Summary on Go paper:
https://storage.googleapis.com/deepmind-media/alphago/AlphaGoNaturePaper.pdf

Summary of goals or techniques introduced

The main goal is to find better ways of playing the Go game using artificial intelligence.
The main technique introduced is to create a new search algorithm that combines Monte Carlo learning with convolutional neural networks.
One of the key concepts of the paper is that the neuronal networks do not use lookahead search. That is, we're not trying to *foresee* what outcomes possible actions might produce, what we do is *learning* from master experts what position-actions are better for playing and capture them. Then and only then you combine this knowledge with a search algorithm based on Monte Carlo, to make the best move for each of the states of the game.

The way this is achieved is really interesting:
First you take a database of expert moves in go games: (position, action). Then, create a neural network to learn the action that an expert in certain state of the board takes, use features like the actual state of the board or the history of actions until the actual state, this is called SL policy network. Think of this network as blind accumulated information of what multiple experts in certain positions of the game would do. You also train a lesser version of this concept but much faster (Rollout policy)
Once you have the SL policy network, use gradient descent and reinforcement learning to improve it by 'teaching' it to recognize which of the possible actions to be taken in a state are more likely to win the match, the RL policy network. This is done by playing games between the RL network and some random previous iteration of the LS policy network. At this moment, you have a neural network that can play fairly well Go and competes with just Monte Carlo opponents.
Next, create a new neural network, Value Network, that has been trained to predict the outcome value of a given state of a board. That is, classifies how good a position is, given that we know that that state has been used in a win situation.
Last, combine the policy and value networks with Monte Carlo lookahead search.
Simplified explanation: for each leaf node, the policy network is used to select the next moves based on probability, then the value and rollouot networks produce a combined value for that state and simulation.
Use the tree generated to choose the best next move.

Summary of paper's results

As clearly stated in the paper and in the media, the creation of a program that is able to defeat the best human player of Go in the world is in itself a milestone in artificial intelligence.
Personally I find that the way this has been achieved:

- Combine in a novel way existing techniques to achieve better results
- Capture domain knowledge using neural networks and use it in search to make better decisions.

Is extremely inspiring.