Good morning, everyone. It is a great honor to speak to you today. I am Yu Han, and he is my partner Li Xu. We are from School of Software and are doing some researches on machine learning. Today, we are going to talk about alphaGo the new dominator of board game go. Recently, a big news has been discussed by a wide range of people, that is alphago beat Ke Jie. The latter is the no.1 ranked human go player in the world. Many people think that AlphaGo is invincible and feel anxious about artificial intelligence. Here, we are going to talk about the core of alphago, including how it works, why it is invincible and what impacts it will bring to our life.

First, let’s have an overview about what is alphago. It is a narrow ai computer program used to play the board game go. It is developed by Google DeepMind, a lab of alphabet company in London. It has some remarkable awards: For example, it is the first go program beating a professional human go player. And it is selected as one of the breakthrough of the year by Science in 2016.

Looking back to the history of alphago, we can see splendid records: two years ago, it beat the European Go chamoion fan hui with 5 to 0. In last year, it beat lee sedol, one of the best professional go player in the world with 4:1. Some people believes that the only defeat is to gain a world rank because according to the rule of go global ranking, only when you get a defeat, can you get a rank.

Next, lets welcome Li Xu to talk about how alphago works in detail.

To understand how AlphaGo works, we need to make clear these three concepts: machine learning, neutral network and deep learning, which are the key technologies of AlphaGo.

To understand what machine learning is, we may start with the question: what is a program. A program is a process. With an input X, it will return a corresponding output Y. Machine learning is a kind of special program. With a series of input X, it will return a program. And the input is called the training set.

The history of machine learning may be older than you think. Linear regression is one of basic machine learning models. In this example, the training result of 100 points is y = x. Now given a new input x = 18, we can predict the output is 18.

But most situations of machine learning are much more complicated. They may have multiple input features and output features. And the influence factors may be difficult to model. Inspired from neural networks, a learning model which is also called neural network is proposed. This model has three kinds of layers: input layer, hidden layers and output layer. Each unit is fully connected with the units in the interfacing layers. Each edge has a weight. Which is set to a random number at the beginning. Using the input data, the weights are adjusted gradually. Eventually, the weights will converge to optimal and we can use it to predict new values.

If we add more hidden layers, this algorithm can fit all complex models. And we have a special name for this: deep learning. With the understanding of how deep learning works, now we turn our sight on AlphaGo.

To let AI play go, we first need to know how humans play.

The steps human playing this game can be summarized as follows:

Analyze global and local situation.

Find some feasible moves.

Predict a few more steps and choose the best move.

AlphaGo tries to do exactly the same thing. To analyze the global and local situation, it trains a value network. With board status as inputs, it will tell you the winning probability.

And to find feasible moves, it uses a policy network. With board status as inputs, it will give you a set of feasible moves. These two networks are the fundamental of AlphaGo and both are trained using deep learning.

To let you have a better understanding, we have an example at last. The first step is to predict feasible next moves using policy network. To choose the best move, AlphaGo plays with itself, after each move, it uses value network to judge the situation. If the situation is clear, it will count the result and start a new iteration.

After a number of competitions with itself, it eventually will get a score map. In this example, it wins 79times here, 20times here and 1time here, here and here. So the next move will be set at cross lower right.

So why alphago becomes the new dominator of go. There are three main reasons. First, it is very fast so that it can analyze situations more quickly than humans. This benefits from the powerful computing ability of computers. Next, it is accurate for it always runs according to what the program says and never make mistakes. And Thirdly, it is perfect because it never gets tired like human but always make the best choice.

After the match with Ke Jie, alphaGo will retire. However, deep learning and AI will not. With the technologies used in alphaGo, we may have alpha-composers, alpha-listeners, alpha-paintors and alpha-drivers.

In conclusion, alphaGo shows great power in Go by using deep learning. With the wider application of deep learning, an intelligent alpha future is coming.