Python Project -1

Tic-Tac-Toe

PROGRAM:

1) Test Program: Simple Two player Tic-Tac -Toe:

```
def ShowBoard(board):
    print("Board : \n\n")
    for i in range(0, 9):
        if ((i > 0) and (i % 3) == 0):
            print("\n")
        if (board[i] == 0):
            print("- ", end=" ")
        if (board[i] == 1):
            print("O ", end=" ")
        if (board[i] == -1):
            print("X ", end=" ")
    print("\n\n")

def Player1(board):
    pos = int(input("Enter X's position from [1...9]: "))
    if (board[pos - 1] != 0):
        print("Wrong Move!!!")
        exit(0)
    board[pos - 1] = -1
def Player2(board):
    pos = int(input("Enter O's position from [1...9]: "))
    if (board[pos - 1] != 0):
        print("Wrong Move!!!")
        exit(0)
    board[pos - 1] = 1

def monitor(board):
    bp = [[0, 1, 2], [3, 4, 5], [6, 7, 8], [0, 3, 6], [1, 4, 7], [2, 5, 8],
[0, 4, 8], [2, 4, 6]]
```

```
    for i in range(0, 8):
        if (board[bp[i][0]] != 0 and board[bp[i][0]] == board[bp[i][1]] and
board[bp[i][0]] == board[bp[i][2]]):
            return board[bp[i][2]]
    return 0
def tic_tac():
    board = [0, 0, 0, 0, 0, 0, 0, 0, 0]
    for i in range(0, 9):
        if (monitor(board) != 0):
            break
        if ((i) % 2 == 0):
            ShowBoard(board)
            Player1(board)
        else:
            ShowBoard(board)
            Player2(board)
    x = monitor(board)
    if (x == 0):
        ShowBoard(board)
        print("It is a Draw!!!")
    if (x == -1):
        ShowBoard(board)
        print("X Wins!!! 0 Loose !!!")
    if (x == 1):
        ShowBoard(board)
        print("X Loose!!! O Wins !!!!")
tic_tac()
```

2) Final Program: Tic Tac Toe Game

For single player tic tac toe game, we need to let the computer be one player and its moves are calculated using minimax algorithm, which is a backtracking algorithm that is used in decision making.

```
 1 def ShowBoard(board):
 2     print("Board : \n\n")
 3     for i in range(0, 9):
 4         if ((i > 0) and (i % 3) == 0):
 5             print("\n")
 6         if (board[i] == 0):
 7             print("- ", end=" ")
 8         if (board[i] == 1):
 9             print("O ", end=" ")
10         if (board[i] == -1):
11             print("X ", end=" ")
12     print("\n\n")
13 def minimax(board, player):
14     x = monitor(board)
15     if (x != 0):
16         return (x * player)
17     pos = -1
18     value = -2
19     for i in range(0, 9):
20         if (board[i] == 0):
21             board[i] = player
22             score = -minimax(board, (player * -1))
23             if (score > value):
24                 value = score
25                 pos = i
26             board[i] = 0
27
28     if (pos == -1):
29         return 0
30     return value
31
32 def Player1(board):
33     pos = int(input("Enter X's position from [1...9
   ]: "))
34     if (board[pos - 1] != 0):
35         print("Wrong Move!!!")
36         exit(0)
37     board[pos - 1] = -1
38 def Player2(board):
39     pos = int(input("Enter O's position from [1...9
   ]: "))
```

```
40      if (board[pos - 1] != 0):
41          print("Wrong Move!!!")
42          exit(0)
43      board[pos - 1] = 1
44  def CompTurn(board):
45      pos = -1
46      value = -2
47      for i in range(0, 9):
48          if (board[i] == 0):
49              board[i] = 1
50              score = -minimax(board, -1)
51              board[i] = 0
52              if (score > value):
53                  value = score
54                  pos = i
55
56      board[pos] = 1
57  def monitor(board):
58      cb = [[0, 1, 2], [3, 4, 5], [6, 7, 8], [0, 3, 6
    ], [1, 4, 7], [2, 5, 8], [0, 4, 8], [2, 4, 6]]
59
60      for i in range(0, 8):
61          if (board[cb[i][0]] != 0 and board[cb[i][0
    ]] == board[cb[i][1]] and board[cb[i][0]] == board[cb
    [i][2]]):
62              return board[cb[i][2]]
63      return 0
64  def tic_tac():
65      choice = int(input("Enter 1 for single player, 2
    for multiplayer: "))
66      board = [0, 0, 0, 0, 0, 0, 0, 0, 0]
67      if (choice == 1):
68          print("Computer : O V/s You : X")
69          player = int(input("Enter to play 1(st) or 2(
    nd) :"))
70          for i in range(0, 9):
71              if (monitor(board) != 0):
72                  break
73              if ((i + player) % 2 == 0):
74                  CompTurn(board)
75              else:
```

```
 76                 ShowBoard(board)
 77                 Player1(board)
 78     else:
 79         for i in range(0, 9):
 80             if (monitor(board) != 0):
 81                 break
 82             if ((i) % 2 == 0):
 83                 ShowBoard(board)
 84                 Player1(board)
 85             else:
 86                 ShowBoard(board)
 87                 Player2(board)
 88
 89     x = monitor(board)
 90     if (x == 0):
 91         ShowBoard(board)
 92         print("It is a Draw!!!")
 93     if (x == -1):
 94         ShowBoard(board)
 95         print("X Wins!!! 0 Loose !!!")
 96     if (x == 1):
 97         ShowBoard(board)
 98         print("X Loose!!! O Wins !!!!")
 99
100
101
102 tic_tac()
103
```

OUTPUTS

```
 1 "C:\Users\GANGA V SAJI\PycharmProjects\
   Assignment_projects\.venv\Scripts\python.exe" "C:\
   Users\GANGA V SAJI\PycharmProjects\
   Assignment_projects\test.py"
 2 Board :
 3
 4
 5 -  -  -
 6
 7 -  -  -
 8
 9 -  -  -
10
11
12 Enter X's position from [1...9]: 5
13 Board :
14
15
16 -  -  -
17
18 -  X  -
19
20 -  -  -
21
22
23 Enter O's position from [1...9]: 1
24 Board :
25
26
27 O  -  -
28
29 -  X  -
30
31 -  -  -
32
33
34 Enter X's position from [1...9]: 3
35 Board :
36
37
38 O  -  X
```

```
39
40 -  X  -
41
42 -  -  -
43
44
45 Enter O's position from [1...9]: 8
46 Board :
47
48
49 O  -  X
50
51 -  X  -
52
53 -  O  -
54
55
56 Enter X's position from [1...9]: 7
57 Board :
58
59
60 O  -  X
61
62 -  X  -
63
64 X  O  -
65
66
67 X Wins!!! 0 Loose !!!
68
69 Process finished with exit code 0
70
```

```
"C:\Users\GANGA V SAJI\PycharmProjects\Assignment_projects\.venv\Scripts\python.exe" "C:\Users\GANGA V SAJI\PycharmProjects\Assignment_projects\Tic_tac_toe.py"
Enter 1 for single player, 2 for multiplayer: 1
Computer : O V/s You : X
Enter to play 1(st) or 2(nd) :1
Current State Of Board :


-  -  -

-  -  -

-  -  -


Enter X's position from [1...9]: 5
Current State Of Board :


O  -  -

-  X  -

-  -  -


Enter X's position from [1...9]: 3
Current State Of Board :


O  -  X

-  X  -

O  -  -


Enter X's position from [1...9]: 6
Current State Of Board :
```

```
39
40
41 O  -  X
42
43 O  X  X
44
45 O  -  -
46
47
48 X Loose!!! O Wins !!!!
49
50 Process finished with exit code 0
51
```

```
 1 "C:\Users\GANGA V SAJI\PycharmProjects\
   Assignment_projects\.venv\Scripts\python.exe" "C:\
   Users\GANGA V SAJI\PycharmProjects\
   Assignment_projects\Tic_tac_toe.py"
 2 Enter 1 for single player, 2 for multiplayer: 2
 3 Board :
 4
 5
 6 -  -  -
 7
 8 -  -  -
 9
10 -  -  -
11
12
13 Enter X's position from [1...9]: 3
14 Board :
15
16
17 -  -  X
18
19 -  -  -
20
21 -  -  -
22
23
24 Enter O's position from [1...9]: 2
25 Board :
26
27
28 -  O  X
29
30 -  -  -
31
32 -  -  -
33
34
35 Enter X's position from [1...9]: 5
36 Board :
37
38
```

```
-  O  X

-  X  -

-  -  -


Enter O's position from [1...9]: 7
Board :


-  O  X

-  X  -

O  -  -


Enter X's position from [1...9]: 1
Board :


X  O  X

-  X  -

O  -  -


Enter O's position from [1...9]: 9
Board :


X  O  X

-  X  -

O  -  O


Enter X's position from [1...9]: 8
```

```
Board :


X  O  X

-  X  -

O  X  O


Enter O's position from [1...9]: 4
Board :


X  O  X

O  X  -

O  X  O


Enter X's position from [1...9]: 6
Board :


X  O  X

O  X  X

O  X  O


It is a Draw!!!

Process finished with exit code 0

```