

Soft Introduction

Machine Learning for Finance (FIN 570)

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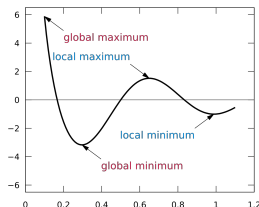
Peking University HSBC Business School, Shenzhen, China

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AlphaGo vs Humans



- AlphaGo made us to rethink about DìngShì or joseki (定式) in Go.
- In Go, DìngShì is the **optimal** (and balanced between black and white) sequences of moves studied by human being for hundreds years.
- AlphaGo surprised Go experts by showing moves not following DìngShì.
- DìngShì we know is not be the globally optimal strategy!



ML/AI: Rise of the machines?

Probably not like this!



Data vs Knowledge

Data

0, 1, 1, 2, 3, 5, 8, 13, 21, 34, ...

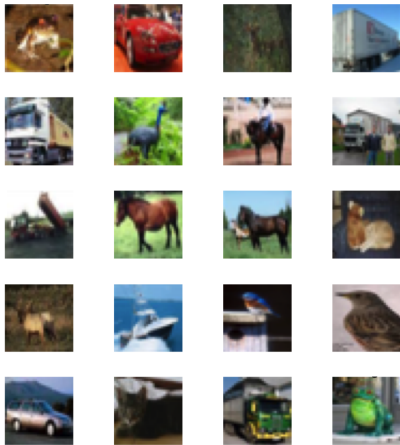
Knowledge

Fibonacci sequence:

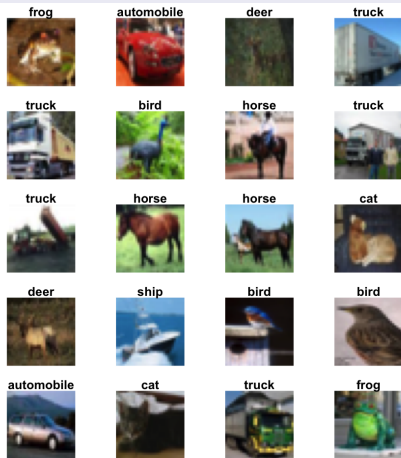
$$A_k = A_{k-1} + A_{k-2}, \quad A_0 = 0, \quad A_1 = 1$$

Data vs Knowledge

Data



Knowledge



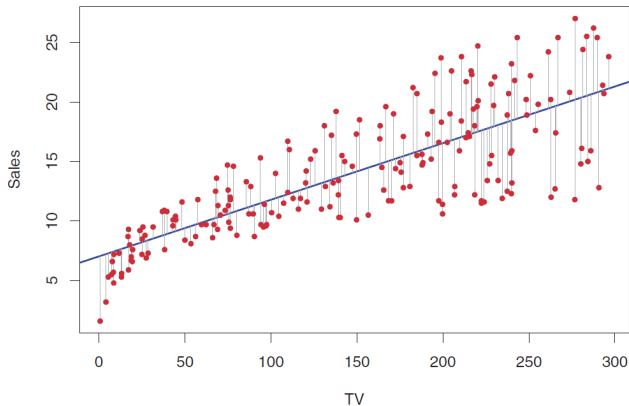
Data vs Knowledge

Data

$$(x_1, y_1), (x_2, y_2), \dots, (x_n, y_n)$$

Knowledge

$$\hat{y} = ax + b$$



What and why now?

What is ML?

- Prediction based on data (data into knowledge)
- An extended version of linear/logistic regression
- Recognition of patterns

Why now?

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

Applications of ML

Machine Learning-Gen
(123 Companies)

Machine Learning-App
(260 Companies)

Computer Vision-Gen
(106 Companies)

Computer Vision-App
(83 Companies)

Smart Robots
(65 Companies)

Virtual Personal Assistants
(92 Companies)

NLP-Speech Recog.
(78 Companies)

NLP-General
(154 Companies)

Speech to Speech Trans.
(15 Companies)

Context Aware Comp.
(28 Companies)

Gesture Control
(33 Companies)

Recommendation Eng.
(60 Companies)

Video Content Recog.
(14 Companies)

Artificial Intelligence

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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?
- Earnings prediction: e.g., [Prediction Valley](#)
- Predicting next financial crisis?

ML in Finance (reality)

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