

Chinese Chess AI Player – Initial Plan

Author: Mingrui Fang

Supervisor: Yunkun Lai

CM3203 One Semester Individual Project

40 credits

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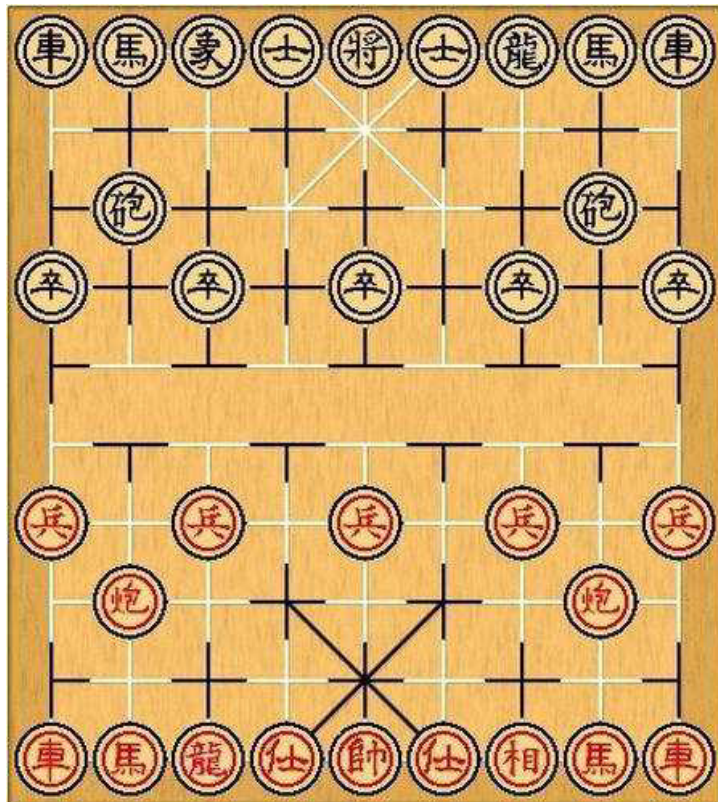
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Project Description

Chinese chess is one of the most historical and popular board games in China for nearly 2000 years. It is a two-player adversarial game. Chinese chess uses a square lattice board with totally 32 chessmen and 16 pieces in each of red and black, which are placed and moved at the intersection. Each player seems to command an army; each has a king with two rooks, two horses, two elephants, two guns and five soldiers. The two players move their chess alternately, and the one who captures the opponent king first wins the game.



Nowadays, with the development of science and technology, Machine game plays an important role in the field of artificial intelligence [1]. The artificial intelligence of chess has become more and more wide spread concerns. Different from other Chess, Chinese chess has more complex rules and larger branching factor, making it more challenging to simulate the game.

Therefore, in this project, I will investigate different AI techniques for building an automatic game player for Chinese chess. The project will involve implementation of a user interface for presenting the game and the AI algorithm such as **Minimax Search** and so on for playing the game with user. And then, I will exploit different machine learning techniques with the results evaluated and discussed.

Project Aims and Objectives

The aim of the project is to investigate different AI techniques for building an automatic game player for Chinese chess. Different machine learning techniques will be exploited with the results evaluated and discussed.

Therefore, I can divide this aim into three stages.

1. Creating a basic and functional implementation of Chinese chess game.

This stage is to create a basic and functional implementation of Chinese chess and create a suitable user interface for the game. This initial implementation of Chinese chess can be played by human-to-human.

2. The initial and simple implementation of the Chinese chess AI techniques.

This stage is to create a Chinese chess AI player for the game. This initial implementation of Chinese chess can be played by human-to-human and human-to-AI. In order to quickly implement the Chinese chess which can be played by human-to-AI, the initial implementation will be based on Minimax Search because this algorithm is the most frequently used and simple method to implement chess AI.

3. The implementation of more different Chinese chess AI techniques.

This stage is to investigate and implement more different AI techniques on Chinese chess. It refers to various of advanced algorithms such as Negamax Search algorithm, Alpha-Beta Search algorithm, Aspiration search algorithm, Principal Variation algorithm, Monte Carlo Tree Search algorithm and so on. After implementing different AI techniques on Chinese chess, the AI-to-AI of Chinese chess will be feasible.

4. The results evaluated and discussed of different Chinese chess AI techniques.

This stage is to do the experiment of Chinese chess and analyse the results of different AI techniques using different algorithms. The experiment will also be done by the Chinese chess played by AI-to-AI, which is an intuitive method to compare the performance of two AI players. Then, some knowledge will be exploited with the results evaluated and discussed so as to decide which AI techniques will be the best approach to the Chinese chess. I will try my best to investigate as many algorithms as possible so as to collect more data.

Work Plan

My project will be divided into weekly segments within the 12 weeks of the semester, to give distinct milestones, while still allowing for some flexibility on timing on a day-to-day basis. I have scheduled meetings with my supervisor every Friday Morning to discuss the previous week's progress and any problems, as well as the coming weeks tasks.

Week 1 (31/01/2022):

- ✧ Research on existing AI algorithm of Chinese chess
- ✧ Write the initial plan

Week 2 (07/02/2022)

- ✧ Research the game logic
- ✧ Choose a suitable software and plugins to create the Chinese game
- ✧ Start to design the user interface

Week 3 (14/02/2022)

- ✧ Go on designing the user interface
- ✧ Finishing researching the game logic
- ✧ Add the game logic into user interface

Week 4 (21/02/2022)

- ✧ Finish the user interface
- ✧ Test the interface of initial implementation of Chinese chess.

Week 5 (28/02/2022)

- ✧ Research the Minimax search algorithm
- ✧ Learn how to use Minimax search algorithm to create a AI player in the user interface.

Week 6 (07/03/2022):

- ✧ Create the Minimax AI player.
- ✧ Test the interface of initial implementation of Chinese chess Minimax AI player.

Week 7 (14/03/2022)

- ✧ Research more AI techniques of Chinese chess.

Week 8 (21/03/2022)

- ✧ Select one or two AI techniques different from Minimax AI player to be implemented.
- ✧ Do the experiment of Minimax AI player.

Week 9 (28/03/2022)

- ✧ Create the new AI players using the selected AI techniques in week 8.
- ✧ Go on doing the experiment of Minimax AI player.

East Break – 3 weeks(29/03/2022 - 17/04/2022)

- ✧ Finish creating the new AI players using the selected AI techniques in week 8.
- ✧ Test the interface of new implementation of Chinese chess AI player which is selected in week 8.
- ✧ Do the experiment of Minimax AI player of new AI players which is selected in week 8.
- ✧ Do the experiment by the Chinese chess played by AI-to-AI.
- ✧ The results evaluated and discussed.

Week 10 (18/04/2022)

- ✧ Start writing final report.

Week 11 (25/04/2022)

- ✧ Go on writing final report.

Week 12 (02/05/2022)

- ✧ Finish the final report.

References

[1] Sutton R S. Learning to Predict by the Methods of Temporal Differences [J]. Machine Learning, 1988, 3(1):9-44.