

Title	オンライン将棋における対戦相手が不快になりにくいアシストシステムの構築
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Abstract

AI technology has progressed in a wide range of fields such as natural language processing and image generation. Board games are one of such fields, and game AI has become strong enough to beat top human players, such as AlphaGo for the game of Go and Ponanza for Shogi. These examples show that game AI is reaching a sufficient level of strength.

On the other hand, game AI is attracting attention not only for the purpose of creating strong players, but also for the purpose of “entertaining humans” and “assisting humans’ gameplay.” In Go, for example, research is being conducted to develop methods that display future game states for each candidate move and methods that adjust strength to make game AI become proper opponents. As a slightly extreme example, in Shogi, an online platform Shogi Wars has implemented a system called “Kishin,” in which a powerful AI decides moves on behalf of human players during the games as a kind of assistance. This system is often used in difficult situations or when there are likely to be good moves, which is expected to have learning effects.

Such assistance systems provided by game operators also have the advantage of preventing the use of prohibited software (cheats). This is because by presenting assistance systems as an option that satisfies the needs of cheaters, it reduces the motivation for daring the possible penalties to use cheats. However, some problems need to be solved, especially in the case of powerful assistance systems such as Kishin, which may be noticed by opponents and cause them discomfort.

The purpose of this study is to construct an assist system for online Shogi that entertains the players and is less likely to be noticed by the opponents. We expect the system to improve players’ enjoyment and prevent cheating, while at the same time being difficult to be noticed and avoiding making the opponents uncomfortable.

First, we conducted a questionnaire survey to collect participants' impressions of the Kishin system and their expectations of general assistance systems. The results showed that the participants were divided into two groups: those who could tolerate the use of the Kishin system by their opponents and those who could not. On the other hand, many participants did not want to use the Kishin system themselves. As a result of the questionnaire survey on what kind of assistance systems they would like to have, we found that many participants wanted assistance systems that prevented mistakes and were educational, while those increasing win rates were not so desirable.

Next, we conducted a preliminary experiment on Shogi Wars to see how the enjoyment of the games was affected when players themselves or their opponents used the Kishin system, and to see whether the players could notice that the opponents used the Kishin system. We asked the participants to try all four cases of using or not using the Kishin system. We also asked the participants to evaluate on a 5-point scale “how much do you feel your opponent used the Kishin system?” and “how much do you enjoy the game?” The scores were 1.8 and 3.3 for cases that the opponent did not use and cases that the opponent used, respectively. From the big difference, we confirmed our hypothesis that the use of the Kishin System was easily detected. Regarding enjoyment, the scores were 3.7 and 2.9 for cases that the opponent did not use and cases that the opponent used, respectively. We confirmed that players tended to enjoy less when their opponents used the Kishin system.

Based on the results of these preliminary experiments, we proposed four assistance systems aiming to entertain Shogi players while not making the opponents

uncomfortable. (1) “Future State Prediction” helps the players reduce their anxiety about selecting moves by showing the near future of attempting moves, which we expect to also have learning effects. (2) “Move Recommendation” allows the players to freely choose a direction (e.g., offensive or defensive) and recommends several promising moves for each direction. (3) “Careless Mistake Prevention” prevents the players from making careless mistakes, helping the players feel at ease and enjoy the gameplay. In addition, it helps improve the quality of games, which may help improve the opponents’ enjoyment. (4) “Five Move Help” decides five moves on behalf of the players, which remains the same advantage as the Kishin system that players may enjoy in the sense that it becomes easier for them to win regardless of their strength. However, in our “Five Move Help” system, we introduce a technique to solve the problem of being easily noticed.

We employed 12 participants to play a total of 60 games to evaluate our proposed assistance systems. Particularly, we investigated how each assistance system was easily detected by the opponents and what kinds of assistance systems the players preferred to use.

First, we analyzed the players’ evaluations when their opponents used assistance systems. For evaluating “how much do you feel your opponent used an assistance system?”, as a baseline, the score was 2.1 when the opponent did not use any assistance system. When the opponent used “Five Move Help,” the score was 3.0, and when the opponent used the other three assistance systems, the scores were 2.0, 2.2, and 2.0. Except for “Five Move Help,” we confirmed that we succeeded in creating assistance systems that were hard for the opponent to notice. As for evaluating “how much do you enjoy the game?”, as a baseline, the score was 3.8 when the opponent did not use any assistance system. The scores dropped 0.4 and 0.5 when the opponent used “Move Recommendation” and “Five Move Help,” respectively. For “Five Move Help,” it is possible that the players noticed that their opponents were using assistance systems and felt that the game was less enjoyable. Interestingly, “Move Recommendation” was not easily detected; thus, we suspected the players felt less enjoyable for other reasons.

Next, we analyzed the players’ evaluations when themselves used assistance systems. For evaluating “how much do you enjoy the game?”, as a baseline, the score was 3.6 when the players did not use any assistance system. The scores were 3.1 for “Future State Prediction,” 3.8 for “Move Recommendation,” 3.9 for “Careless Mistake Prevention,” and 3.2 for “Five Move Help.” We concluded that the assistance systems could improve the players’ enjoyment and that the players’ enjoyment did not necessarily correlate with how easily the usage of the assistance system was noticed. For “Future State Prediction,” which received a low score, it is possible that players could not enjoy the system under a time-limited tournament setting because the players might need some time to understand the future game states. As for “Careless Mistake Prevention,” we concluded it to be an assistance system that entertained the players and was not easily noticed by the opponents, which was supported by players’ evaluations.