Monte-Carlo tree search (MCTS) is a well-known online planning strategy for solving sequential decision problems. We propose a new technique called Primal-Dual MCTS that utilizes sampled information relaxation (Brown et. al., 2010) bounds on potential actions in order to make tree expansion decisions. The approach shows promise when used to optimize the behavior of a driver navigating a graph while operating on a ride-sharing platform.

The second part of the talk focuses on using MCTS in an offline manner within a reinforcement learning setting: we propose a model-based reinforcement learning technique that iteratively applies MCTS on batches of small, finite-horizon versions of the original infinite-horizon Markov decision process. In addition, we show how a neural network implementation of the technique can be used to create an AI agent for the popular multi-player online battle arena game.

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