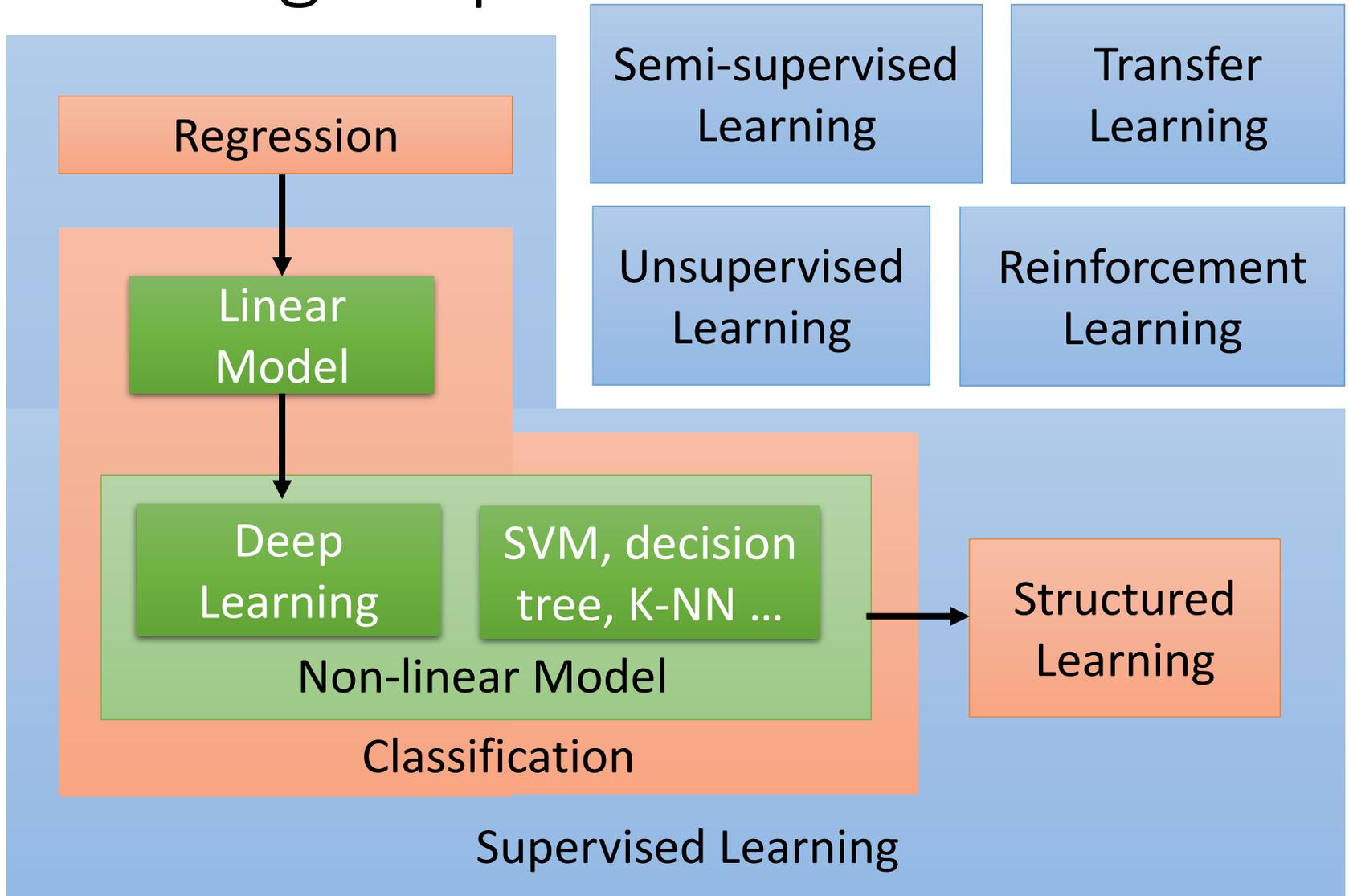


# Learning Map

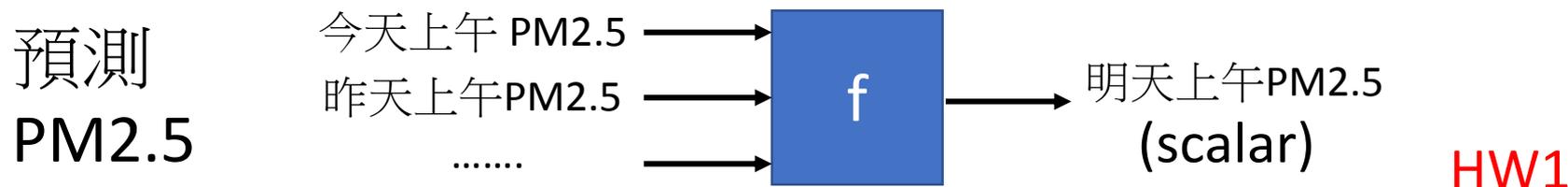
# Learning Map



# Learning Map

Regression

The output of the target function  $f$  is “scalar”.



## Training Data:

Input:

9/01 上午 PM2.5 = 63    9/02 上午 PM2.5 = 65

Input:

9/12 上午 PM2.5 = 30    9/13 上午 PM2.5 = 25

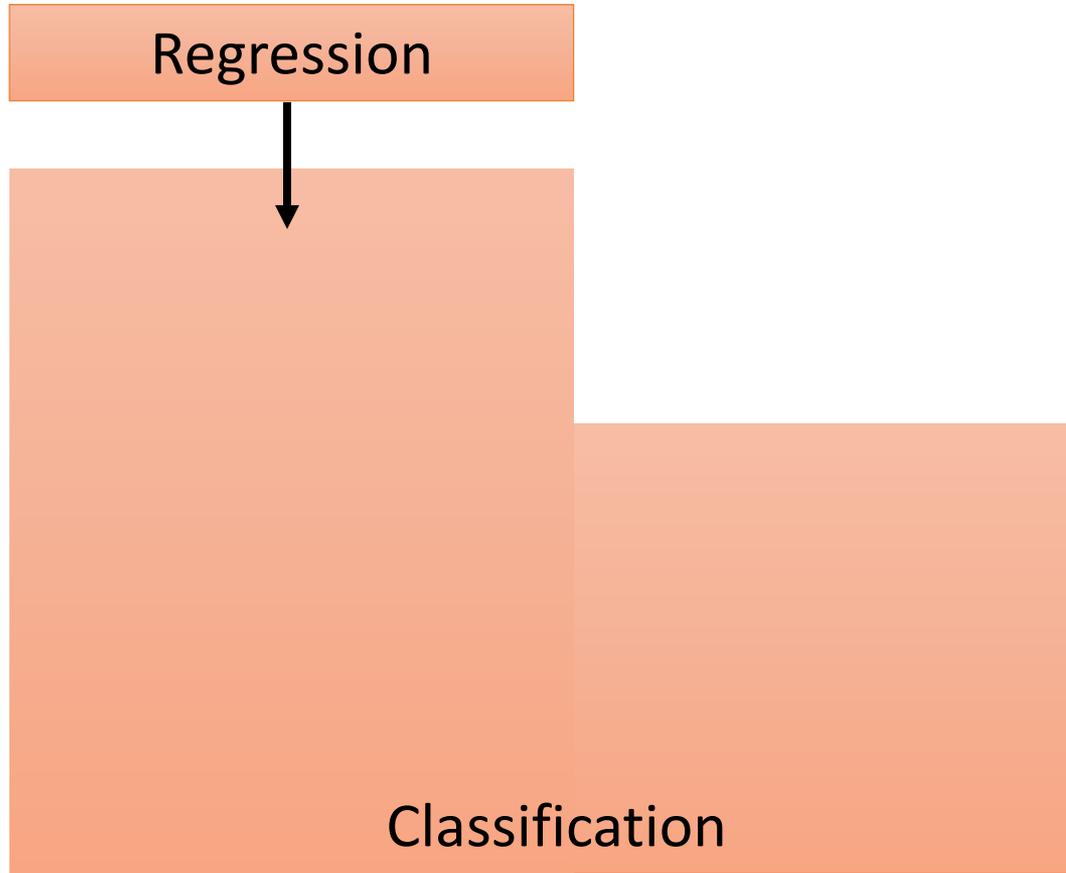
Output:

9/03 上午 PM2.5 = 100

Output:

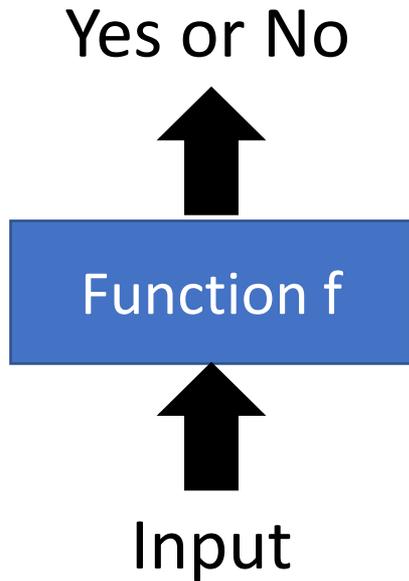
9/14 上午 PM2.5 = 20

# Learning Map

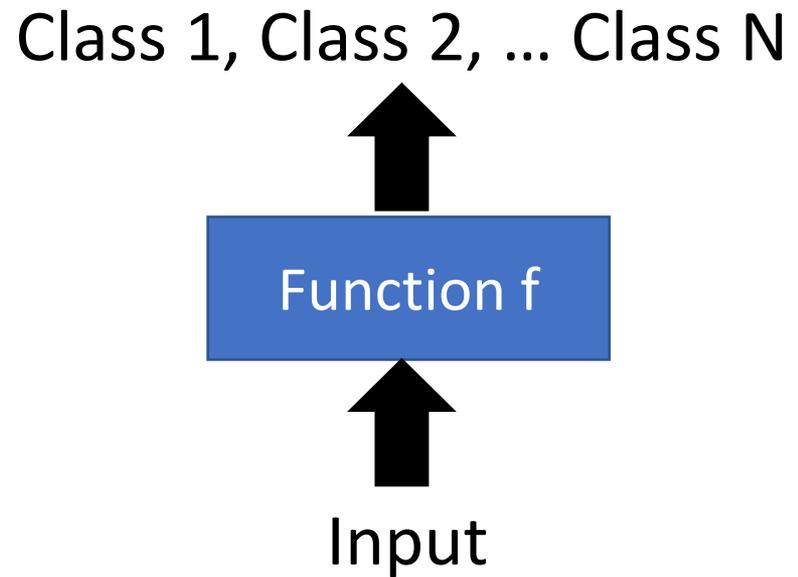


# Classification

- Binary Classification

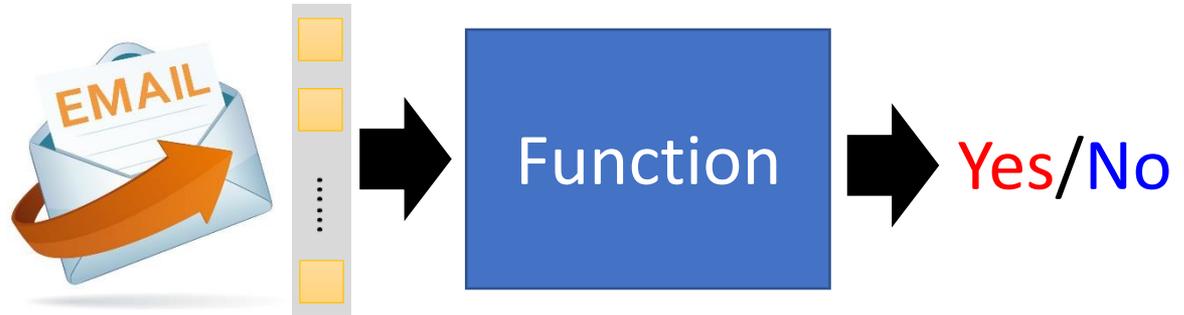


- Multi-class Classification



# Binary Classification

Spam  
filtering



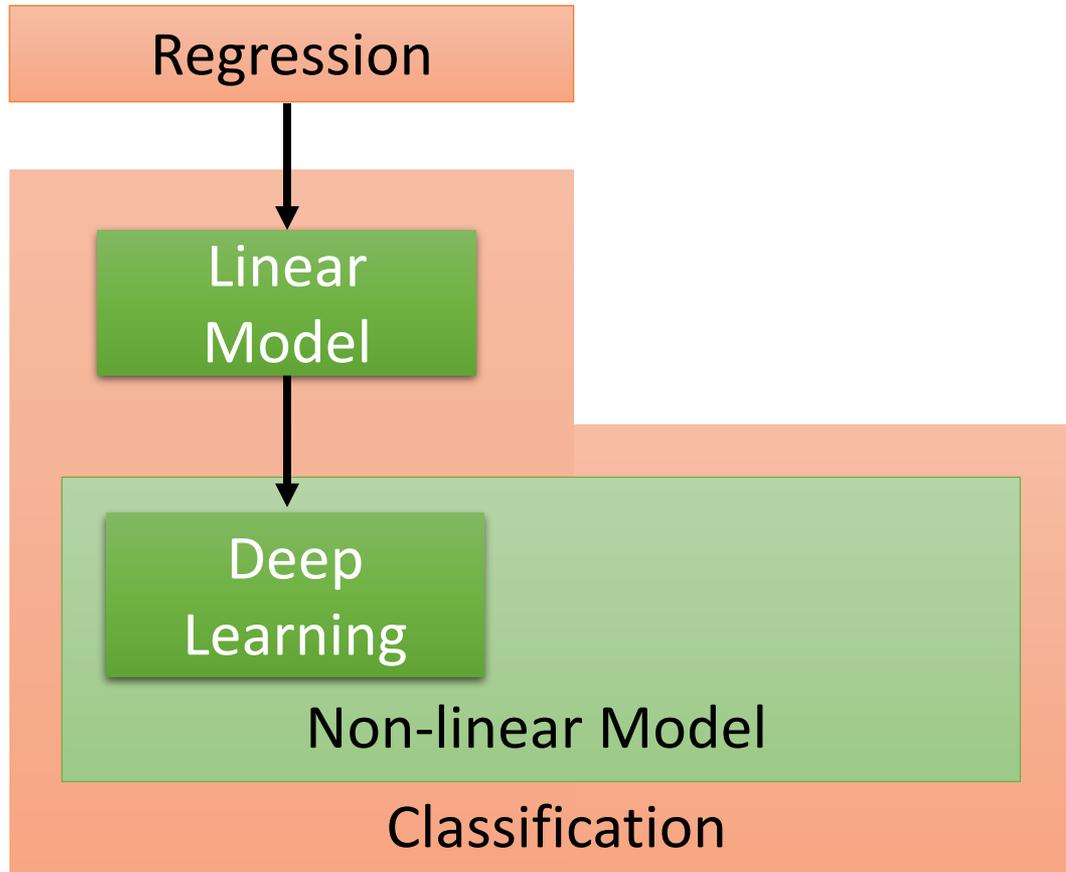
(<http://spam-filter-review.toptenreviews.com/>)

# Multi-class Classification

## Document Classification

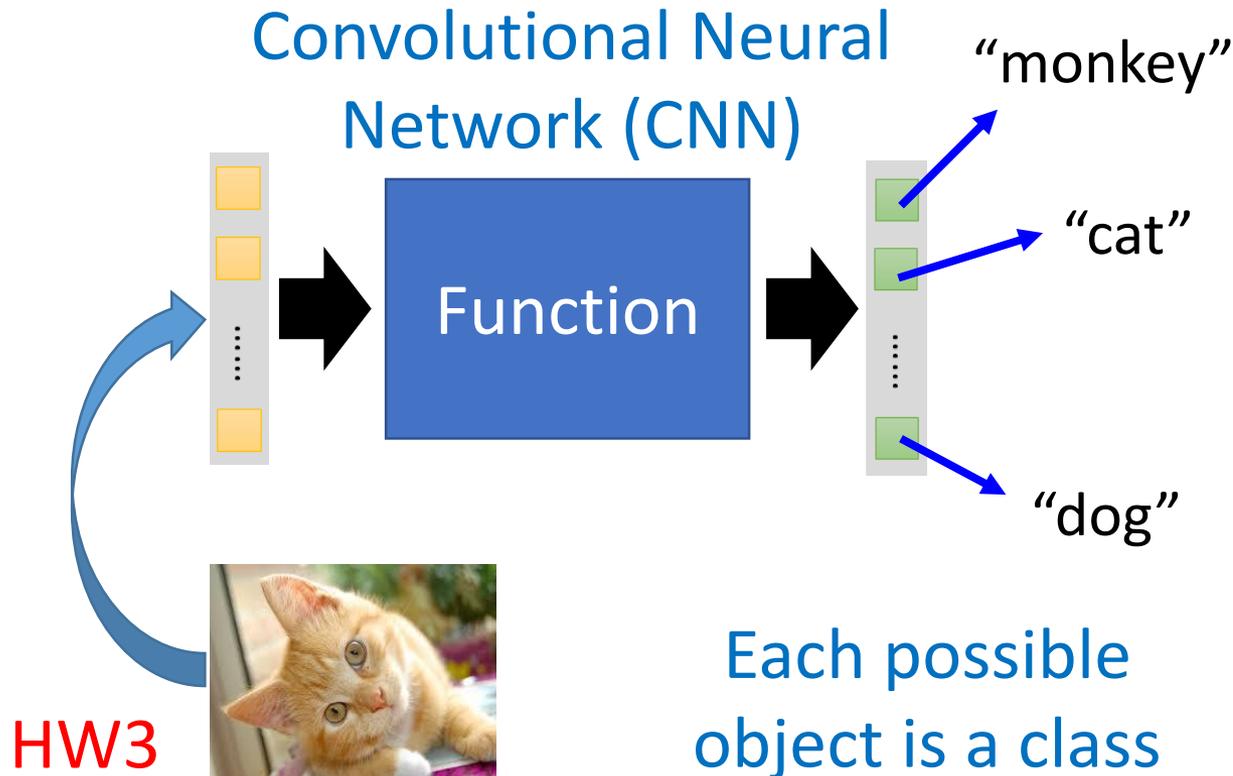


# Learning Map

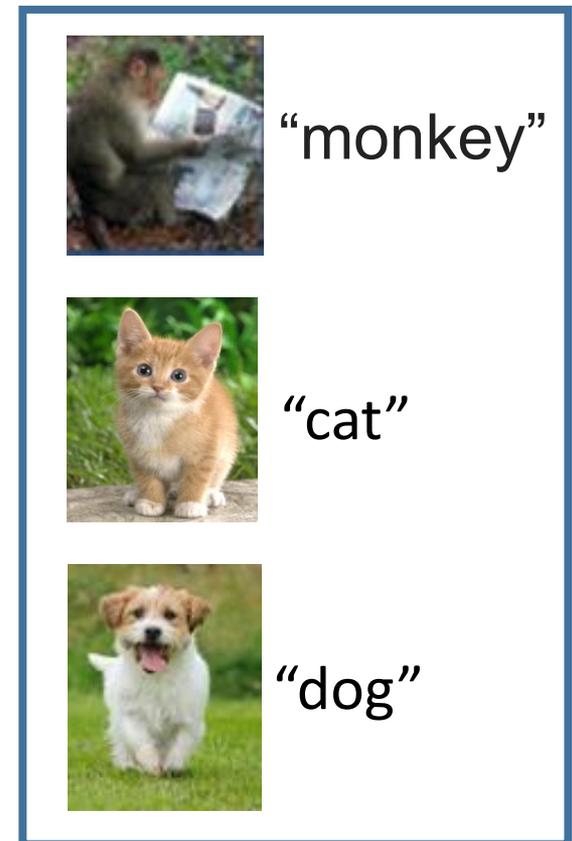


# Classification - Deep Learning

- Image Recognition



## Training Data



# Classification - Deep Learning

- Playing GO

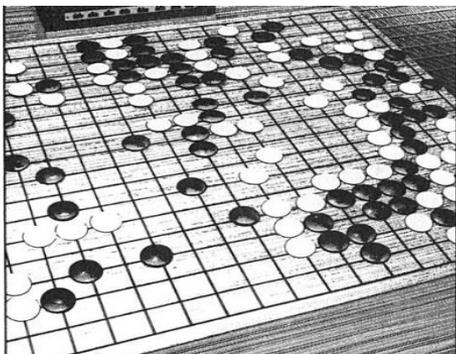


Function



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



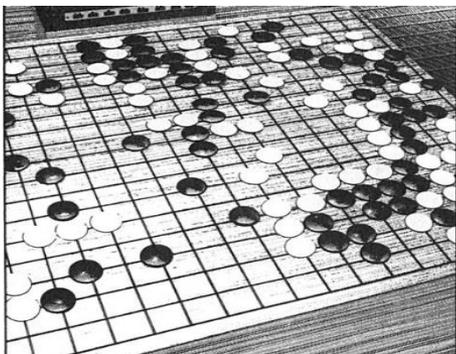
# Classification - Deep Learning

- Playing GO



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

## Training Data



一堆棋譜

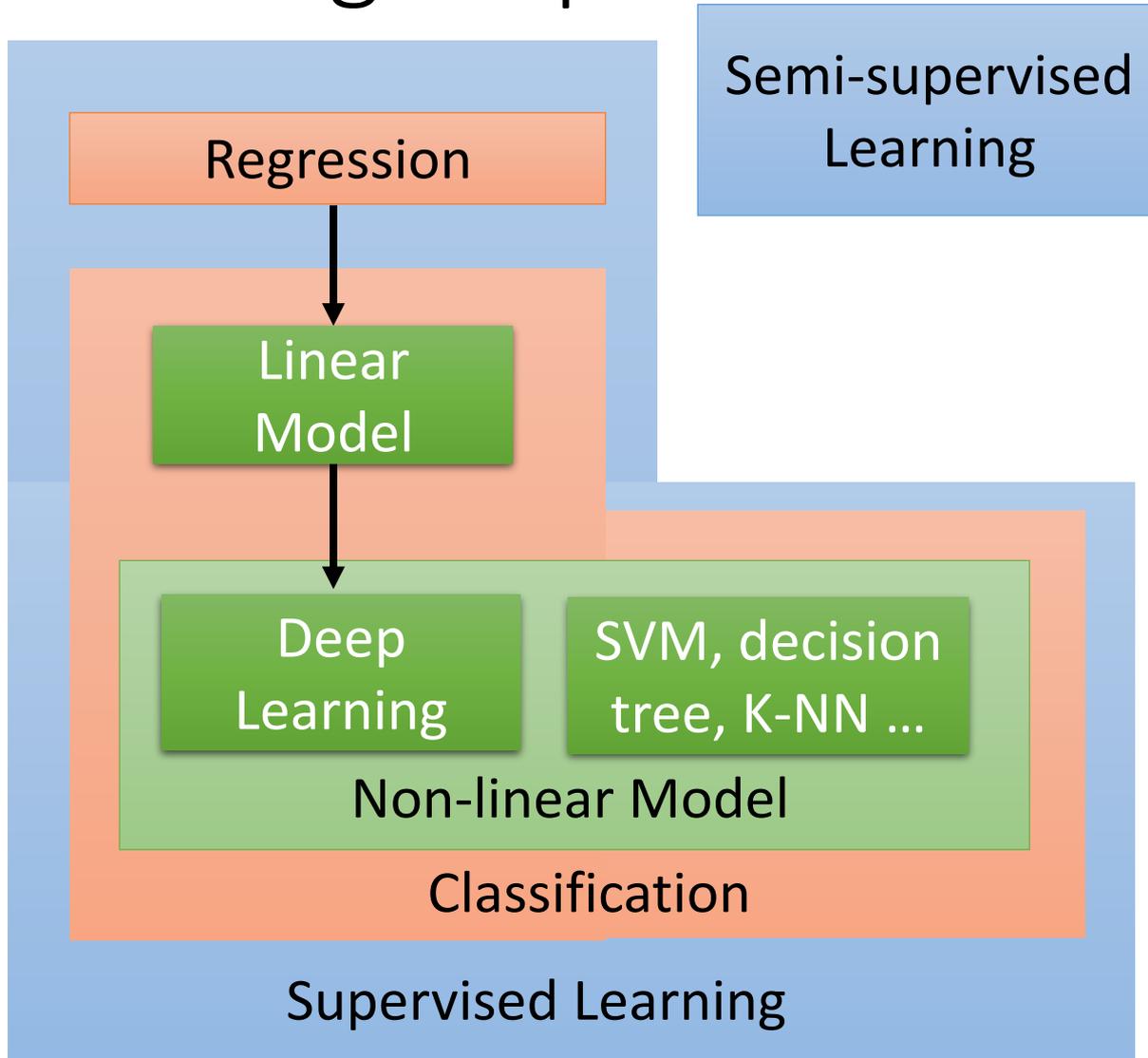
進藤光 v.s. 社清春

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

# Learning Map



Training Data:

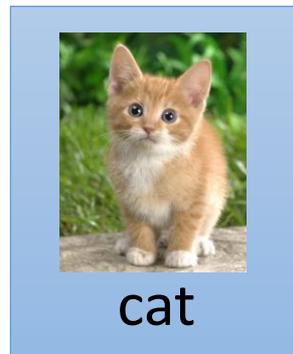
Input/output  
pair of target  
function

Function  
output = label

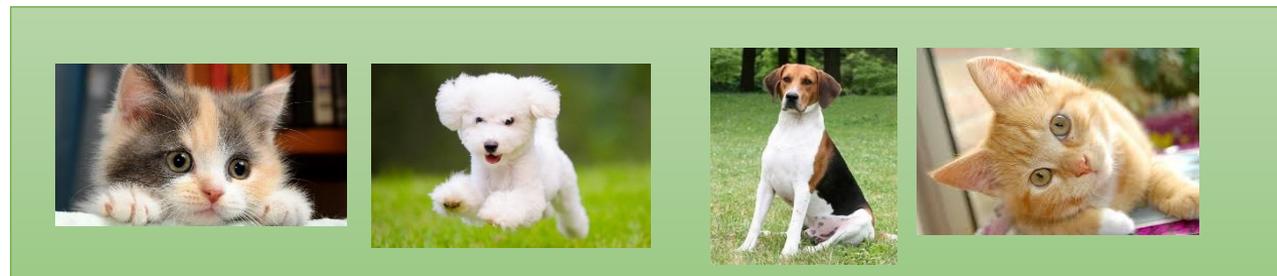
# Semi-supervised Learning

For example, recognizing cats and dogs

Labelled  
data

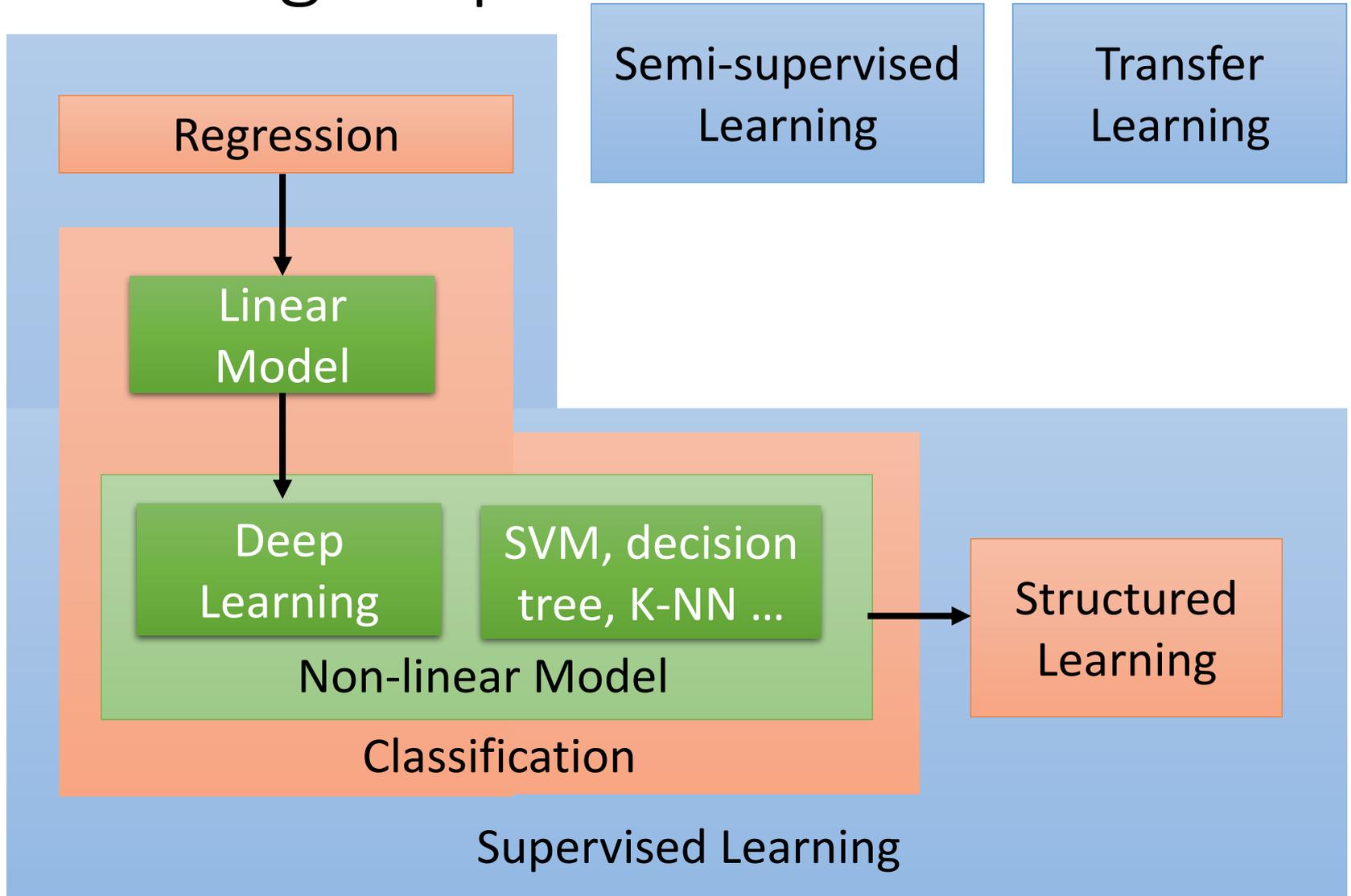


Unlabeled  
data



(Images of cats and dogs)

# Learning Map



# Transfer Learning

For example, recognizing cats and dogs

Labelled  
data



cat



dog



elephant

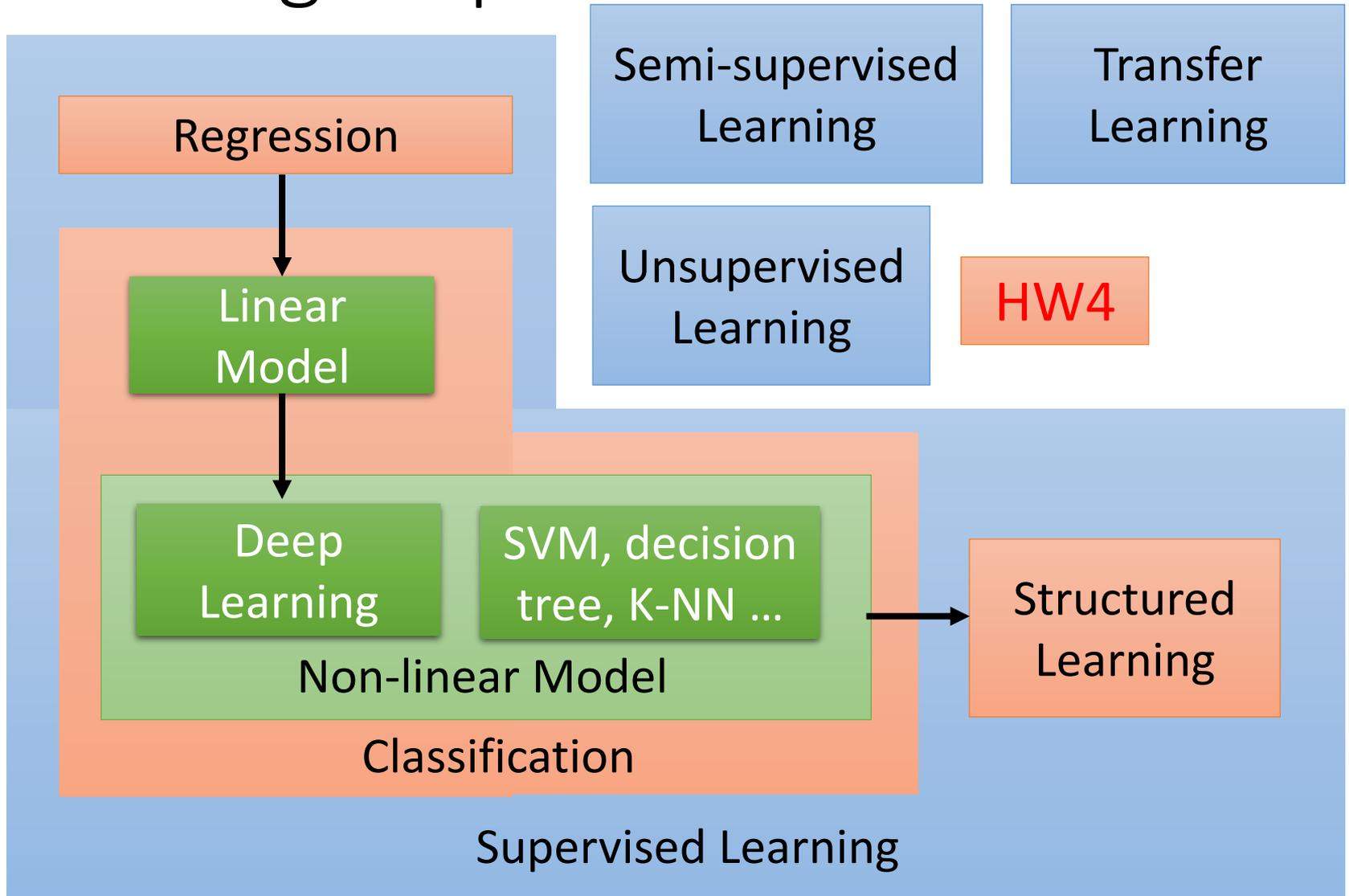


Haruhi



Data not related to the task considered  
(can be either labeled or unlabeled)

# Learning Map



# Unsupervised Learning

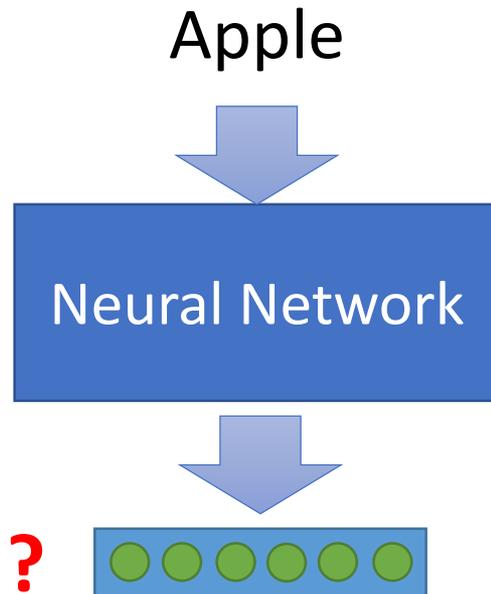
- Machine Reading: Machine learns the meaning of words from reading a lot of documents



<http://top-breaking-news.com/>

# Unsupervised Learning

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



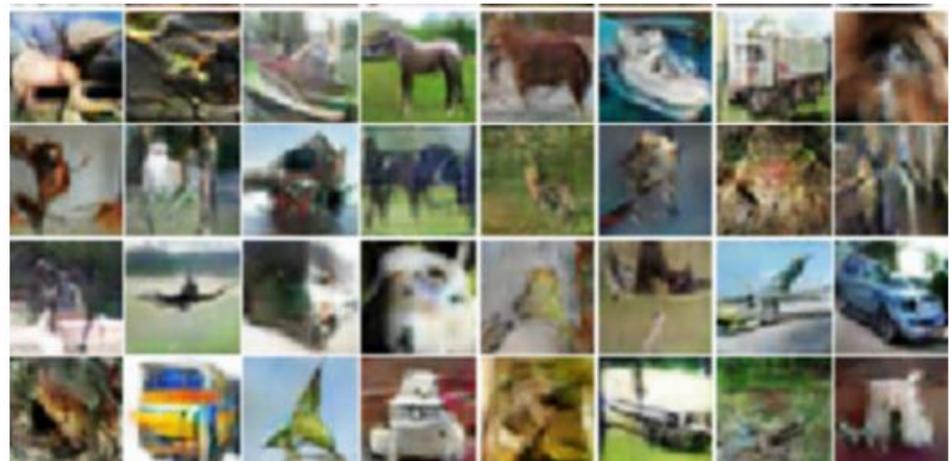
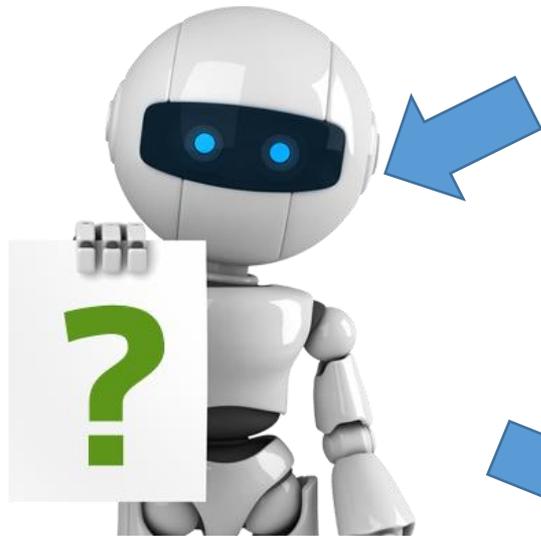
Training data is a lot of text



<https://garavato.files.wordpress.com/2011/11/stacksdocuments.jpg?w=490>

# Unsupervised Learning

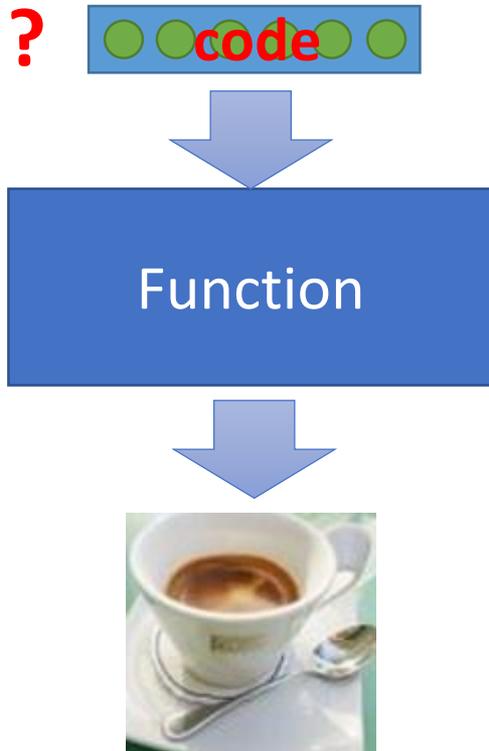
Ref: <https://openai.com/blog/generative-models/>



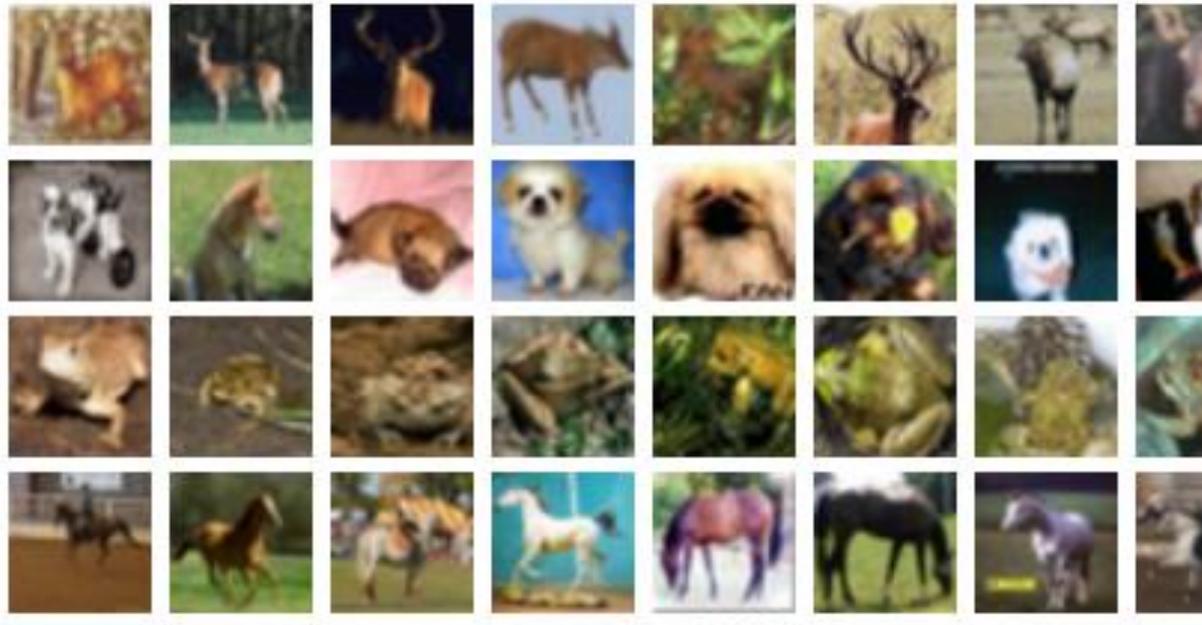
Draw something!

# Unsupervised Learning

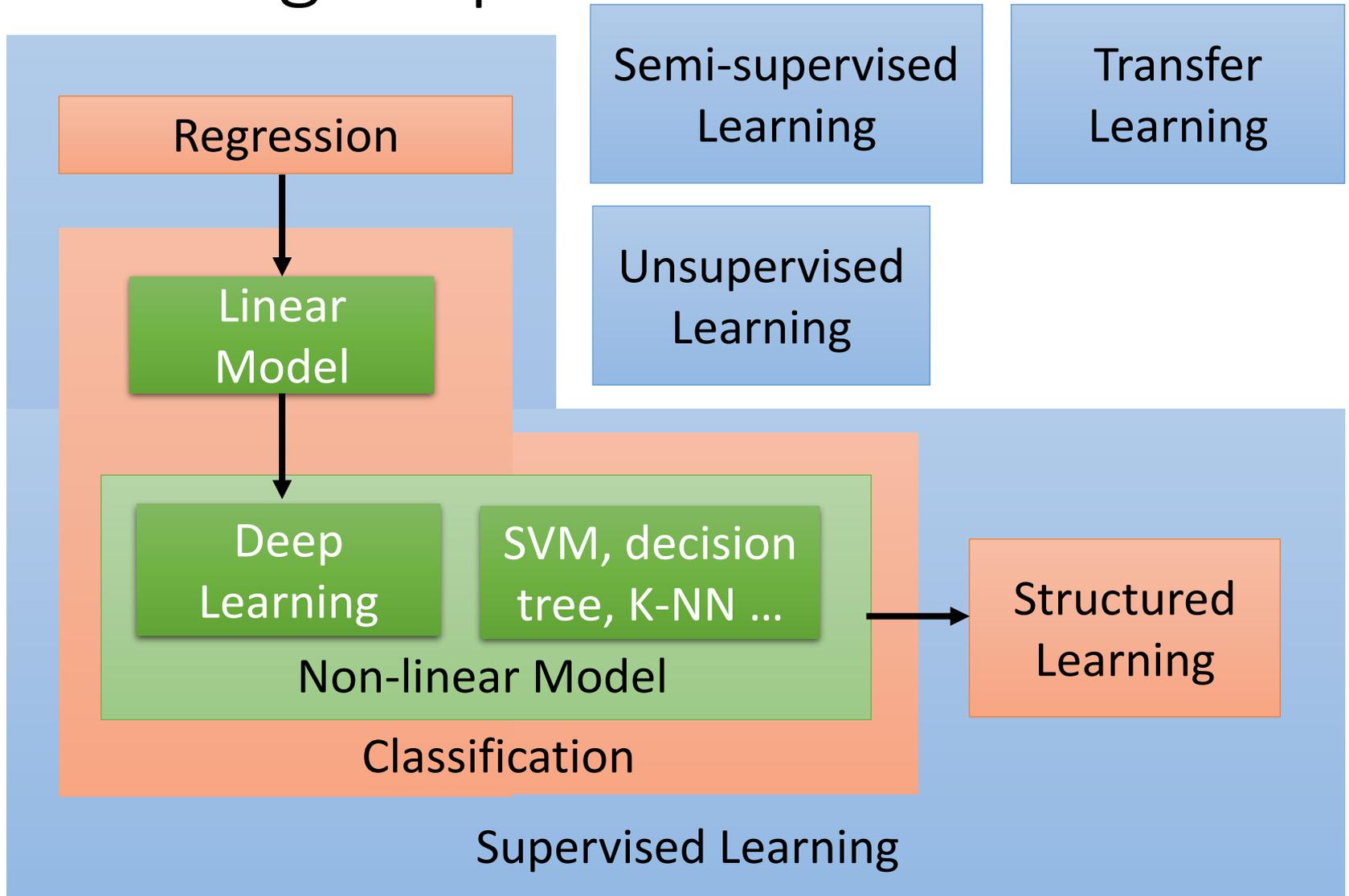
- Machine Drawing



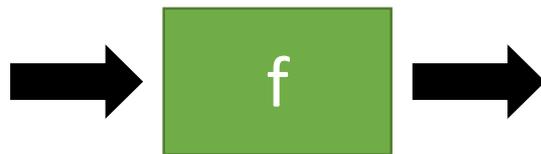
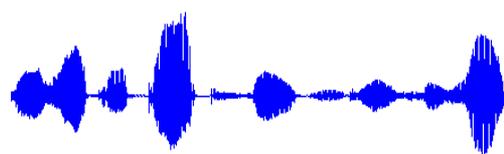
Training data is a lot of images



# Learning Map



# Structured Learning - Beyond Classification



“大家好，歡迎大家來修機器學習”

Speech Recognition

“機器學習”



“Machine Learning”

Machine Translation

人臉辨識

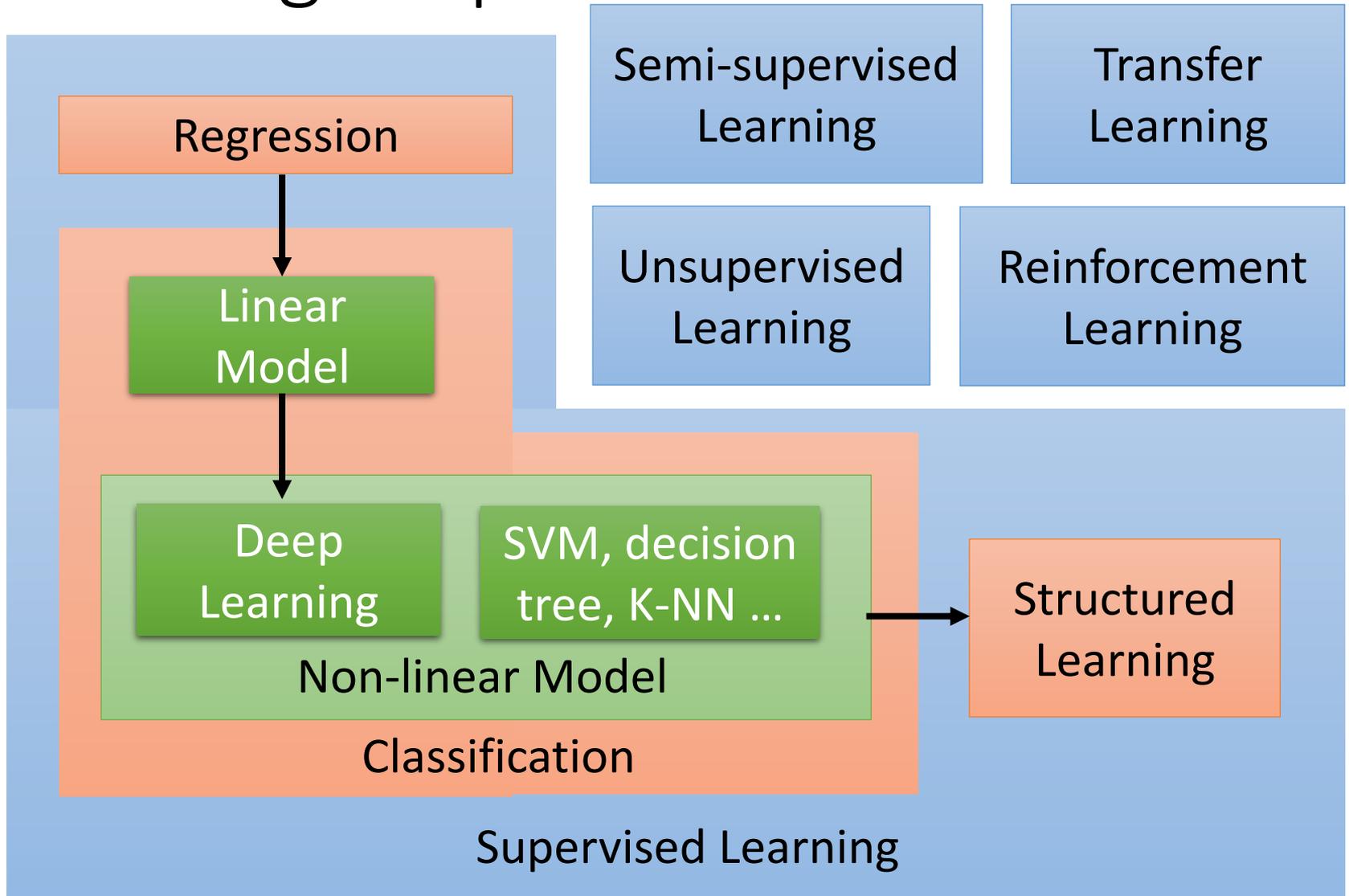


長門

春日

實玖瑠

# Learning Map



# Reinforcement Learning



# Supervised v.s. Reinforcement

- Supervised

Learning from teacher

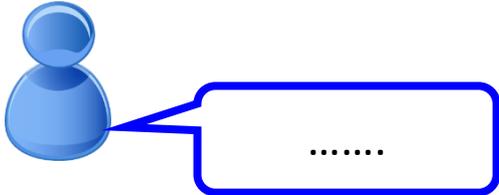
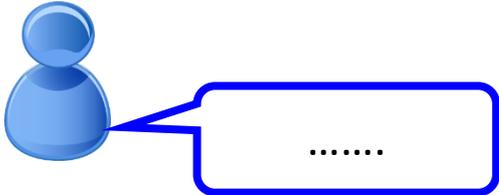


Say "Hi"



Say "Good bye"

- Reinforcement

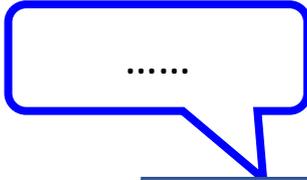


.....

Learning from critics



Agent



Agent



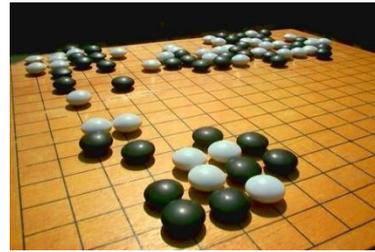
Bad

# Supervised v.s. Reinforcement

- Supervised:



Next move:  
"5-5"



Next move:  
"3-3"

- Reinforcement Learning

First move → ..... many moves ..... → Win!

Alpha Go is supervised learning + reinforcement learning.

■ scenario ■ task ■ method

# Learning Map

