Karlsruhe Institute of Technology

Technology for Pervasive Computing

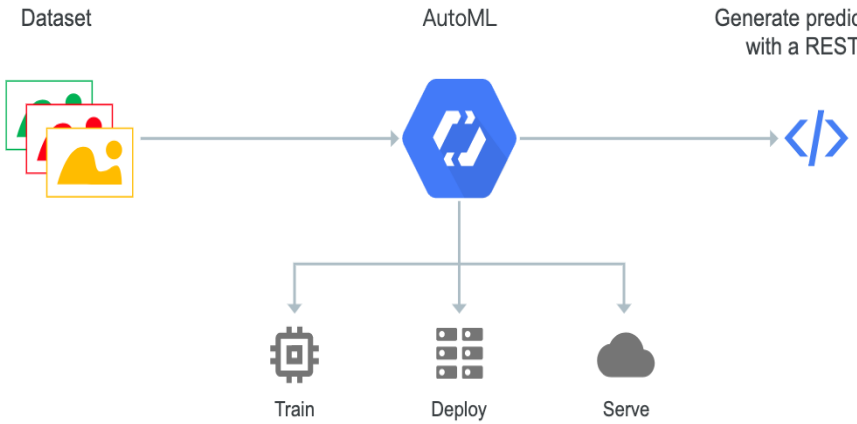
MCTML: AutoML with Monte Carlo Tree and Neural Network

CHAIR FOR PERVASIVE COMPUTER SYSTEMS, INSTITUTE OF TELEMATICS, DEPARTMENT OF COMPUTER SCIENCE

Table of Contents

1. Motivation

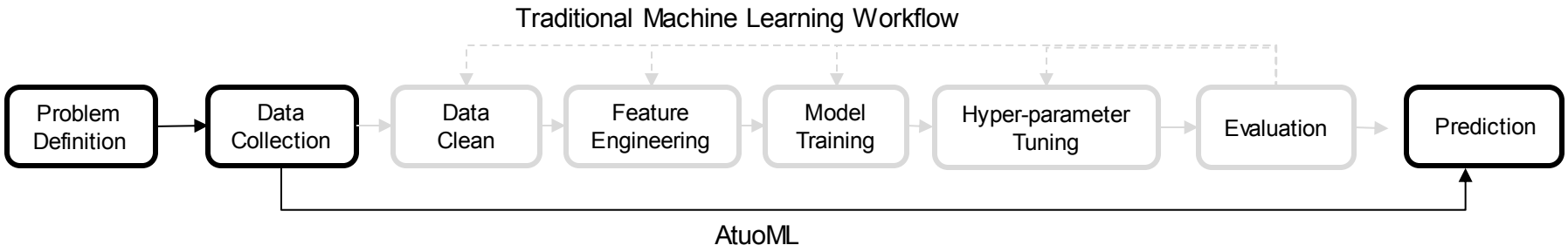
- Hypothes: Use idea of AlphaGo to solve AutoML problem



AlphaGo

2. Background

- Traditional ML vs AutoML workflow

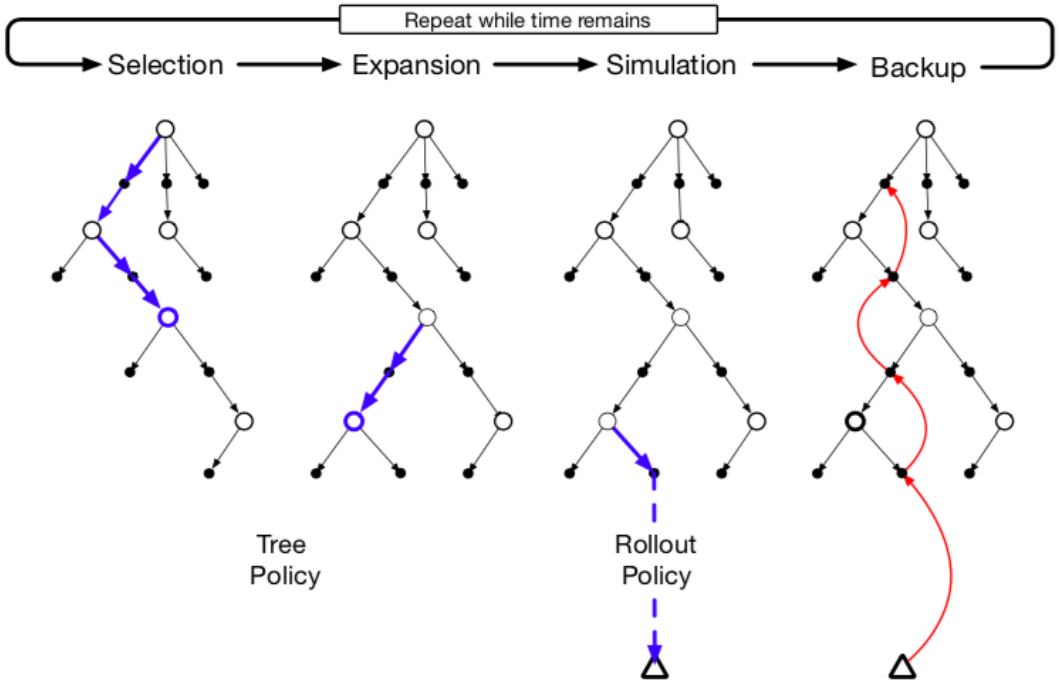


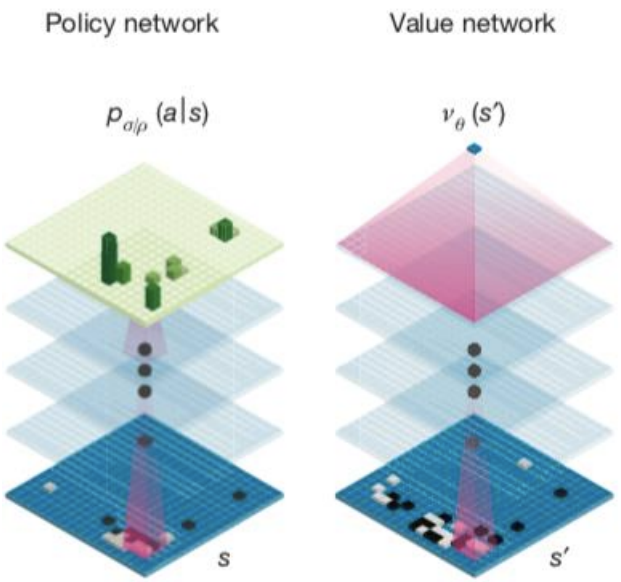
- AutoML and Go

	AutoML	Go
Problem	Sequential black-box optimization	
Structure	Search tree	
Aim	Find a search policy to serach for the best result efficiently	

3. AlphaGo

- AlphaGo[1] uses MCTS with neural network to learn search policy.





[1] Mastering the game of Go with deep neural networks and tree search, David Silver, Aja Huang, 2016

4. MCTML

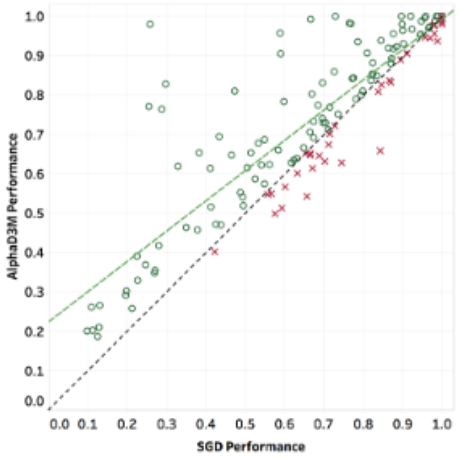
- Two main challenges:
- 1. Update search policy
- 2. Accelerate evluation phase

	AlphaGo	MCTML
Game	Go	AutoML
State	configuration	pipeline
Action	move	Algorithm / Hyper-parameter
Reward	win,loss,draw	Pipeline performance
Search tree	250*250	(10~15) * (15~200)

5. Evaluation

- Datasets:
- OpenML-CC18 Benchmarking suite, including 100 classification data.

- Evaluation Methods
- 1. MCTML vs Baseline(SGD)
- 2. MCTML vs Autosklearn
- 3. MCTML vs variable MCTML(optional)



AlphaD3M vs. SGD performance[2]

[2] AlphaD3M: Machine Learning Pipeline Synthesis. ICML 2018 AutoML Workshop 2016