Research Review

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

https://storage.googleapis.com/deepmind-media/alphago/AlphaGoNaturePaper.pdf

Techniques

The approach used in this paper consists of multiple steps in a pipeline.
First step was training a Neuronal Network *(Neuronal Networks are a model based on the human brain, it adapts it's weights based on the error between output and the desired output of the network)* by Supervised Learning method on expert moves, called policy network. This provides a fast learning rate and fast feedback. The AlphaGo team did train two different of this policy network a faster one with lower accuracy and a slower one with higher accuracy. They used the data from 30 million positions from the KGS Go Server. The slow policy network archieved an accuracy of 57.0% on predicting expert moves, the fast policy network archived 24.2%.
The second step was to improve the policy network from the first step, they used the approach of Reinforcement Learning, it means that they played with the policy network against itself. After training, the RL policy network won 80% of the games against the SL policy network.
The third and final step is a value network which tries to predict the outcome of the game for a position.
So in general it uses the policy network to sample strategies and the value network to calculate how good the strategy is. The value network controls the depth and the policy network the breath of the search tree.

Results

The AlphaGo won against any previous Go program, with 494 out of 495 games (99.8%). Also with handicap stones (free moves for the opponent) AlphaGo won 77%, 86% and 99% against Crazy Stone, Zen and Pachi which are other Go programs. The final evaluation was against *Fan Hui*, he is a professional 2 dan, and winner of the 2013, 2014 and 2015 European Go championship. AlphaGo and Fan Hui played 5 games, all of them were won by AlphaGo, it was the first time that a computer Go program has defeated a human professional player.
After publication of this paper AlphaGo did also win against *Lee Sedol* he is one of the best Go player in the world with 9 dan, AlphaGo won 4 out of 5 games.