AlphaGo Game Playing AI Research Review

Goals:

The goal of the AlphaGo game playing AI, created by the DeepMind team, was to beat the best professional human players in the world at the game of Go, a game very popular in Asia, which due to it's insane branching factor was considered to be the hardest perfect information board game to beat.

Techniques:

The AlphaGo game playing AI used a combination of various machine learning techniques, deep learning convolutional neural networks and a new spin on the Monte Carlo search algorithm. AlphaGo's secret sauce is a new search algorithm that successfully combines neural network evaluations with Monte Carlo rollouts into a high performance tree search engine.

AlphaGo was trained to identify promising moves by being fed a 19x19 image of a Go game board image and having deep learning convolutional layers "look at it" in order to construct a representation of the position of the Go stones.

AlphaGo's new approach was to use "value networks" to evaluate the "goodness" of the board positions and "policy networks" to pick the best moves. These are neural networks that are trained on data from a combination of Supervised Learning from human expert games, and Reinforcement Learning from games of AlphaGo against itself.

The sweet thing about these neural networks is that they came up with their own evaluation function, instead of having a human handwrite its master evaluation function. AlphaGo's neural networks were trained from gameplay purely through general-purpose supervised and reinforcement machine learning methods.

Results:

AlphaGo did what many thought was at least one decade away: defeating a human professional player, without handicap, in the full game of Go.

Over 5–9 October 2015 AlphaGo played against Fan Hui, a professional 2 dan European Go champion, in a five game match and beat him in all games. Besides beating professional human Go players, AlphaGo also achieved a 99.8% winning rate against other Go programs.