Review of the AlphaGo Article

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1 Introduction

The AlphaGo agent made big breakthrough in Artificial Intelligence recently by beating top Go players very stably. This remarkable agent is built upon the most recent start-of-art techniques in deep learning. We are going to give a short review on AlphaGo in this report.

2 Goals

Two common tasks for a game agent are to select moves and to evaluate board positions. The paper is aimed to make improvements on these two important tasks. It introduces convolutional neural networks to study the patterns in a value networks to evaluate board positions and policy networks to select moves.

3 Techniques Introduced

Main techniques used in the agent include the following:

Convolutional Neural Networks. It regards the 19x19 board as an input image to feed into convolutional layers to construct a representation of the posotion. These neural networks are used to reduce the effective depth and breadth of the search tree. The positions are evaluated using a value network while actions are sampled using a policy network.

Policy Networks. The policy networks are trained in two stages. The first stage is the supervised learning with previous human experts' choices of moves. the second stage is the reinforcement learning by playing the game against itself.

Value Networks. These are used to evaluate positions. They are trained with reinforcement learning with a generated self-play data set.

Search. Searching with the policy and value networks is done using Monte-Carlo Tree Search. The tree search is efficiently combined with the neural networks by an asynchronous multi-threaded search.

4 Results

Playing strength of AlphaGo is evaluated with other existing programs including Crazy Stone, Zen, Pachi and Fuego. AlphaGo consistently beat these programs.

The most significant success of AlphaGo is its play against human top experts:

AlphaGo Fan won 5 : 0 agains Fan Hui.

AlphaGo Lee won 4 : 1 agains Lee Sedol.

AlphaGo Master won 60 : 0 against professional players.

AlphaGo Zero won 100 : 0 against AlphaGo Lee and 89 : 11 against AlphaGo Master.

In May 2017, AlphaGo won 3 : 0 against the current world No.1 ranking player Ke Jie.