Combining Gameplay Data With Monte Carlo Tree Search To Emulate Human Play

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Abstract

Monte Carlo Tree Search (MCTS) has become a popular solution for autonomous agents. Its use has repeatedly been shown to be capable of creating strong game playing opponents. However, the emergent playstyle of agents using MCTS is not necessarily human-like, believable or enjoyable.

AI Factory Spades, currently the top rated Spades game in the Google Play store, uses a variant of MCTS to control non-player characters. In collaboration with the developers, we collected gameplay data from 27,592 games and showed that the playstyle of human players significantly differed from that of the non-player characters [1].

This paper [2] presents a method of biasing MCTS using human gameplay data to create Spades playing agents that emulate human play whilst maintaining a strong, competitive performance.

The methodology we have applied could feasibly be applied to any digital game currently using MCTS provided gameplay trace data is collected and the agent's actions are (or could be modelled as) discrete. In particular, we note that the common usage of tech or progression trees in many modern games provides a suitable potential application for this method. Furthermore, given potential applications of MCTS in non-game contexts (e.g. simulations, decision support systems or operations research), the same methodology could again be applied to provide more human-like agents.

[1] Cowling, P. I.; Devlin, S.; Powley, E. J.; Whitehouse, D.; and Rollason, J. 2015. Player preference and style in a leading mobile card game. IEEE Transactions on Computational Intelligence and AI in Games 7(3):233–242

[2] Devlin S., Anspoka A., Sephton N., Cowling P., and Rollason J.: Combining Gameplay Data With Monte Carlo Tree Search To Emulate Human Play. In Proceedings of the 12th Annual AAAI Confrence on Artificial Intelligence and Interactive Digital Entertainment (AIIDE), 2016.