Machine Learning for Finance (FIN 570)
Introduction

Instructor: Jaehyuk Choi

Peking University HSBC Business School, Shenzhen, China

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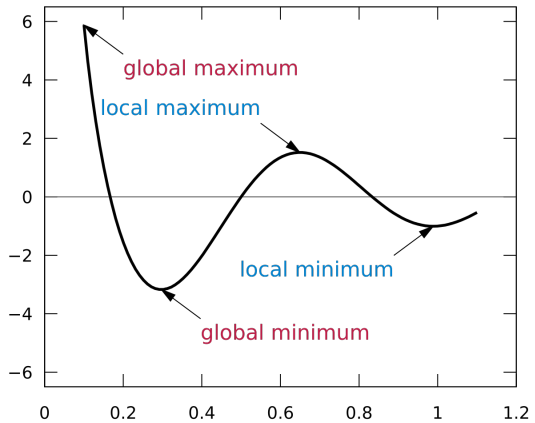
AlphaGo vs Humans (LEE Sedol, KE Jie)

We have to think again about joseki / dìngshì (定石/ 定式) .
In Go (围棋), a joseki is the studied sequences of moves for which the result is considered balanced for both black and white sides.



LEE Sedol afterwards · · ·

- Became more popular and richer
- Perhaps titled as the last human who beat the machine in Go

ML/AI: Rise of the machines?

Probably not like this!

Data vs Knowledge

Data

$$0,\ 1,\ 1,\ 2,\ 3,\ 5,\ 8,\ 13,\ 21,\ 34, \cdots$$

Knowledge

Fibonacci sequence:

$$A_k = A_{k-1} + A_{k-2}, \quad A_0 = 0,\ A_1 = 1$$

What and why now?

What is ML?

- Prediction based on data (data into knowledge)
- Extended linear/logistic regression
- Pattern recognition

Why now?

- Abundant Data (Big Data)
- Faster computer (Graphics Processing Unit: GPU)
- Advances in research: Geoffrey Hinton (Google), Yann LeCun (Facebook).

Recent applications of ML

- Automated driving system (Google, Apple, etc)
- Suggestion engine (Amazon, Taobao)
- Cancer diagnosis (IBM Watson)
- Digitizing images (Facebook, Google)
- Shopping without checkout (Amazon Go: big data)
- ...

ML for Finance?

Andrew Ng's article in HBR

If a typical person can do a mental task with less than one second of thought, we can probably automate it using AI either now or in the near future. *(Nov 2016, HBR)*

ML in Finance: ideals

- Asset management, investment, stock picking/timing?
- Trading algorithm (alpha strategy) for hedge fund?
- Predicting next financial crisis?
- Earnings prediction: e.g., Prediction Valley

Cost cut / labor reduction

- Cost cut / labor reduction: Chat-bot (trading and sales), accounting/tax, analyst report, legal work
- Data analytics: e.g., Kensho

Softwares to use

Python

- Anaconda (Python distribution + Environment management)
- Python Language Tutorial
- Sci-Kit Learn
- TensorFlow (wrapped by Keras)

Github.com

- Distributed version control system
- Clone a repository to create a local copy
- `https://github.com/PHBS/2017.M3.TQF-ML` (our course)
- `https://github.com/rasbt/python-machine-learning-book-2nd-edition` (**PML**)

Other resources for ML

- Coursera ML course (**CML**) by Andrew Ng (Baidu)
- Stanford CS229 Machine Learning: course notes, student projects, etc
- The Elements of Statistical Learning (**ESL**)
- An Introduction to Statistical Learning (with R) (**ISLR**)
- Pattern Recognition and Machine Learning by Bishop (Microsoft)