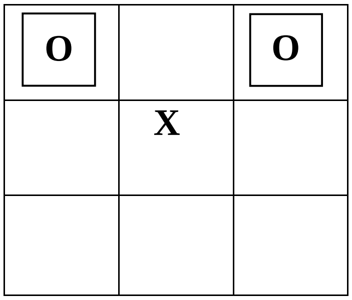

Figure: 3.2

3.2 Second move:

a) Block user from winning. (Figure: 3.3)
b) Option for winning by applying the following logic:
If the center is occupied by user, get any of the corners. (Figure: 3.4)

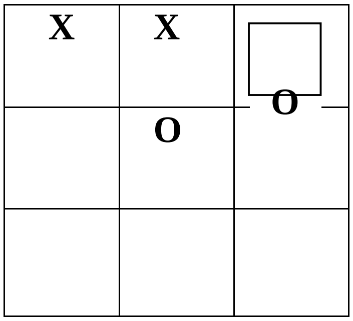

Figure: 3.3

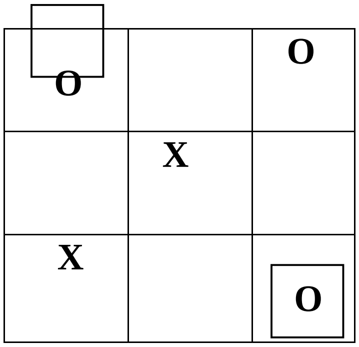

Figure: 3.4

Otherwise, the following cases happen:

Case 1:

X	$\boxed{O}$	
$\boxed{O}$	O	$\boxed{O}$
	$\boxed{O}$	X

Figure: 3.5

If any situation arises like the figure 3.5 then the computer sets its symbol any one of the position among 2, 4, 6 and 8.

Case 2:

	X	
4	O	6
	X	

Figure: 3.6

X		
4	O	6
	X	

Figure: 3.7

	X	
4	O	6
		X

Figure: 3.8

If any situation arises like the figure 3.6 or figure 3.7 or figure 3.8 then the computer sets its symbol at any position among 4 and 6.

Case 3:

	2	
	O	X
X	8	

Figure: 3.9

	2	
X	O	X
	8	

Figure: 3.10

	2	
X	O	
	8	X

Figure: 3.11

If any situation arises like the figure 3.9 or figure 3.10 or figure 3.11 then the computer sets its symbol at any position among 2 and 8.

Case 4:

1	X	3
	O	X
7		9

Figure: 3.12

1	X	3
X	O	
7		9

Figure: 3.13

1		3
X	O	
7	X	9

Figure: 3.14

1		3
	O	X
7	X	9

Figure: 3.15

If any situation arises like the figure 3.12 or figure 3.13 or figure 3.14 or 3.15 then the computer sets its symbol at any position among 1, 3, 7 and 9.

3.3 Third and fourth move:

a) Option for winning. (Figure: 3.16)

b) Block user from winning. (Figure: 3.17)

c) Randomly play a move. (Figure: 3.18)

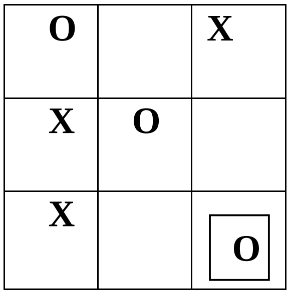

Figure: 3.16

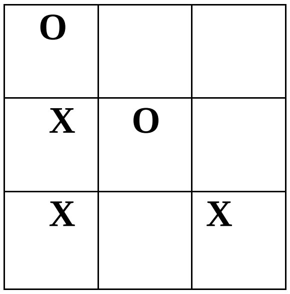

Figure: 3.17

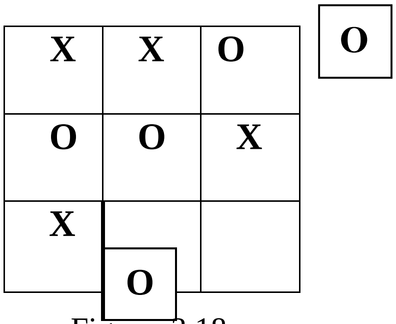

Figure: 3.18

4. Core Logic - Humans:

For each move, check whether any 3 combination is occupied by any player and display the winner accordingly.

5. Methods:

The methods we used in our program are as follows:

def playerInput(board):
For input of the player

def checkrow (board):
To check the combination whether any two symbols(X or O) are same for winning or blocking .

def checkIfWin(board):
To check who is win human or computer.

def checkIfTie(board):
To check the game is tie or not.

def switchPlayer():
To Switching player between human and computer .

6. Limitations:

GUI is not so attractive.

7. Future plan:

1. We want to design more complex boards for the game in future.
2. We will Implement Choosing option for new game after the game end.
3. We will add main menu option in future.