**DAY 3**

DAY 3 (TIK – TAC -TOE PROBLEM ) :

# Tic-Tac-Toe Program using

# random number in Python

# importing all necessary libraries

import numpy as np

import random

from time import sleep

# Creates an empty board

def create\_board():

return(np.array([[0, 0, 0],

[0, 0, 0],

[0, 0, 0]]))

# Check for empty places on board

def possibilities(board):

l = []

for i in range(len(board)):

for j in range(len(board)):

if board[i][j] == 0:

l.append((i, j))

return(l)

# Select a random place for the player

def random\_place(board, player):

selection = possibilities(board)

current\_loc = random.choice(selection)

board[current\_loc] = player

return(board)

# Checks whether the player has three

# of their marks in a horizontal row

def row\_win(board, player):

for x in range(len(board)):

win = True

for y in range(len(board)):

if board[x, y] != player:

win = False

continue

if win == True:

return(win)

return(win)

# Checks whether the player has three

# of their marks in a vertical row

def col\_win(board, player):

for x in range(len(board)):

win = True

for y in range(len(board)):

if board[y][x] != player:

win = False

continue

if win == True:

return(win)

return(win)

# Checks whether the player has three

# of their marks in a diagonal row

def diag\_win(board, player):

win = True

y = 0

for x in range(len(board)):

if board[x, x] != player:

win = False

if win:

return win

win = True

if win:

for x in range(len(board)):

y = len(board) - 1 - x

if board[x, y] != player:

win = False

return win

# Evaluates whether there is

# a winner or a tie

def evaluate(board):

winner = 0

for player in [1, 2]:

if (row\_win(board, player) or

col\_win(board,player) or

diag\_win(board,player)):

winner = player

if np.all(board != 0) and winner == 0:

winner = -1

return winner

# Main function to start the game

def play\_game():

board, winner, counter = create\_board(), 0, 1

print(board)

sleep(2)

while winner == 0:

for player in [1, 2]:

board = random\_place(board, player)

print("Board after " + str(counter) + " move")

print(board)

sleep(2)

counter += 1

winner = evaluate(board)

if winner != 0:

break

return(winner)

# Driver Code

print("Winner is: " + str(play\_game()))

**DAY 3 ( MIN – MAX PROBLEM ) :**

# A simple Python3 program to find

# maximum score that

# maximizing player can get

import math

def minimax (curDepth, nodeIndex,

maxTurn, scores,

targetDepth):

# base case : targetDepth reached

if (curDepth == targetDepth):

return scores[nodeIndex]

if (maxTurn):

return max(minimax(curDepth + 1, nodeIndex \* 2,

False, scores, targetDepth),

minimax(curDepth + 1, nodeIndex \* 2 + 1,

False, scores, targetDepth))

else:

return min(minimax(curDepth + 1, nodeIndex \* 2,

True, scores, targetDepth),

minimax(curDepth + 1, nodeIndex \* 2 + 1,

True, scores, targetDepth))

# Driver code

scores = [3, 5, 2, 9, 12, 5, 23, 23]

treeDepth = math.log(len(scores), 2)

print("The optimal value is : ", end = "")

print(minimax(0, 0, True, scores, treeDepth))

# This code is contributed

# by rootshadow

DAY 3 ( DECESION TREE PROBLEM ) :

# Run this program on your local python

# interpreter, provided you have installed

# the required libraries.

# Importing the required packages

import numpy as np

import pandas as pd

from sklearn.metrics import confusion\_matrix

from sklearn.model\_selection import train\_test\_split

from sklearn.tree import DecisionTreeClassifier

from sklearn.metrics import accuracy\_score

from sklearn.metrics import classification\_report

# Function importing Dataset

def importdata():

balance\_data = pd.read\_csv(

'https://archive.ics.uci.edu/ml/machine-learning-'+

'databases/balance-scale/balance-scale.data',

sep= ',', header = None)

# Printing the dataswet shape

print ("Dataset Length: ", len(balance\_data))

print ("Dataset Shape: ", balance\_data.shape)

# Printing the dataset obseravtions

print ("Dataset: ",balance\_data.head())

return balance\_data

# Function to split the dataset

def splitdataset(balance\_data):

# Separating the target variable

X = balance\_data.values[:, 1:5]

Y = balance\_data.values[:, 0]

# Splitting the dataset into train and test

X\_train, X\_test, y\_train, y\_test = train\_test\_split(

X, Y, test\_size = 0.3, random\_state = 100)

return X, Y, X\_train, X\_test, y\_train, y\_test

# Function to perform training with giniIndex.

def train\_using\_gini(X\_train, X\_test, y\_train):

# Creating the classifier object

clf\_gini = DecisionTreeClassifier(criterion = "gini",

random\_state = 100,max\_depth=3, min\_samples\_leaf=5)

# Performing training

clf\_gini.fit(X\_train, y\_train)

return clf\_gini

# Function to perform training with entropy.

def tarin\_using\_entropy(X\_train, X\_test, y\_train):

# Decision tree with entropy

clf\_entropy = DecisionTreeClassifier(

criterion = "entropy", random\_state = 100,

max\_depth = 3, min\_samples\_leaf = 5)

# Performing training

clf\_entropy.fit(X\_train, y\_train)

return clf\_entropy

# Function to make predictions

def prediction(X\_test, clf\_object):

# Predicton on test with giniIndex

y\_pred = clf\_object.predict(X\_test)

print("Predicted values:")

print(y\_pred)

return y\_pred

# Function to calculate accuracy

def cal\_accuracy(y\_test, y\_pred):

print("Confusion Matrix: ",

confusion\_matrix(y\_test, y\_pred))

print ("Accuracy : ",

accuracy\_score(y\_test,y\_pred)\*100)

print("Report : ",

classification\_report(y\_test, y\_pred))

# Driver code

def main():

# Building Phase

data = importdata()

X, Y, X\_train, X\_test, y\_train, y\_test = splitdataset(data)

clf\_gini = train\_using\_gini(X\_train, X\_test, y\_train)

clf\_entropy = tarin\_using\_entropy(X\_train, X\_test, y\_train)

# Operational Phase

print("Results Using Gini Index:")

# Prediction using gini

y\_pred\_gini = prediction(X\_test, clf\_gini)

cal\_accuracy(y\_test, y\_pred\_gini)

print("Results Using Entropy:")

# Prediction using entropy

y\_pred\_entropy = prediction(X\_test, clf\_entropy)

cal\_accuracy(y\_test, y\_pred\_entropy)

# Calling main function

if \_name=="main\_":

main()

DAY 3 ( ALPHA – BETA PROBLEM ) :

def max\_alpha\_beta(self, alpha, beta):

maxv = -2

px = None

py = None

result = self.is\_end()

if result == 'X':

return (-1, 0, 0)

elif result == 'O':

return (1, 0, 0)

elif result == '.':

return (0, 0, 0)

for i in range(0, 3):

for j in range(0, 3):

if self.current\_state[i][j] == '.':

self.current\_state[i][j] = 'O'

(m, min\_i, in\_j) = self.min\_alpha\_beta(alpha, beta)

if m > maxv:

maxv = m

px = i

py = j

self.current\_state[i][j] = '.'

# Next two ifs in Max and Min are the only difference between regular algorithm and minimax

if maxv >= beta:

return (maxv, px, py)

if maxv > alpha:

alpha = maxv

return (maxv, px, py)

}