

# AlphaGo: Mastering the Game of Go with Deep Neural Networks and Tree Search

Presented paper by David Silver, Aja Huang, Demis Hassabis et al. (from Google DeepMind)

(<http://www.nature.com/nature/journal/v529/n7587/full/nature16961.html>)

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When: 20<sup>th</sup> April 2016 (Wednesday), 9:00 - 10:30

Where: S9

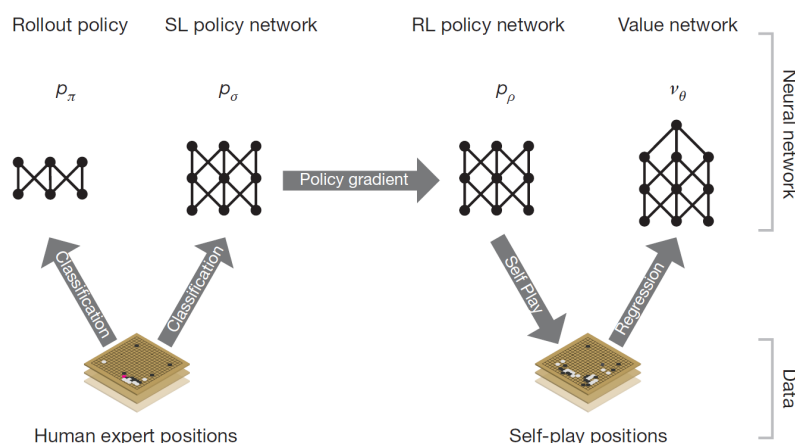
Why: Optimization Seminar (NOPT053)

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The game of Go has long been viewed as the most challenging of classic games for artificial intelligence owing to its enormous search space and the difficulty of evaluating board positions and moves.

A new approach to computer Go introduces *value networks* to evaluate board positions and *policy networks* to select moves. These deep neural networks are trained by a novel combination of supervised learning from human expert games, and reinforcement learning from games of self-play.

Furthermore, a new search algorithm is introduced: it combines Monte Carlo simulation with value and policy networks. Using this search algorithm, the computer program AlphaGo developed by Google DeepMind achieved a 99.8 % winning rate against other Go programs.



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**Theorem 1.** *The (distributed version of) AlphaGo plays Go at the super-human level.*

*Proof.* The proof is left as an exercise to the reader. The exercise is to come to the talk. :-)  $\square$