Research Review on Deepmind's AlphaGo

-Shashank

AlphaGo, the first computer Go program to beat a human professional Go player on a full-sized 19*19 board was developed by Alphabet Inc.'s Google DeepMind in london. Chosen by Science(journal) as one of the breakthrough of the year, AlphaGo uses deep Neural network and tree search to master the game of Go. Compared to other computer games chess, Go is considered difficult because of the larger branching factor. Due to this high branching factor traditional AI methods such as alpha-beta pruning, tree traversal and heuristic search doesn't have good impact. Computer programs like AlphaGo helps in understanding how well a neural network using deep learning can perform.

An efficient algorithm which involves lot of computation needs to have a good hardware to produce good results. Tensor Processing Unit , Google's proprietary hardware has been used to run AlphaGo to beat human Go champion. TPU's are Application specific Integrated circuits designed for a higher volume of reduced precision computation with higher IOPS per watt.

A combination of supervised and reinforcement learning was used to train the deep neural networks in AlphaGo program. Efficient move selection and position evaluation functions like, a new search algorithm that successfully combines neural networks evaluations with Monte-Carlo rollouts were used. Using policy and value networks for selecting positions intelligently from thousands of available positions is something that AlphaGo does very efficiently when compared with computer programs like Deep Blue. Another unique thing about the AlphaGo program is that it is trained directly from gameplay purely through general-purpose supervised and reinforcement learning methods rather than relying on handcrafted evaluation function.

By achieving a 99.8% winning rate against other Go programs, and defeating the human Go champion by 5 to 0, AlphaGo provides hope that human-level performance can now be achieved in other domains.