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Chess Playing AI: A Survey

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Abstract: ***In today's present era, the capabilities of the human brain to find solutions to a wide range of problems is a wonderful gift that inspires scientists to embark on the artificial intelligence revolution as well as apply it to a wide range of applications. The suggested system is an intelligent chessboard that functions in a similar way to the human brain, predicting the next locations for any chess piece based on the current game circumstances and previous learning or experience. It has Artificial Intelligence as well as a player. The idea is for Artificial Intelligence to play and think in the same way as humans do.***

Originally, computers were created to outperform people in pre-calculated tactics that could be tedious and monotonous. However, Artificial Intelligence can give decision-making capacity to make diverse moves and learn new ones. It employs artificial intelligence approaches such as the Minimax Algorithm and the Monte Carlo Algorithm to obtain the best reward and advantage over the opponent in the present circumstance.

Keywords: ***Chess, Artificial Intelligence, Predictions, Minimax Algorithm, Monte Carlo Algorithm.***

I. INTRODUCTION

Chess is a psychological strategy game being played on a chequered board with an 8x8 grid. The game is typically played between two players, with each starting with 16 pieces of colour schemes (one - king, queen, two - rocks, knights, bishops, and eight pawns). The ultimate aim is to checkmate the rival's king by bringing it in a situation where it cannot outbreak being captured. This has piqued the curiosity of computer scientists for as long as the topic of computer science has existed. As a result, substantial research into computer chess has been performed, with the goal of creating strategies that allow computers to not only play a legal game, but to excel at it, persistently defeating even the most powerful human chess grandmasters.

A chess engine is a computer programme that determines how to play the game. To determine the next move, it does several computations depending on the present location.

Chess has become has been among the most popular tittle games for promoting artificial intelligence and information science because of the sort of convincing victory a machine has over a human grand master. Chess engines, on the other hand, are still unable to plan strategic moves or explain why they calculate a particular set of moves. The decision tree-based architectures take too much time to explore through the accurate and complete option set for the appropriate decision, resulting in a limitation in the machine's power. The use of neural networks to solve board games has been discovered to be uncommon. The end-game stages of the game are given a lot of attention, but there aren't many uses of machine learning modals in computational chess as a world in general.

Chess is a game that you may play on your phone or tablet. It simulates a real-life situation. Each player has a time limit of 10 minutes. If one of the players or the AI manages to stretch the time limit, the other player will eventually win. The computing capacity and decision-making capabilities of a system have evolved throughout time as technology has progressed. AI is used against the player in the proposed system. This can assist both the player and the AI progress by learning new movements and assessing different defensive, aggressive, and neutral methods based on the situation's demands.

II. OBJECTIVES

Playing with a comparable computer system with pre-programmed difficulties (easy, medium, and hard) is frequent and, at times, tedious. As a result, the AI comes into the equation in this case. Regardless, it contains two separate AIs with various playing styles to make the game more fascinating since it mimics, thinks, and concludes in the same way that humans do. It can also adapt new moves, which allows individuals to discover new approaches.

III. RELATED WORK

C. Zheng (2016) [2] this paper investigates the Einstein chess game paradigm. The game is won by the one who advances the chess to towards another opponent's upper corner first. The major aspects in determining the scenario are the position of chess pieces, stochastic movement, and defending against an opponent. The implications of a random number key computation on the likelihood of a pawn move. The optimization method for the chess strategy is based on location and probability.

I. M. Ismail (2018) [3] demonstrates if heuristic characteristic residencies have a distinct impact on standard and legitimate heuristic search approaches. By contrasting traditional and legitimate probabilistic reasoning explore procedures, the amount to which heuristic characteristics have an influence on seek technique homes may be determined. Issue problems are measurable, foreseeable challenges with a series of activities as a solution. Only the impact of heuristic characteristics here on the real-time searching region is being investigated.

D. A. Chentsotv [4] The authors assessed the success of the suggested approach in three games, including Aliens, Frogs, and Zelda, and compared it to other algorithms and techniques based entirely on the assertive GVG-AI engine. Instead of being the most effective, an intelligent agent may solve a variety of problems. Such smart vendors focus on educating in Generic Game Playing in the game industry. The Monte Carlo tree search algorithm (MCTS) is one of the most environmentally friendly algorithms, although it can be inefficient if used in a hurry without considering the task's peculiarities. The study introduces MCTS, which allows you to eliminate the option of choosing a solution.

H. Kaindl [5] discusses many strategies for determining exact minimax values of recreation timber (using backward pruning) are investigated. The recognition is on wood, with an ordering similar to those seen in a recreational gaming establishment. The authors look at how one-of-a-kind distributions of static values, uniform distributions, and a distribution anticipated from

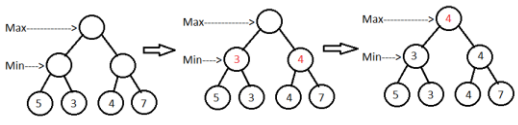
genuine data are used in the methods. For all of the same old minimax algorithms, a systematic evaluation of the use of aspiration home windows is offered.

Nicolas Lassabe [9] stated in their paper that the initial strategy was to evaluate and store the first-class pass to start a game for each chessboard configuration. This idealistic and unsophisticated method necessitated a lot of comparisons and judgments.

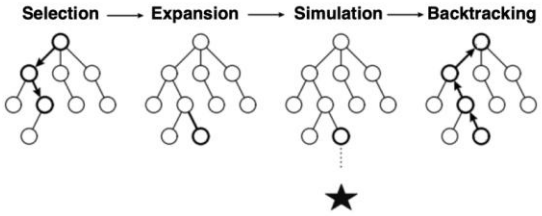
Nathaporn Karnjanapoomi [10] present the potential of abandoning the traditional notion of contrast between the two chess games and enabling three players to engage in the same game in this study. In this game, the player who captures the King of another payer is proclaimed the winner. As a result, this game not only provides an opponent advantage but also allows two players to work together to defeat the third. It is done through the use of the no influenced Adversarial Search method, which then requires the player to take precedence the number of excellent moves above the quality of movements.

IV. METHODOLOGY

1) Minimax Algorithm: It is indeed a decision-making algorithm, and its objective is to discover the best next step. In this case, one player known also as maximizer, while another is known as a minimizer. The maximizer tries to get the best possible result, whereas the minimizer tries to get the least potential score by counter moving. It is based around the idea of a zero-sum game. The entire utility score is split among the participants in this game. A rise over one player's score leads in a drop in the score of another player.



2) Monte Carlo Tree Search: is a technique that determines the optimal move from a collection of moves by selecting, expanding, simulating, and upgrading the nodes within the tree to arrive at the final answer. This process is repeated until the solution is found and the game's policy is learned.



V. CONCLUSION

Even a rudimentary chess-playing algorithm has the advantage of not making pointless blunders. Nonetheless, it lacks strategic knowledge. This AI would be a straight forward classic chess engines having two distinct AI playing styles, each supported by a different algorithm and method. It is capable of playing with any human. This AI is capable of significantly improve assessments, resulting in quicker move generation.

When humans use this AI, the AI seeks to optimize its score by making quicker moves at lower ranks of the game tree. This can assist both the player and the AI progress by learning new movements and studying alternative defensive, aggressive, or neutral methods according on the situation's demands.

VI. REFERENCE

[1] Hal-Tao Liu and Bao-En Guo, "A new pruning algorithm for game tree in Chinese Chess Computer Game".

[2] C. Zheng, M. Xian, T. Yuan, B. Lei and D. Meiqi, "The game model and the probability algorithm of Einstein chess".

[3] I. M. Ismail and N. N. Agwu, "Influence of Heuristic Functions on Real-Time Heuristic Search Methods".

[4] D. A. Chentsov and S. A. Belyaev, "Monte Carlo Tree Search Modification for Computer Games".

[5] H. Kaindl, R. Shams and H. Horacek, "Minimax search algorithms with and without aspiration windows".

[6] R. Ferraz, "Accessibility and search engine optimization on scalable vector graphics".

[7] C. Matuszek, B. Mayton, R. Aimi, M. P. Deisenroth, L. Bo, R. Chu, M. Kung, L. LeGrand, J. R. Smith and D. Fox, "Gambit: An Autonomous Chess-Playing Robotic System".

[8] N. Upasani, A. Gaikwad, A. Patel, N. Modani, P. Bijamwar and S. Patil, "Dev-Zero: A Chess Engine,".

[9] Nicolas Lassabe, Stephane Sanchez HerveLuga and Yves Duthen, "Genetically Programmed Strategies for Chess Endgames".

[10] Nathaporn Karnjanapoomi, Pongpol Pramanpol, Voratep Lertratsamewong, Torsakuln Chacavarnkitkuln, Vazuthorn Rattanajongjittakorn and Chaicharn Thavaravej, "A Non dominated Adversarial Search Algorithm for a Three-player Chess Game".