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Bad Move Detection and Playstyle Production using Deep Learning Go Programs

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Computer Go programs have already exceeded top-level human players by using deep learning and reinforcement learning techniques. In 2016, AlphaGo developed by DeepMind defeated Lee Sedol, In 2017, its successor, AlphaGo Zero, defeated Ke Jie, the world's first-ranked human player at that time. The chasing for strength is enough for human players.

On the other hand, "Entertainment Go AI" or "Coaching Go AI" are also exciting directions that have not been well investigated. Several kinds of research have been done for entertaining beginners or intermediate players. "Bad move detection" and "Playstyle Production" are important tasks in the area of education and entertainment Go. In the previous researches, they are proposed and evaluated using a traditional Monte-Carlo tree search program. In this research, we try to evaluate the approaches using Leela Zero and KataGo. There are some critical differences between the previous program and the new programs. For example the new program does not use random simulations to the ends of games, then the previous method for producing various playstyles cannot be used. Also, we want to check how well previous approach performs in strong Go programs. Leela Zero is designed under the structure by AlphaGo Zero, while KataGo tries to improve AlphaGo Zero's process and architecture.

Bad move detection is an important task in educational Go programs, which can help human players improve their play by pointing out the program's good/bad moves. In the previous researches, data with bad labels are used in machine learning. The learning result showed that it is useful for intermediate players. In this research, we try to evaluate the machine learning again by KataGo, as the strength of KataGo has already surpassed human top players, also, some new features, such as "territory difference" and "prior selection probability", are much precise than the previous program, the calculated new features may help to produce better models of machine learning. The result shows that the weighted average F-measure of good/bad moves is better than the previous research.

Playstyle Production is another vital task in entertainment Go programs, Which can entertain human players by using some specific playstyle while without apparent strength loss. In the previous researches, a Monte-Carlo Go Program used an online method to produce some playstyles, human players can feel some of these playstyles clearly. As the searching mechanism of Leela Zero is totally different from the previous Monte-Carlo program, in

Monte-Carlo Go, online method is used for playstyle production, it is worth to produce playstyles by new offline method. In this research, we try to train models to produce playstyles by Leela Zero. Human projects are used for evaluation, which claims that human players could identify the produced playstyles (center and edge/corner) with a high probability.