

# Mastering the game of Go with deep neural networks and tree search

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## *Research Review*

The game of Go is a very challenging game for AI due to huge search space and difficulty to evaluate a certain move.

## **Goals and Techniques**

The goal is to reduce the search space using convolutional neural networks. The game board we will be treated as image then, neural networks can be used to reduce the depth and breadth of the search tree.

The neural network consists of the following machine learning stages:

1. Train supervised learning using expert human moves, to predict expert human moves and receive an immediate feedback on the goodness of a move. This stage yield an accuracy of 57.0%
2. Train reinforcement learning that improves the supervised learning above, by training RL policy against itself.

AlphaGo combines the policy and value networks in an MCTS algorithm. MCTS algorithm selects best current action by look-ahead search; by using the value network and a fast rollout policy then compute the winner. Each edge in the tree contains the current state and the legal actions in the same state.

## **Results**

To evaluate AlphaGo, a tournament is conducted against other Go programs, the result of the tournament show that AlphaGo was able to win 99.8% of the matches against other Go programs, even without rollouts, which indicate that the value networks provide valuable information on the game.