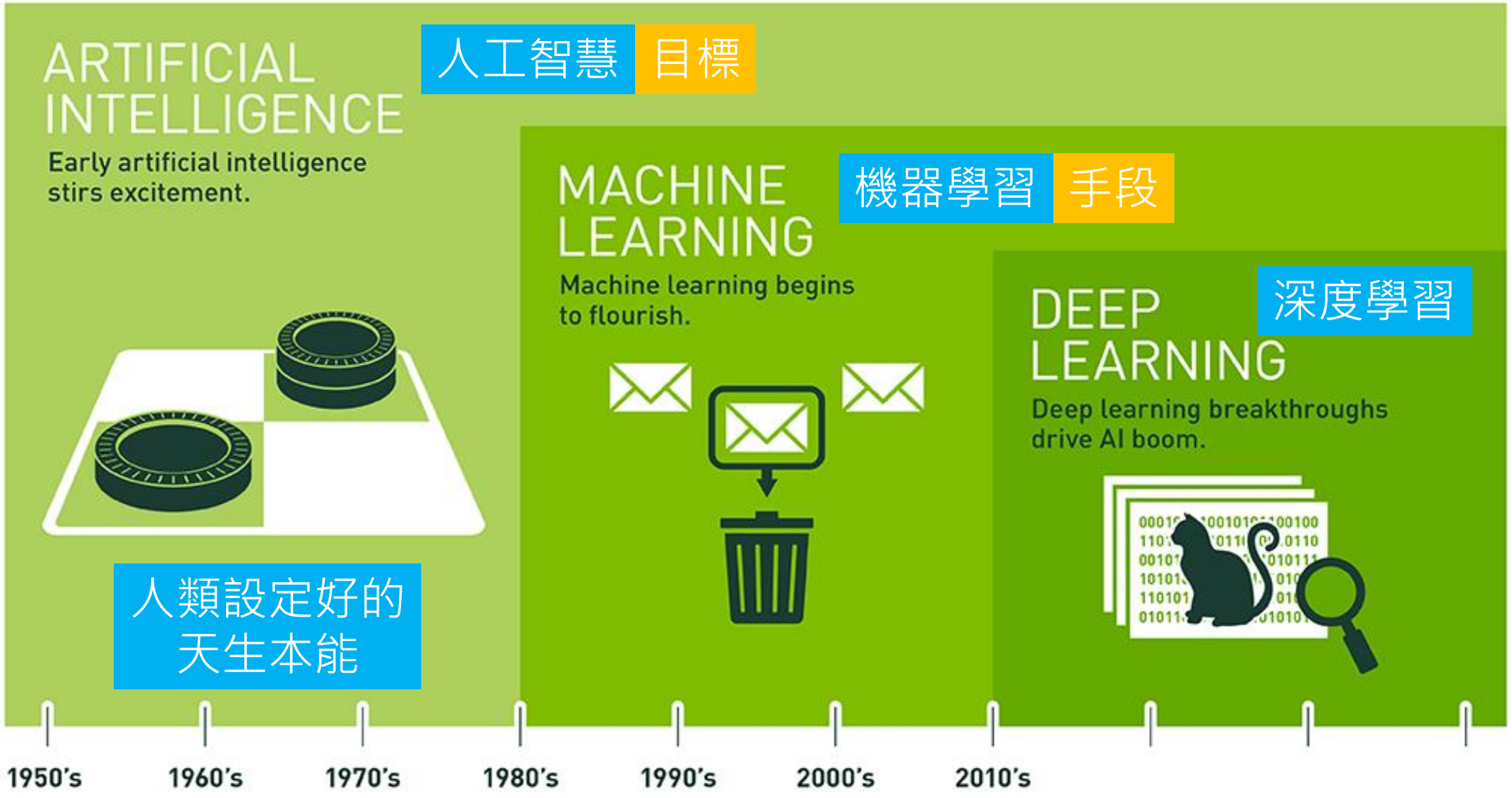
人工智慧概述

周哲維

2022/09/21



Since an early flush of optimism in the 1950s, smaller subsets of artificial intelligence – first machine learning, then deep learning, a subset of machine learning – have created ever larger disruptions.

https://blogs.nvidia.com.tw/2016/07/whats-difference-artificial-intelligence-machine-learning-deep-learning-ai/

人類設定好的天生本能

- e.g. You want to build a Chat-bot….
  - if there is “turn off” in the input, then “turn off the music” (hand-crafted rule)
    - You can say “Please turn off the music” or “Can you turn off the music?”. Smart?
    - What if someone says “Please don’t turn off the music” …….

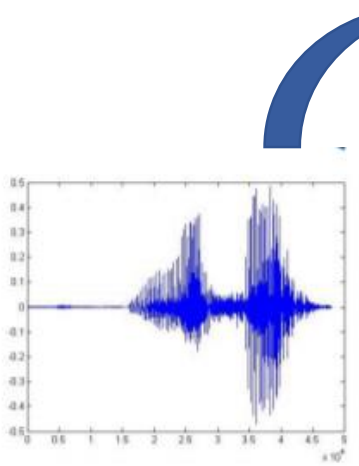
- Weakness of hand-crafted rules
  - Hard to consider all possibilities
    - 永遠無法超越創造者
  - Lots of human efforts (not suitable for small industry)

人類設定好的天生本能

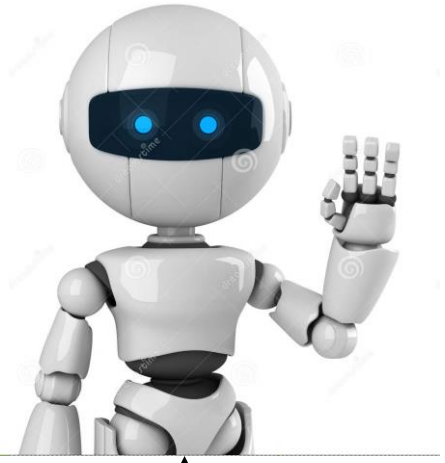
- AI?

http://www.commitstrip.com/en/2017/06/07/ai-inside/?

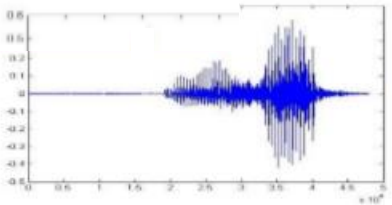
What is Machine Learning



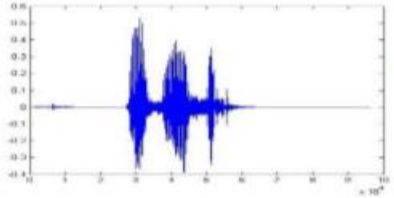
Learning…..



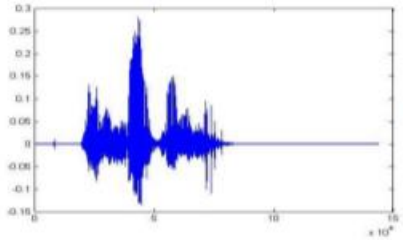
You said “Hello”



“Hi”



“How are you”



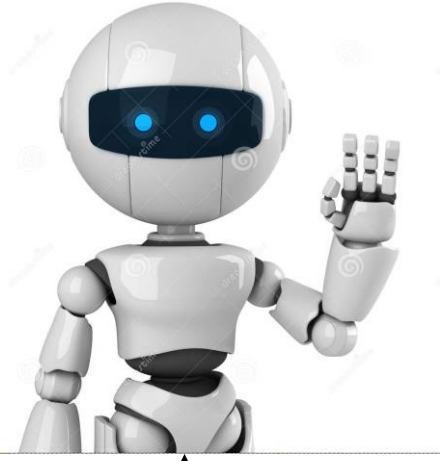
“Good bye”

A large amount of audio data

You write the program for learning

http://e-wiki.org/tr/images/Robotica

What is Machine Learning



Learning…..

This is a “cat”

“monkey”

“cat”

“dog”

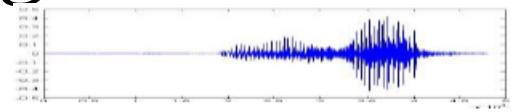
A large amount of images

You write the program for learning

http://e-wiki.org/tr/images/Robotica

Machine Learning ≈ Looking for a Function

- Speech Recognition

$f($  $) =' How\ are\ you'$

- Image Recongintion

$f($  $) = 'Cat'$

- Playing Go

$f($  $) =' 5-5'$

- Dialogue System

$f($ $'Hi'$ $) =\ ' Hello'$

Framework

Image Recongintion

$f($  $) = 'Cat'$

A set of function

Model

$f_1, f_2 \ldots\ldots$

$f_1($  $) = 'Cat'$

$f_2($  $) =' monkey'$

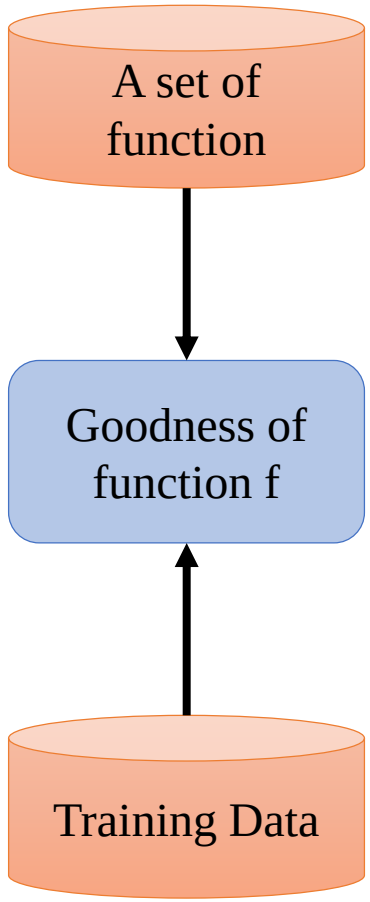
$f_1($  $) =' dog'$

$f_2($  $) =' snake'$

Framework

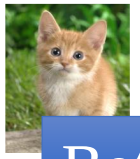
Image Recongintion

$f($  $) = 'Cat'$



Model

$f_1, f_2 \ldots\ldots$

$f_1($  $) = 'Cat'$

$f_2($  $) =' monkey'$

Better!

$f_1($  $) =' dog'$

$f_2($  $) =' snake'$

function input:   

function output: “monkey” “cat” “dog”

Framework

Image Recongintion

$f($  $) = 'Cat'$

Training

Testing

Model

A set of function

$f_1, f_2 \ldots \ldots$

Step 1

Goodness of function f

Step 2

Pick the "Best" function

f^*

Step 3

Training Data

"monkey"

"cat"

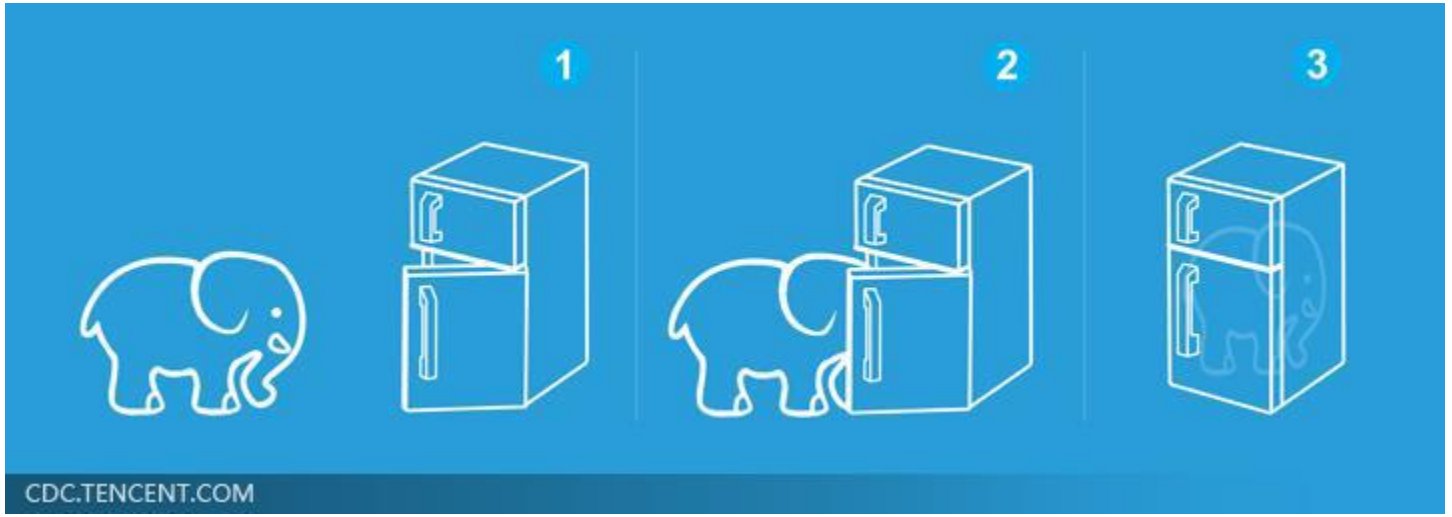
"dog"

"cat"

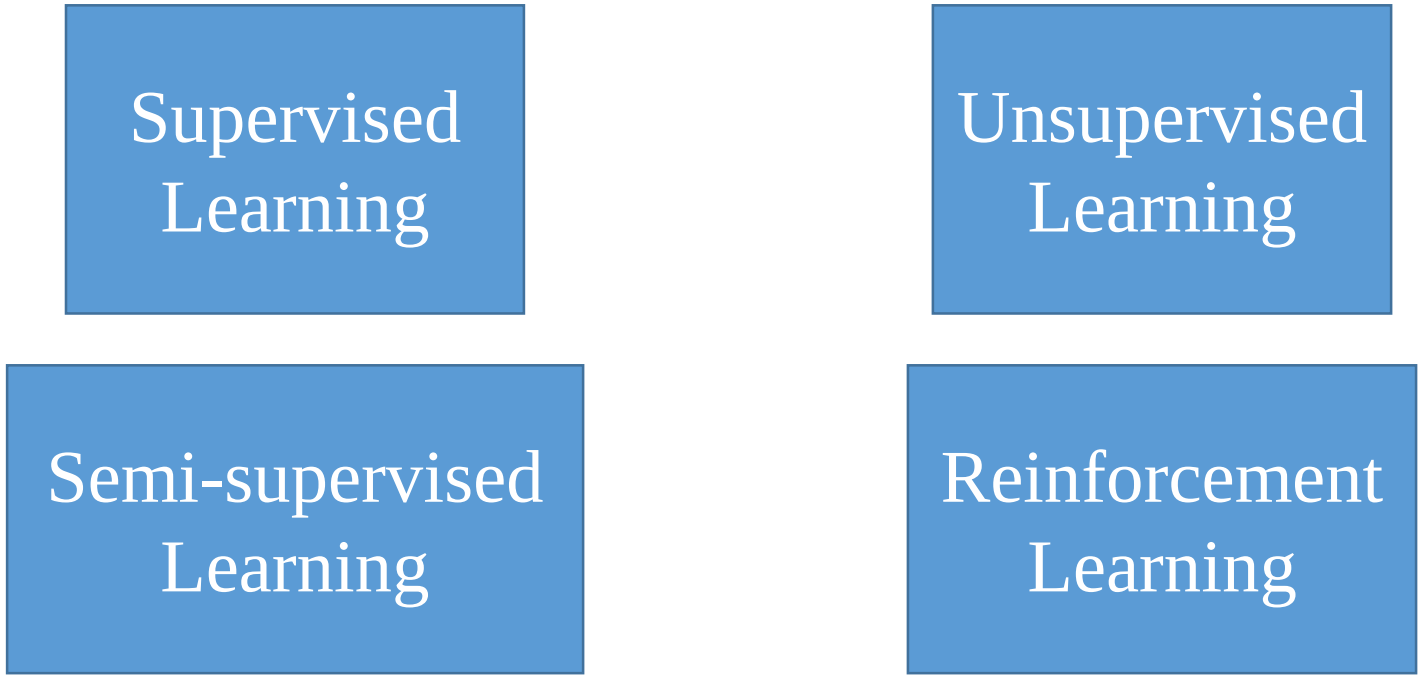
Using f^*

Machine Learning is so simple……

就好像把大象放進冰箱……



Scenario


Supervised Learning
Unsupervised Learning
Semi-supervised Learning
Reinforcement Learning

Task

Regression

Classification

Structured Learning

Task - Regression

The output of the target function f is a "scalar"

預測
PM2.5

Training Data:

input:

09/01 上午 PM2.5 = 63　09/02 上午 PM2.5 = 65

Output:

09/03 上午 PM2.5 = 100

input:

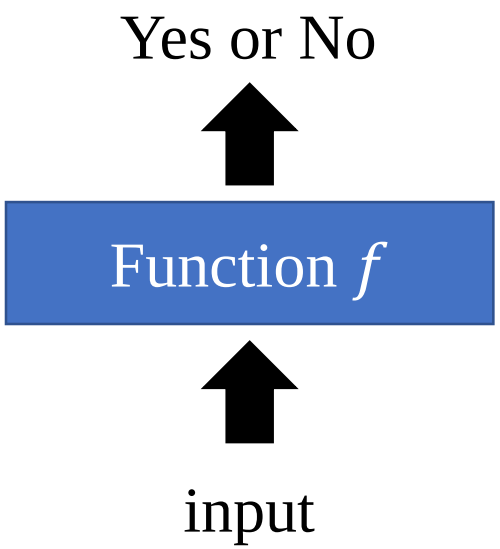
09/12 上午 PM2.5 = 30　09/13 上午 PM2.5 = 25

Output:

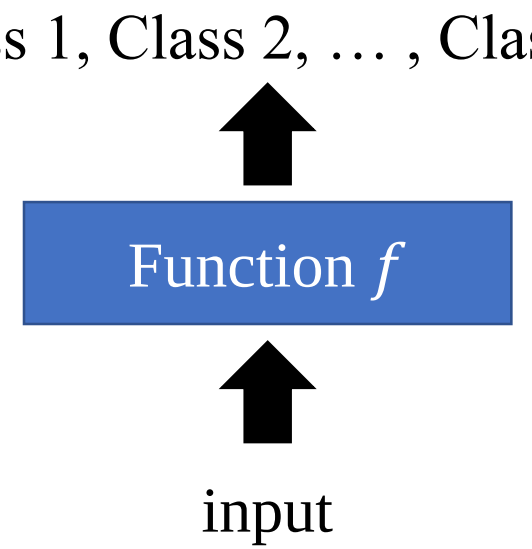
09/14 上午 PM2.5 = 20

Task - Classification

Binary Classification



Multi-class Classification



Binary Classification

Spam Filter

Function *f*

Yes / No

Training data

Yes

No

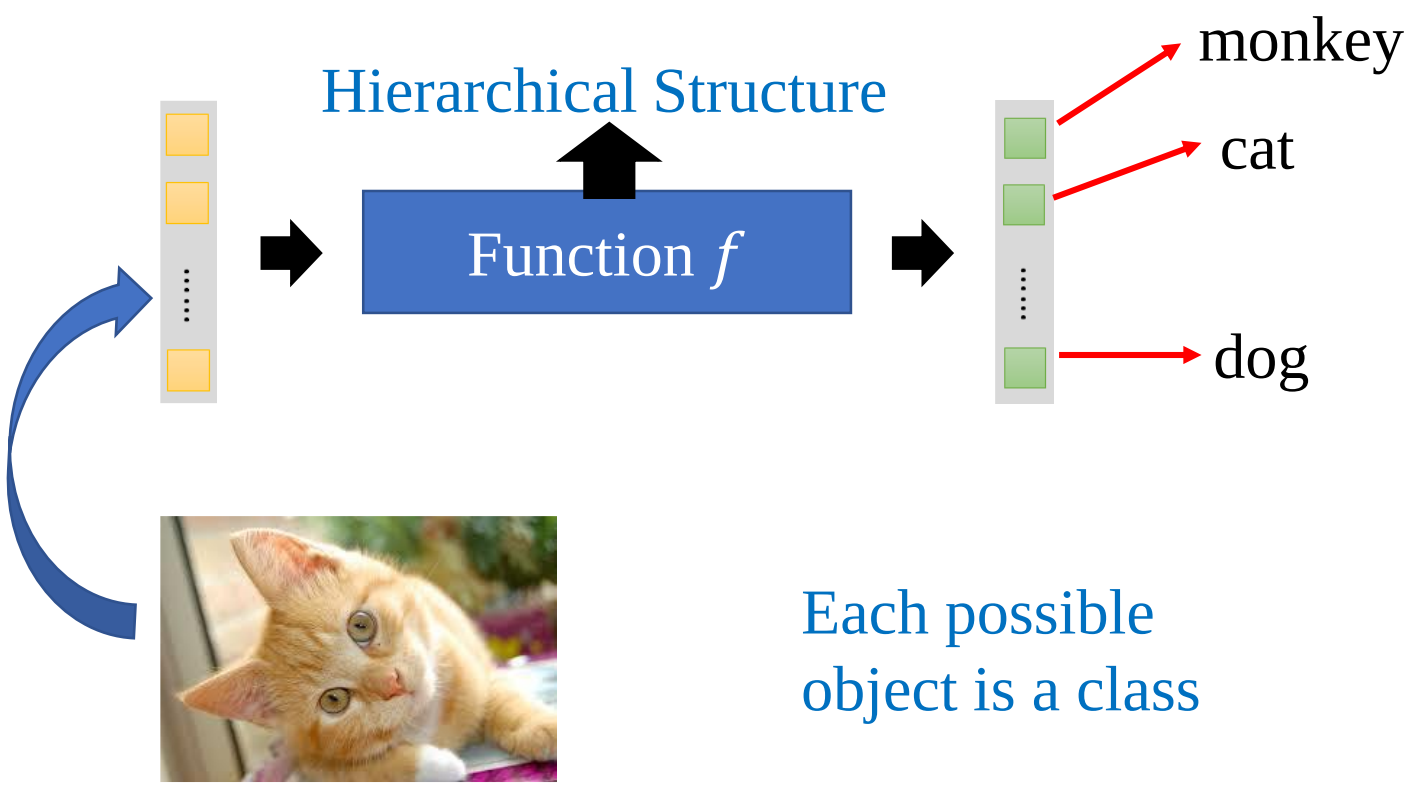
Multi-class Classification

Document Classification

Training Data

Classification – Deep Learning

Image Recognition



Each possible object is a class

Training Data


monkey


cat


dog

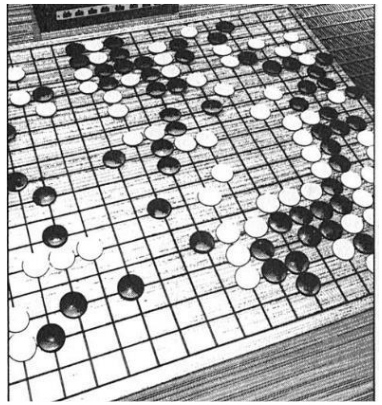
Classification – Deep Learning

Playing Go

Function *f*

Next move
Each position
is a class
(19 x 19 classes)

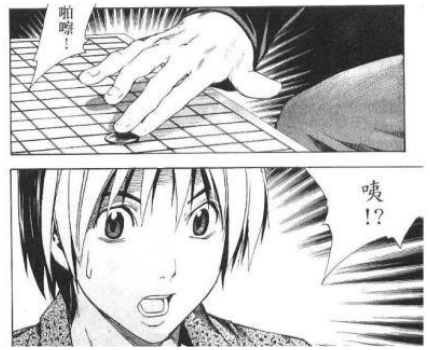
Training Data



一堆棋譜

進藤光 v.s. 社清春

黑 : 5之五 ⟶ 白 : 天元 ⟶ 黑 : 五之5



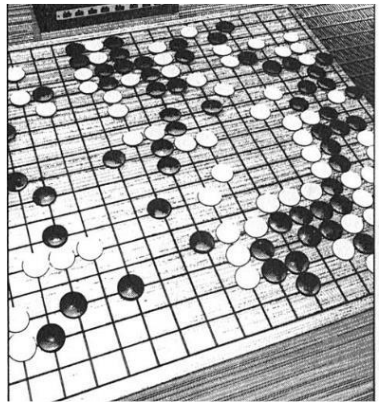
Classification – Deep Learning

Playing Go

Function *f*

Next move
Each position
is a class
(19 x 19 classes)

Training Data



一堆棋譜

進藤光 v.s. 社清春

黑 : 5之五 → 白 : 天元 → 黑 : 五之5

input:
黑 : 5之五 → output:
天元

input:
黑 : 5之五、白 : 天元 → output:
五之5

Supervised Learning

- Training Data : input / output pair of target function
- Function output = label

- Hard to collect a large amount of labelled data

Semi-supervised Learning

For example, recognizing cats and dogs

labelled data

cat

dog

unlabelled data



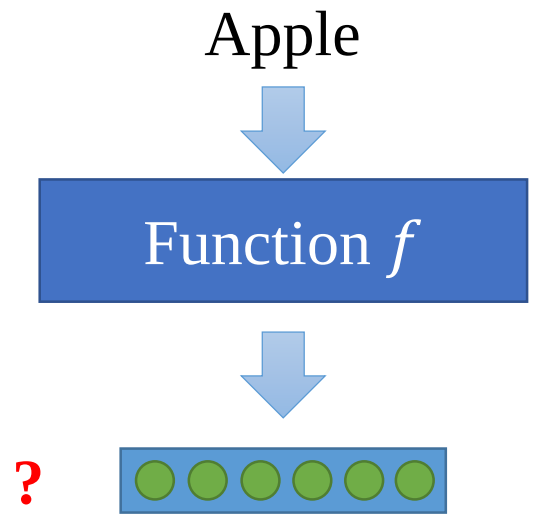

(images of cats and dogs)

Unsupervised Learning

Machine Reading : Machine learns the meaning of words from reading a lot of documents

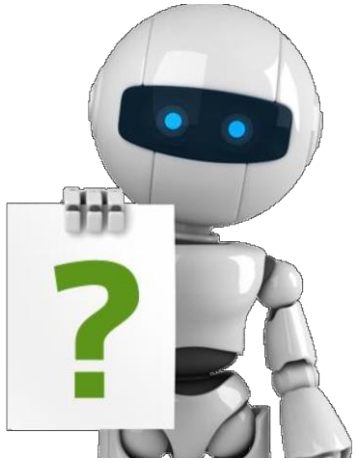
Unsupervised Learning

Machine Reading : Machine learns the meaning of words from reading a lot of documents



Training data is a lot of text

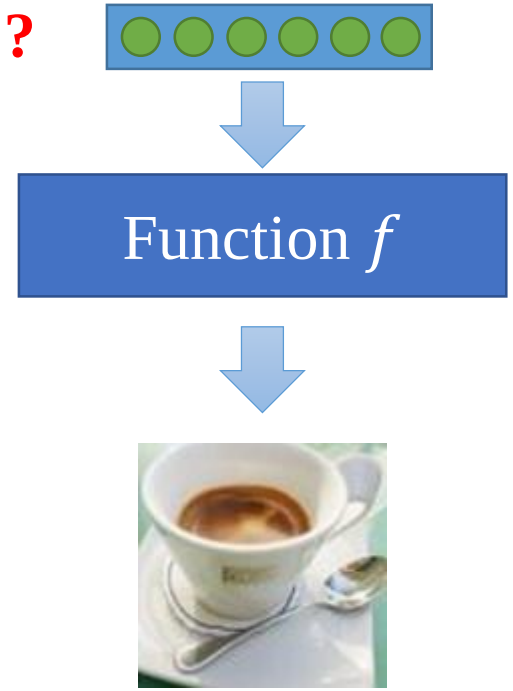
Unsupervised Learning



Draw something!

Unsupervised Learning

- Machine Drawing



Training data is a lot of images

Reinforcemnt Learning

Supervised v.s. Reinforcement

Supervised

Learning from teacher

"Hello"

say "Hi"

"Bye Bye"

say "Good bye"

Reinforcement

Learning from critics

.....

Hello

Agent

.....

.....

Agent

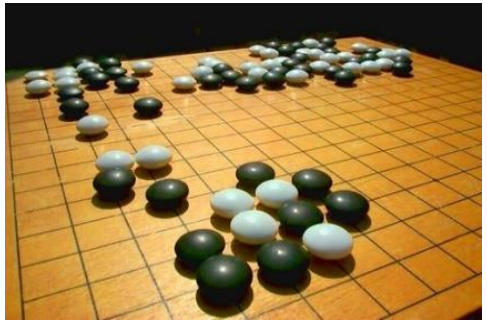
.....

Bad

Supervised v.s. Reinforcement

Supervised

next move:
“5-5”

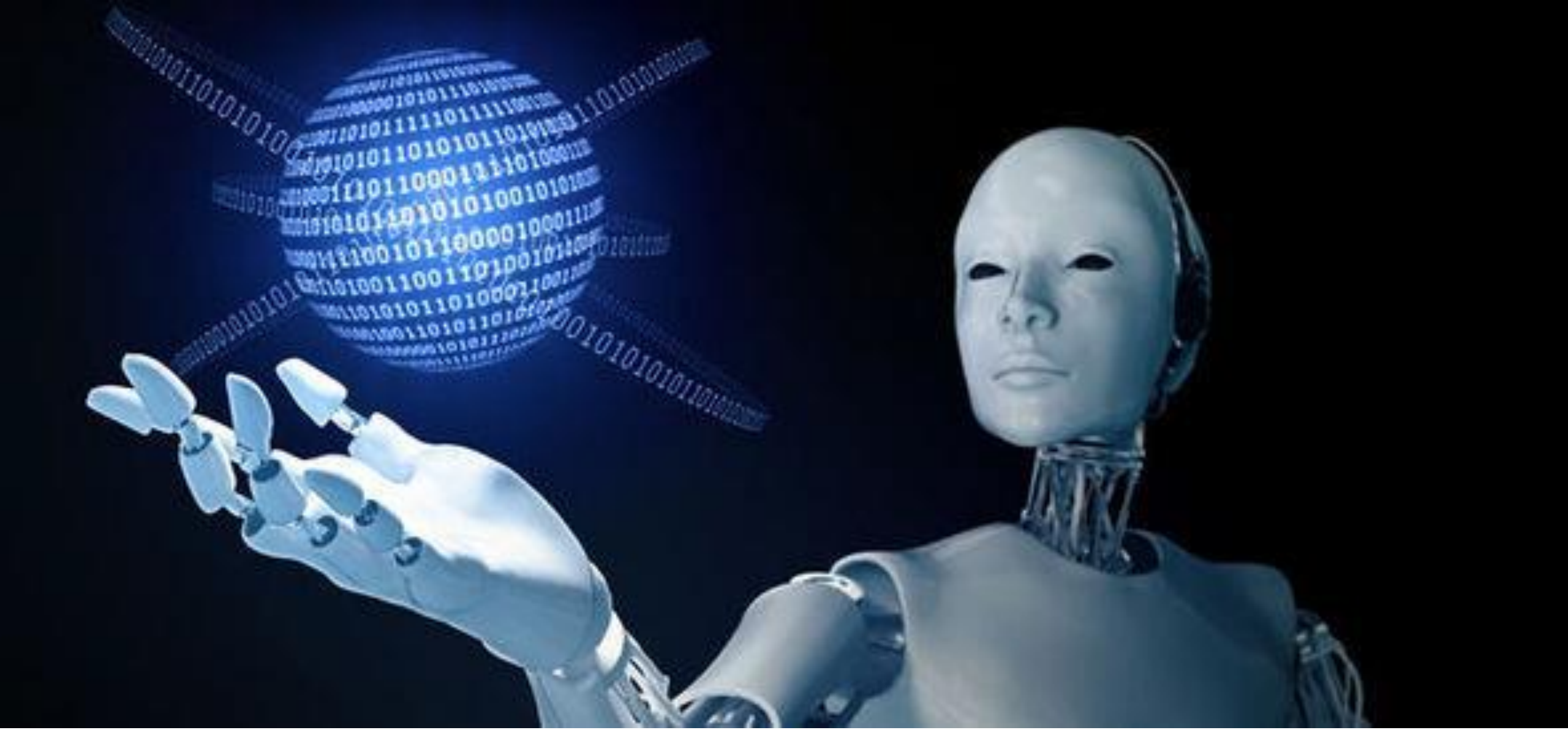


next move:
“3-3”

Reinforcement

First move → …… many moves …… → Win!

Alpha Go is supervised learning + reinforcement learning.



AI 即將取代部份工作?

AI 訓練師

機器不是會自己學嗎?
為什麼需要 AI 訓練師

戰鬥是寶可夢在打
為什麼需要寶可夢訓練師?

AI 訓練師

寶可夢訓練師

- 要挑選適合的寶可夢來戰鬥
  - 寶可夢有不同屬性

AI 訓練師

- 要挑選合適的 model 與 loss function
  - 不同的 model 與 loss function 適合解決不同的問題


眞的沒有問題嗎

AI 訓練師

寶可夢訓練師

- 要挑選適合的寶可夢來戰鬥
  - 寶可夢有不同屬性
- 召喚出來的寶可夢不一定聽話
  - e.g. 小智的噴火龍
  - 需要有經驗的寶可夢訓練師

AI 訓練師

- 要挑選合適的 model 與 loss function
  - 不同的 model 與 loss function 適合解決不同的問題
- 不一定能找出 best function
  - e.g. Deep Learning
  - 需要有經驗的 AI 訓練師

Thanks!