**Name: Usman Ul Haq**

**Roll# BSAIM-035**

**AI LAB TASKs**

**LAB TASK 8:**

**Write code for Min Max Algorithm**

def is\_winner(board, player):

winning\_combinations = [

[0, 1, 2], [3, 4, 5], [6, 7, 8], # Rows

[0, 3, 6], [1, 4, 7], [2, 5, 8], # Columns

[0, 4, 8], [2, 4, 6] # Diagonals

]

return any(all(board[i] == player for i in combo) for combo in winning\_combinations)

def is\_draw(board):

return all(cell != ' ' for cell in board)

def minimax(board, depth, is\_maximizing):

if is\_winner(board, 'X'):

return -1

if is\_winner(board, 'O'):

return 1

if is\_draw(board):

return 0

if is\_maximizing:

best\_score = -float('inf')

for i in range(9):

if board[i] == ' ':

board[i] = 'O'

score = minimax(board, depth + 1, False)

board[i] = ' '

best\_score = max(best\_score, score)

return best\_score

else:

best\_score = float('inf')

for i in range(9):

if board[i] == ' ':

board[i] = 'X'

score = minimax(board, depth + 1, True)

board[i] = ' '

best\_score = min(best\_score, score)

return best\_score

def best\_move(board):

best\_score = -float('inf')

move = -1

for i in range(9):

if board[i] == ' ':

board[i] = 'O'

score = minimax(board, 0, False)

board[i] = ' '

if score > best\_score:

best\_score = score

move = i

return move

def print\_board(board):

for i in range(0, 9, 3):

print(board[i], '|', board[i+1], '|', board[i+2])

print('\n')

board = [' '] \* 9

while True:

print\_board(board)

if is\_winner(board, 'X'):

print("Player X wins!")

break

if is\_winner(board, 'O'):

print("AI (O) wins!")

break

if is\_draw(board):

print("It's a draw!")

break

player\_move = int(input("Enter your move (0-8): "))

if board[player\_move] == ' ':

board[player\_move] = 'X'

else:

print("Invalid move, try again.")

continue

if not is\_draw(board) and not is\_winner(board, 'X'):

ai\_move = best\_move(board)

if ai\_move != -1:

board[ai\_move] = 'O'

**Output**

**| |**

**| |**

**| |**

**Enter your move (0-8): 5**

**| | O**

**| | X**

**| |**

**Enter your move (0-8): 4**

**| | O**

**O | X | X**

**| |**

**Enter your move (0-8): 8**

**O | | O**

**O | X | X**

**| | X**

**Enter your move (0-8): 2**

**Invalid move, try again.**

**O | | O**

**O | X | X**

**| | X**

**Enter your move (0-8): 2**

**Invalid move, try again.**

**O | | O**

**O | X | X**

**| | X**

**Enter your move (0-8): 2**

**Invalid move, try again.**

**O | | O**

**O | X | X**

**| | X**

**Enter your move (0-8): 2**

**Invalid move, try again.**

**O | | O**

**O | X | X**

**| | X**

**Enter your move (0-8): 2**

**Invalid move, try again.**

**O | | O**

**O | X | X**

**| | X**

**Enter your move (0-8): 1**

**O | X | O**

**O | X | X**

**O | | X**

**AI (O) wins!**