Class: B.E (Computer), Sem – VI Subject Name: Artificial Intelligence

Student Name: DIVYA JUNGHARE   **Roll No: 9613**

Practical No:	**1**
Title:	Tic Tac Toe game implementation by a) Brute Force Method b) Heuristic Approach
Date of Performance:	**29/01/2024**
Date of Submission:	**04/02/2024**

Rubrics for Evaluation:

Sr. No	Performance Indicator	Excellent	Good	Below Average	Marks
1	On time Completion & Submission (01)	01 (On Time)	NA	00 (Not on Time)	
2	Logic/Algorithm Complexity analysis (03)	03(Correct)	02(Partial)	01 (Tried)	
3	Coding Standards (03): Comments/indention/Naming conventions Test Cases /Output	03(All used)	02 (Partial)	01 (rarely followed)	
4	Post Lab Assignment (03)	03(done well)	2 (Partially Correct)	1(submitted)	
Total					

Signature of the Teacher:

Experiment No: 1

Title: Tic Tac Toe game implementation by
        a) Brute Force Method
        b) Heuristic Approach

Objective: To write a computer program in such a way that computer wins most of the time

Post Lab Assignment:

1. What is the easiest trick to win Tic Tac Toe?

The easiest trick to win Tic Tac Toe involves starting in the center square if you have the first move. If your opponent responds by placing their marker in a corner, you can guarantee a win by placing your next marker in a corner that is adjacent to both your initial marker and the one your opponent just placed. This creates two potential winning lines, and your opponent cannot block both of them. If your opponent responds differently, you can still follow basic strategies to secure a win, such as creating threats that force your opponent to respond defensively while you continue to build your own winning lines.

2. What is the algorithm to follow to win a 5*5 Tic TacToe?

Winning a 5x5 Tic Tac Toe game requires a more sophisticated approach compared to the standard 3x3 version due to the increased complexity. Here's a basic strategy you can follow to increase your chances of winning:

1. Start in the center: As with the 3x3 version, starting in the center gives you the most control over the board. This is particularly important in a larger grid like 5x5.

2. Focus on creating threats: Look for opportunities to create multiple threats simultaneously. This means placing your markers in positions that can lead to winning lines in multiple directions.

3. Block your opponent's threats: While creating your own threats, pay attention to your opponent's moves and block their potential winning lines whenever possible. This might involve placing your markers strategically to disrupt their progress.

4. Control the center: As the game progresses, try to maintain control over the central squares as they offer the most opportunities for creating winning lines in multiple directions.

5. Plan ahead: Anticipate your opponent's moves and plan your own moves accordingly. Try to position your markers in a way that sets up future winning combinations while simultaneously blocking your opponent's options.

6. Adapt your strategy: Be flexible and adjust your strategy based on the specific situation on the board. Look for patterns and opportunities to exploit your opponent's weaknesses while minimizing your own vulnerabilities.

3. Is there a way to never lose at Tic-Tac-Toe?

Yes, there is a strategy that allows you to play Tic-Tac-Toe in a way that guarantees you will never lose, assuming you play perfectly. This strategy involves following a predetermined sequence of moves that ensures you either win or force a draw, depending on your opponent's moves.

The strategy goes as follows:

1. If you have the first move, always start by placing your marker in the center square.

2. If your opponent responds by placing their marker in a corner, you can guarantee a win by placing your next marker in a corner that is adjacent to both your initial marker and the one your opponent just placed. This creates two potential winning lines, and your opponent cannot block both of them.

3. If your opponent responds differently, you can still follow basic strategies to secure a win, such as creating threats that force your opponent to respond defensively while you continue to build your own winning lines

4. What can tic-tac-toe help you with?
Tic-Tac-Toe, while a simple game, can still provide several benefits and help with various skills:
1. Critical thinking: Tic-Tac-Toe requires players to think ahead and anticipate their opponent's moves. It encourages logical thinking and strategizing to outmaneuver the opponent.

2. Pattern recognition: Players must recognize patterns on the game board to spot potential winning combinations or block their opponent's attempts. This skill can be useful in various problem-solving scenarios.

3. Decision-making: Players must make decisions quickly and efficiently, weighing the pros and cons of different moves. This can help improve decision-making skills in other areas of life where quick thinking is required.

4. Spatial reasoning: Tic-Tac-Toe involves spatial reasoning as players must visualize the game board and how their moves will affect the overall layout. This skill is valuable in fields such as mathematics, engineering, and design.

5. Strategy development: The game encourages the development of strategic thinking as players learn to formulate and execute plans to achieve their goals while thwarting their opponent's plans.

6. Sportsmanship: Playing Tic-Tac-Toe teaches sportsmanship, as players learn to win graciously and accept defeat gracefully. It promotes fair play, respect for opponents, and the ability to learn from mistakes

Class: B.E (Computer), Sem – VI Subject Name: Artificial Intelligence

Student Name:DIVYA JUNGHARE   **Roll No:9613**

Practical No:	2
Title:	Tic Tac Toe game implementation by Magic Square Method
Date of Performance:	29/01/2024
Date of Submission:	04/02/2024

Rubrics for Evaluation:

Sr. No	Performance Indicator	Excellent	Good	Below Average	Marks
1	On time Completion & Submission (01)	01 (On Time)	NA	00 (Not on Time)	
2	Logic/Algorithm Complexity analysis (03)	03(Correct)	02(Partial)	01 (Tried)	
3	Coding Standards (03): Comments/indention/Naming conventions Test Cases /Output	03(All used)	02 (Partial)	01 (rarely followed)	
4	Post Lab Assignment (03)	03(done well)	2 (Partially Correct)	1(submitted)	
Total					

Signature of the Teacher:

Post Lab Assignment:

1. What is the relationship between tic-tac-toe and magic square?

Tic-Tac-Toe and magic squares are both mathematical concepts involving grids or matrices, but they are fundamentally different in nature.

1. Tic-Tac-Toe: Tic-Tac-Toe is a simple two-player game played on a 3x3 grid, where players take turns placing their markers (traditionally X and O) in empty squares with the goal of getting three of their markers in a row, either horizontally, vertically, or diagonally.

2. Magic Square: A magic square is a square grid filled with distinct numbers such that the sum of the numbers in each row, column, and diagonal is the same. There are various types of magic squares, including odd-order magic squares (3x3, 5x5, etc.) and even-order magic squares (4x4, 6x6, etc.).

The relationship between Tic-Tac-Toe and magic squares lies in their grid structures and the possibility of using elements from one concept to inform the other in certain contexts:

- Some variations of Tic-Tac-Toe might involve playing on larger grids, including 4x4 or 5x5 grids. In these cases, players might aim to get four or five markers in a row to win. These larger grids can be conceptualized similarly to magic squares, especially if they are odd-order grids, as they have similarities in terms of structure and patterns.

  - Conversely, concepts from magic squares, such as the patterns used to construct them or the properties they exhibit, could potentially inform strategies or patterns in certain variations of Tic-Tac-Toe played on larger grids.

2. What is a magic square of order n?

A magic square of order n is a square grid containing n^2 distinct numbers, arranged in such a way that the sum of the numbers in each row, column, and main diagonal is the same. In other words, the sum of the numbers in any row, column, or diagonal of the square is equal to the magic constant M.

The magic constant, M, for a magic square of order n is calculated as follows:

$$M = \frac{n \times (n^2 + 1)}{2}$$

For example, in a magic square of order 3 (3x3), the magic constant M would be:

$$M = \frac{3 \times (3^2 + 1)}{2} = \frac{3 \times 10}{2} = 15$$

So, in a magic square of order 3, the sum of the numbers in any row, column, or diagonal would be 15.

Magic squares of order n have been studied extensively in mathematics and have various properties and interesting characteristics. They are often used in recreational

mathematics, puzzles, and as a basis for exploring mathematical concepts such as number theory and combinatorics.