

4. Conclusion

This study constructs the deep CNN models to predict sudden-death positions of Connect6 game and explores the differences of related deep CNN models from experiments. The construction of this model is of great significance to the design of the Connect6 game, because if the prediction accuracy of the model is high, the number of candidate moves during the search can be greatly reduced, which will help improve the search efficiency. We summarize the contributions and the conclusions of the study as follows.

- An experimental study of different CNN-based architectures of deep CNN models for Connect6.
- In Connect6 game, this study proposes using deep convolutional neural network to predict the sudden-death positions, and it improve the search performance of Kavalan, which is an AI program we design to play Connect6 game.
- The experimental results show that the depth of stacking multiple convolutional layers has a greater impact on the prediction of sudden-death positions than the number of filters.

With the rise of artificial intelligence (AI), people need the ability to think and judge logically. Puzzle games can be used as a tool for training logic, which has a positive effect on the sustainable development of society. Connect6 is a very interesting puzzle game; therefore, the deep CNN model developed in this study is of great significance in the research of Connect6 game.

5. future work

This study builds the sudden-death positions model of Connect6, and uses a large amount of data in the knowledge base for deep learning, in order to find the best model to predict the sudden-death positions of Connect6. There are still some unfinished parts of this study; therefore, the future works of this study are as follows:

1. This study only trains the deep CNN model for the positions of move order 2 to 5. In the future, it can be expanded to all sudden-death positions in the knowledge base, so that the trained model will be more in line with the purpose of this study. Furthermore, predictions for sudden-death positions will also be more accurate.
2. The kernel size selected in this study is only 3x3. In the future, experiments can be carried out on kernels of different sizes to understand the accuracy of different sizes of kernels and the difference in learning efficiency. This has important implications for building deep CNN model to predict sudden-death positions.

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