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ARTIFICIAL INTELLIGENCE APPROACH FOR TIC TAC TOE

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Abstract - Artificial Intelligence (AI) is a multidisciplinary field whose purpose is to automate activities that currently require human intelligence. Recent achievements in A.I. include computerized medical diagnostics and systems that automatically adapt equipment to the specific needs of users. The main problem areas reported in A.I. can be summarized as perception, manipulation, reasoning, communication and learning. Perception aims to construct models of the physical world from sensory inputs (visual, audio, etc.). Manipulation involves the articulation of limbs (eg, mechanical arms, locomotives) to effect a desired state in the physical world. The argument deals with higher level cognitive functions such as planning, derived from global model conclusions, diagnosis, design, etc. The communication deals with the understanding of the problem and communicates the information through the use of language. Finally, learning addresses the problem of automatically improving system performance over time based on the experience of the system.
During this report we have implemented Tic-Tac-Toe game which is 2 player paper-pencil strategy game. We have used different approaches to get better result and compared them

Key Words: Artificial Intelligence, Machine Learning, TicTac Toe, journals

```
x moves
[[' ' ' ' ' ']
 [' ' ' ' ' ']
 [' ' 'x' ' ']]
o moves
[[' ' ' ' 'o']
 [' ' ' ' ' ']
 [' ' 'x' ' ']]
x moves
[['x' ' ' 'o']
 [' ' ' ' ' ']
 [' ' 'x' ' ']]
o moves
[['x' ' ' 'o']
 [' ' 'o' ' ']
 [' ' 'x' ' ']]
x moves
[['x' ' ' 'o']
 [' ' 'o' ' ']
 [' ' 'x' 'x']]
o moves
[['x' ' ' 'o']
 [' ' 'o' 'o']
 [' ' 'x' 'x']]
x moves
[['x' ' ' 'o']
 [' ' 'o' 'o']
 ['x' 'x' 'x']]
player x wins after 7 moves
[Finished in 6.0s]
```

Figure 1 : Sample result of Program

1.INTRODUCTION

Artificial Intelligence (AI) is a field of research based on the premise that intelligent thinking can be considered as a form of computation, a form that can be formalized and ultimately mechanized. To achieve this, however, two main problems have to be solved. The first problem is the presentation of knowledge, and the second is the manipulation of knowledge. At the intersection of these two questions lies the mechanized intelligence. AI combines precision and processing power with pure logic to solve problems and reduce operational errors. Expert robot systems already support many jobs in industries that are dangerous to human capabilities or beyond. I stress that the potential applications of artificial intelligence are abundant. They range from the military for autonomous control and target identification to the entertainment industry for computer games and robot animals.

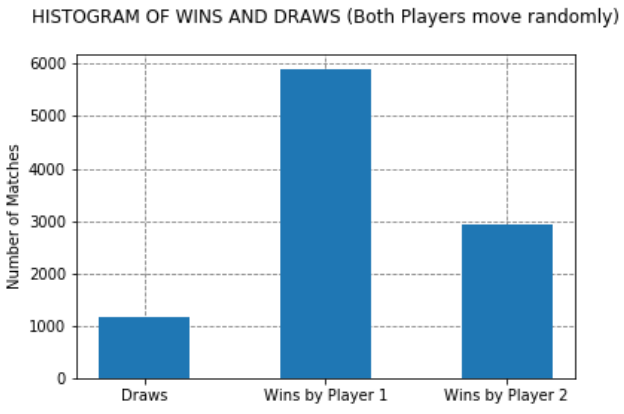

Figure 2 : Histogram displaying the frequency count of wins by player 1, wins by player 2 and draws

2.Methods

2.1 Randomly-

Tic Tac Toe game when player moves randomly

2.2 Probalistic Method

The fundamental thought of probabilistic programming is to utilize computer projects to speak to probabilistic models. One approach to do this is to have the computer program create an information generator from the probabilistic model, This test system calls to an irregular number generator with the goal that

rehashed simulation cycles test distinctive conceivable accounts of the model.

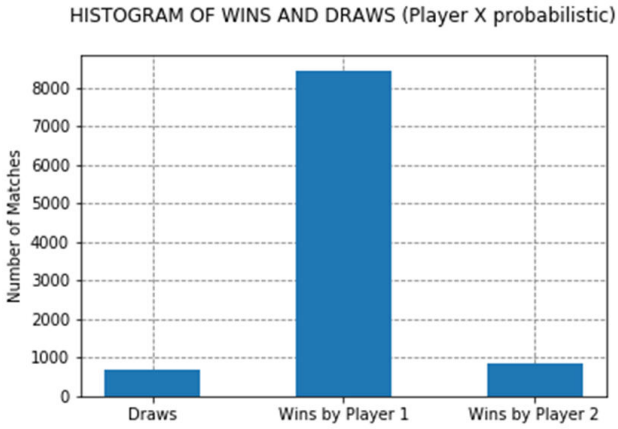

Figure 3 : Histogram displaying the frequency count of wins by player 1, wins by player 2 and draws

2.2 Heuristic Method

Each search procedure might be considered as a kept running of a situated diagram in which the hubs speak to dangerous states and the circular segments speak to relations between states. The search procedure must discover a path through this graph, beginning with an initial state and ending in at least one or more final states. The accompanying focuses ought to be considered before a search.

Histogram plotted for 10000 matches.

The following heuristic rules was used:
a)3 cells in a line empty : +1
b)One of player's symbol in a line : +10
c)One of opponent's symbol in a line: -10
d)Both player's and opponent's symbol in a line: 0
e)Two of player's symbols in a line: +150
f)Two of opponent's symbols in a line: +100

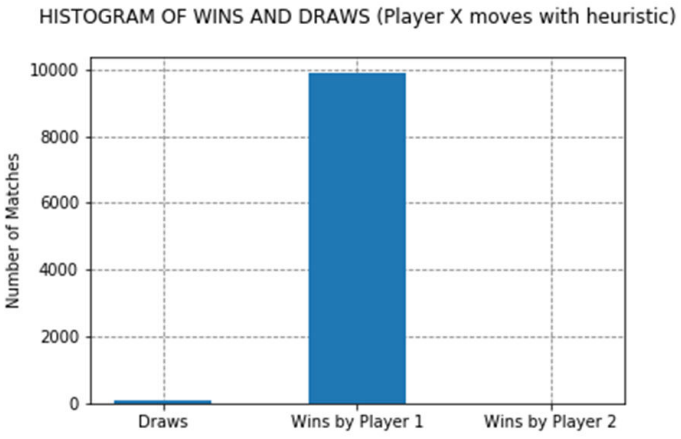

Figure 4 : Histogram displaying the frequency count of wins by player 1, wins by player 2 and draws

3. CONCLUSIONS

We have run the game for 10000 tie where both players choose any cell in grid through a random function (cell which are empty). The results are that player 1 has won 5900 matches, player 2 has won 3400, and draws 1200. But with probabilistic approach player 1 wins 8400 games losing only 900 whereas 700 are draws and the result are outstanding where player 1 wins 9900 matches while other 100 are draw.

ACKNOWLEDGEMENT

I, PRIYANSH PANDEY hereby declare the project titled "Artificial Intelligence approach for Tic Tac Toe" which is submitted by me. The author attests that permission of has been obtained for the use of copyrighted material appearing in the report, other than brief excerpts requiring only proper acknowledgement in scholarly writing, and all that such use is acknowledged.

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