**Artificial Intelligence**

**Assignment Number 1**

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**TY-CS-D**

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**Problem Statement**  - TIC-TAC-TOE USING AI TECHNIQUES

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**Source Code**

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**#include <stdio.h>**

**#include <limits.h>**

**char board[9] = {'1', '2', '3', '4', '5', '6', '7', '8' ,'9'};**

**char ai = 'O';**

**char human = 'X';**

**void displayBoard() {**

**printf("\n---------------------TIC-TAC-TOE---------------------------\n");**

**printf("\n---------------------AI VS YOU--------------------------\n\n");**

**printf(" | | \n");**

**printf(" %c | %c | %c \n", board[0], board[1], board[2]);**

**printf("\_\_\_\_\_|\_\_\_\_\_|\_\_\_\_\_\n");**

**printf(" | | \n");**

**printf(" %c | %c | %c \n", board[3], board[4], board[5]);**

**printf("\_\_\_\_\_|\_\_\_\_\_|\_\_\_\_\_\n");**

**printf(" | | \n");**

**printf(" %c | %c | %c \n", board[6], board[7], board[8]);**

**printf(" | | \n\n");**

**}**

**char checkWinner() {**

**for (int i = 0; i < 9; i += 3) {**

**if (board[i] == board[i + 1] && board[i + 1] == board[i + 2] ) {**

**return board[i];**

**}**

**}**

**for (int i = 0; i < 3; i++) {**

**if (board[i] == board[i + 3] && board[i + 3] == board[i + 6] ) {**

**return board[i];**

**}**

**}**

**if (board[0] == board[4] && board[4] == board[8] ) {**

**return board[0];**

**}**

**if (board[2] == board[4] && board[4] == board[6] ) {**

**return board[2];**

**}**

**int draw = 1;**

**for (int i = 0; i < 9; i++) {**

**if (board[i] != 'X' && board[i] != 'O') {**

**draw = 0;**

**break;**

**}**

**}**

**if (draw) {**

**return 't';**

**}**

**return 'Y';**

**}**

**int minimax(char player) {**

**char result = checkWinner();**

**if (result == ai) {**

**return 1;**

**} else if (result == human) {**

**return -1;**

**} else if (result == 't') {**

**return 0;**

**}**

**int bestScore;**

**if (player == ai) {**

**bestScore = INT\_MIN;**

**for (int i = 0; i < 9; i++) {**

**if (board[i] != 'X' && board[i] != 'O') {**

**char ch = board[i];**

**board[i] = ai;**

**int score = minimax(human);**

**board[i] = ch;**

**bestScore = (score > bestScore) ? score : bestScore;**

**}**

**}**

**} else {**

**bestScore = INT\_MAX;**

**for (int i = 0; i < 9; i++) {**

**if (board[i] != 'X' && board[i] != 'O') {**

**char ch = board[i];**

**board[i] = human;**

**int score = minimax(ai);**

**board[i] = ch;**

**bestScore = (score < bestScore) ? score : bestScore;**

**}**

**}**

**}**

**return bestScore;**

**}**

**void aiMove() {**

**int bestScore = INT\_MIN;**

**int bestMove = -1;**

**for (int i = 0; i < 9; i++) {**

**if (board[i] != 'X' && board[i] != 'O') {**

**char ch = board[i];**

**board[i] = ai;**

**int score = minimax(human);**

**board[i] = ch;**

**if (score > bestScore) {**

**bestScore = score;**

**bestMove = i;**

**}**

**}**

**}**

**board[bestMove] = ai;**

**}**

**void humanMove() {**

**int move;**

**do {**

**printf("Enter your move (1-9): ");**

**scanf("%d", &move);**

**move--;**

**if(board[move] == 'X' || board[move] == 'O'){**

**printf("Enter valid number\n\n");**

**}**

**} while (move < 0 || move >= 9 || board[move] == 'X' || board[move] == 'O');**

**board[move] = human;**

**}**

**int main() {**

**int turn = 0;**

**while (1) {**

**displayBoard();**

**if (checkWinner() != 'Y') {**

**if(checkWinner()=='X'){**

**printf("--------------------YOU WON------------------\n");**

**}**

**else if (checkWinner()=='O'){**

**printf("-------------------AI WON------------------\n");**

**}**

**else if (checkWinner()=='t'){**

**printf("-------------------MATCH DRAW----------------------\n");**

**}**

**break;**

**}**

**else{**

**if (turn == 0) {**

**aiMove();**

**turn = 1;**

**} else {**

**humanMove();**

**turn = 0;**

**}**

**}**

**}**

**return 0;**

**}**

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**OUTPUT**

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