AlphaGo Summary

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

Goals

The goal for AlphaGo was to defeat a professional Go player. This was, however, a very hard task because of the extreme size of the search space of the game. A computer program, regardless of the computational horsepower behind it, could not exhaustively search all combinations of board positions. The search space is on the order of 250^{150} or 10^{761}, which is quite large considering there are only 10^{80} atoms in the entire universe. The DeepMind team set out to see if they could solve this seemingly intractable problem by playing one of the best Go players in the world, Lee Sedol of South Korea.

Results

The results were nothing short of astonishing. The DeepMind team used a variety of approaches to reduce search space while still maintaining robust board positions. First the team uses two different types of networks, a policy network which selects the best move and a value network that evaluates varies board positions. It also uses deep neural networks that have been trained by professional Go players and also from playing itself over and over again. Finally they combine these with a Monte Carlo simulation and in total, received greater than 99% success rate compared to the other Go programs and also defeated professional European Go players as well as Lee Sedol of South Korea. This is quite amazing considering the fact that researchers did not think this type of result wouldn't be possible for another decade or longer. It is the hope that these results, i.e., finding solutions to seemingly intractable computer science problems, can be used for solving larger societal problems.