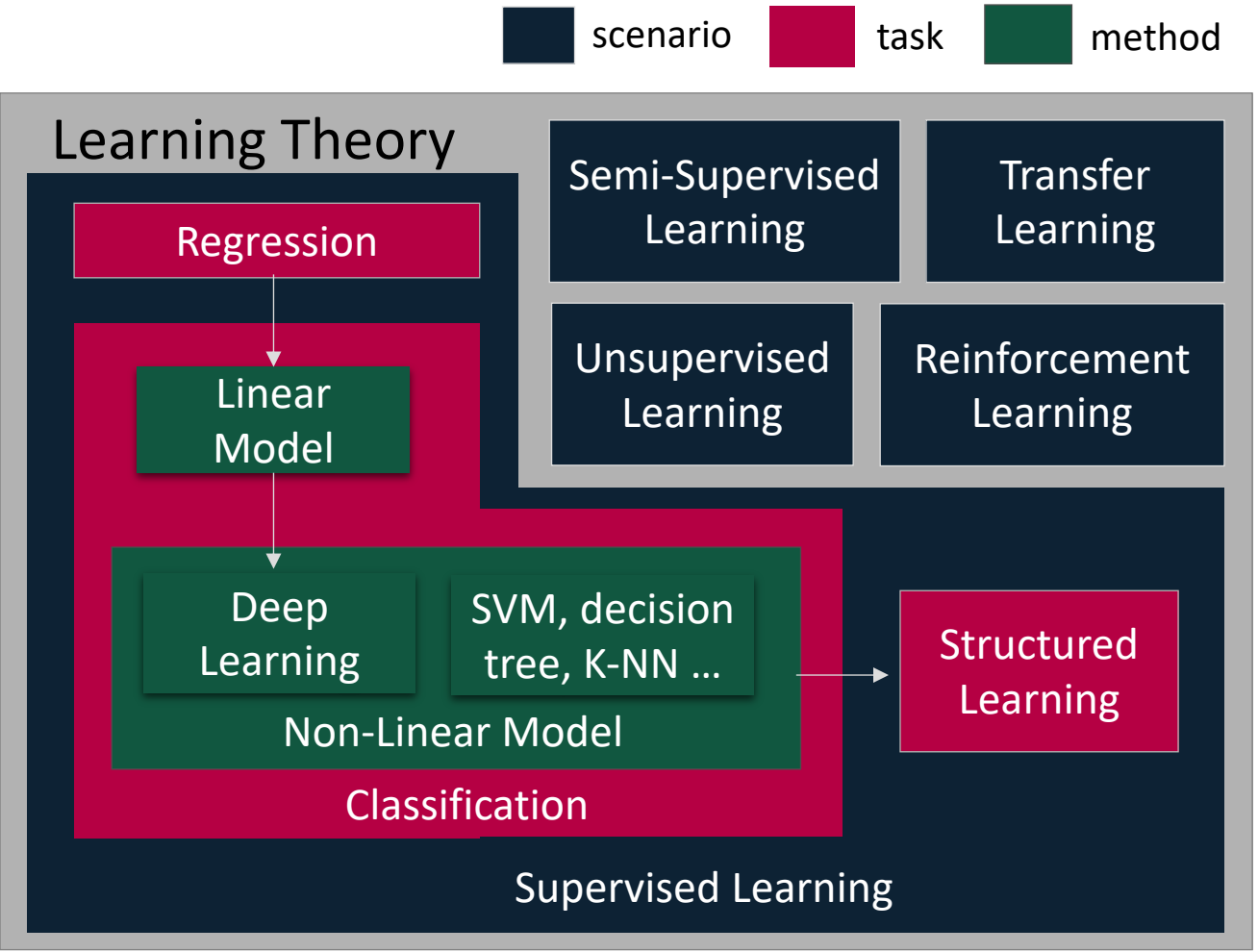
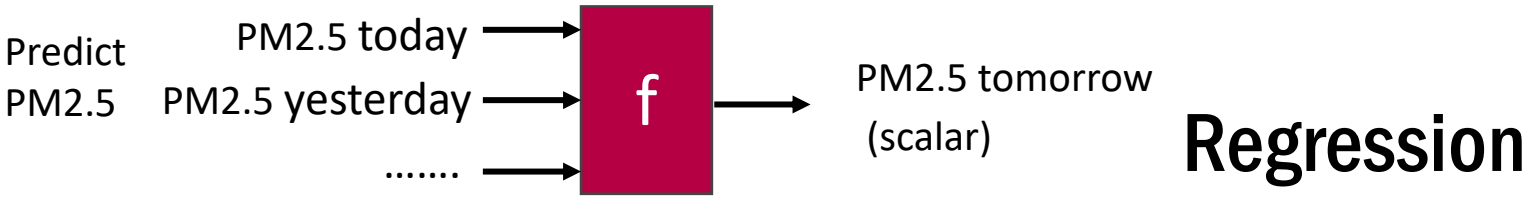
Learning Map



Introduction to the Learning Map

Regression: The output of the target function f is "scalar".



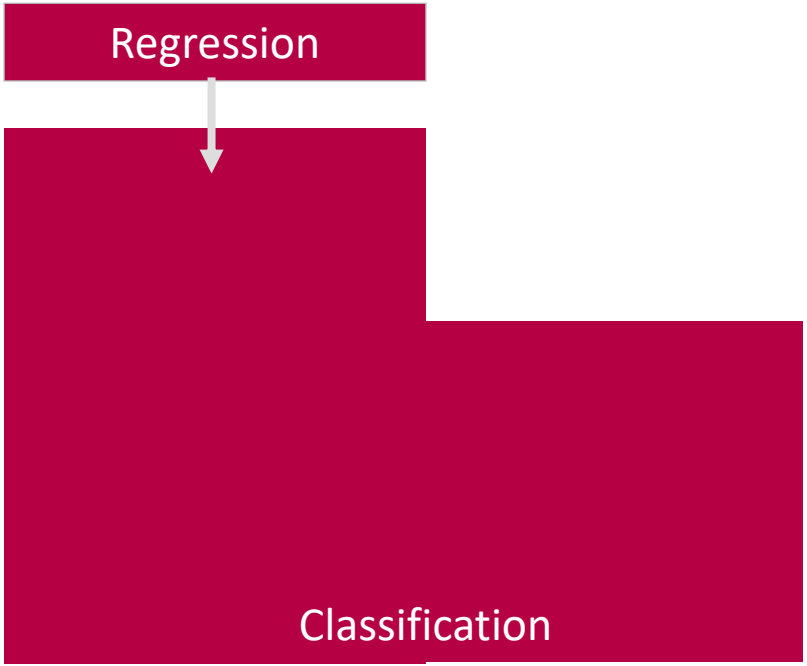
Training Data:

Input:
9/01 PM2.5=63 9/02 PM2.5=65

Output:
9/03 PM2.5=100

Input:
9/12 PM2.5=30 9/13 PM2.5=25

Output:
9/14 PM2.5=20

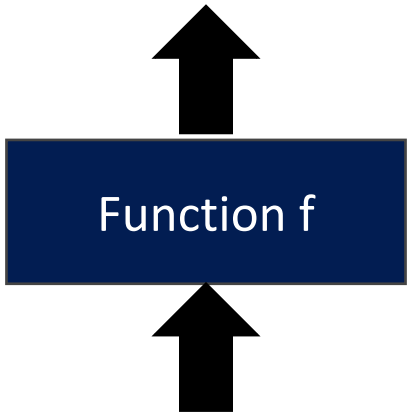


Learning Map: Part I

Classification

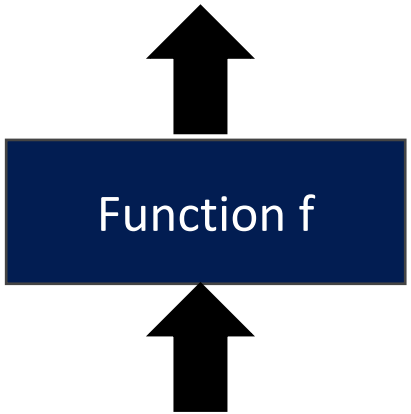
Binary Classification

Yes or No



Multi-Class Classification

Class 1, Class 2, … Class N



Binary Classification

Spam filtering

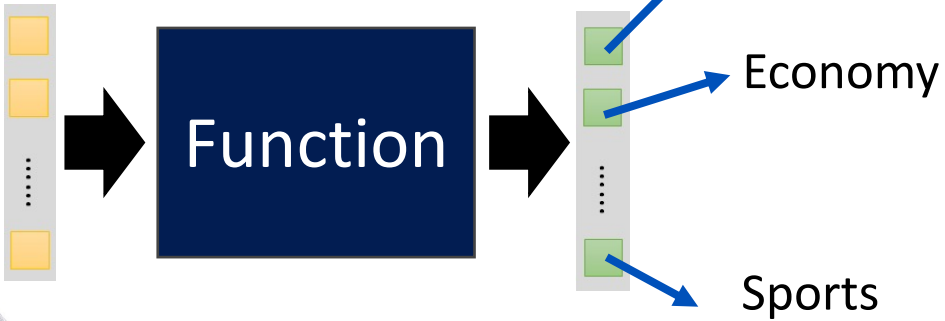
Function

Yes/No

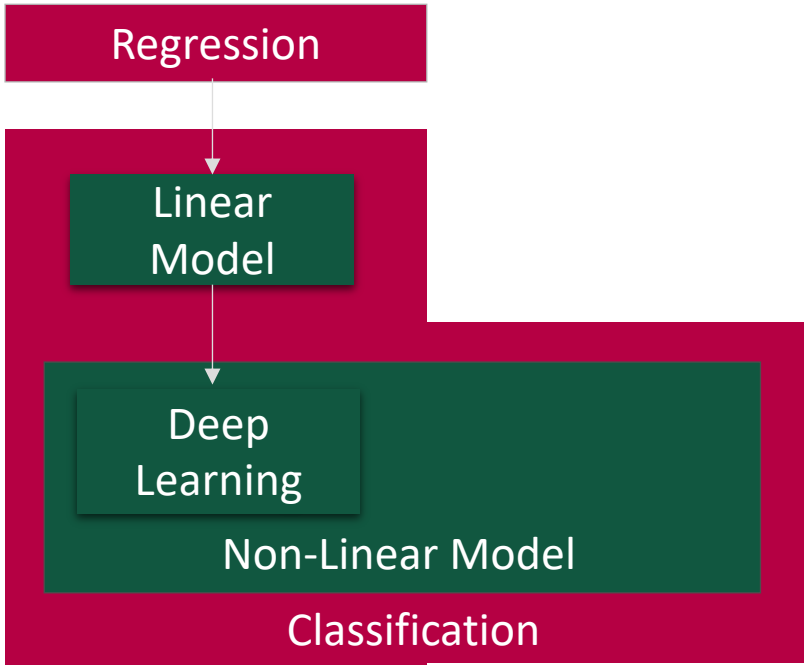
Training Data

Multi-Class Classification

Document Classification



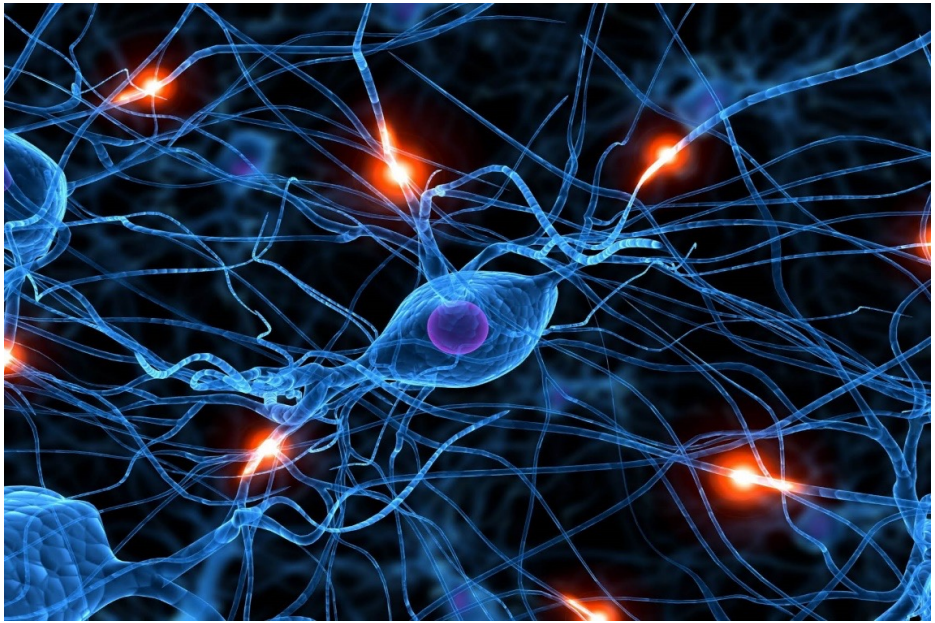
Training Data



Learning Map: Part II

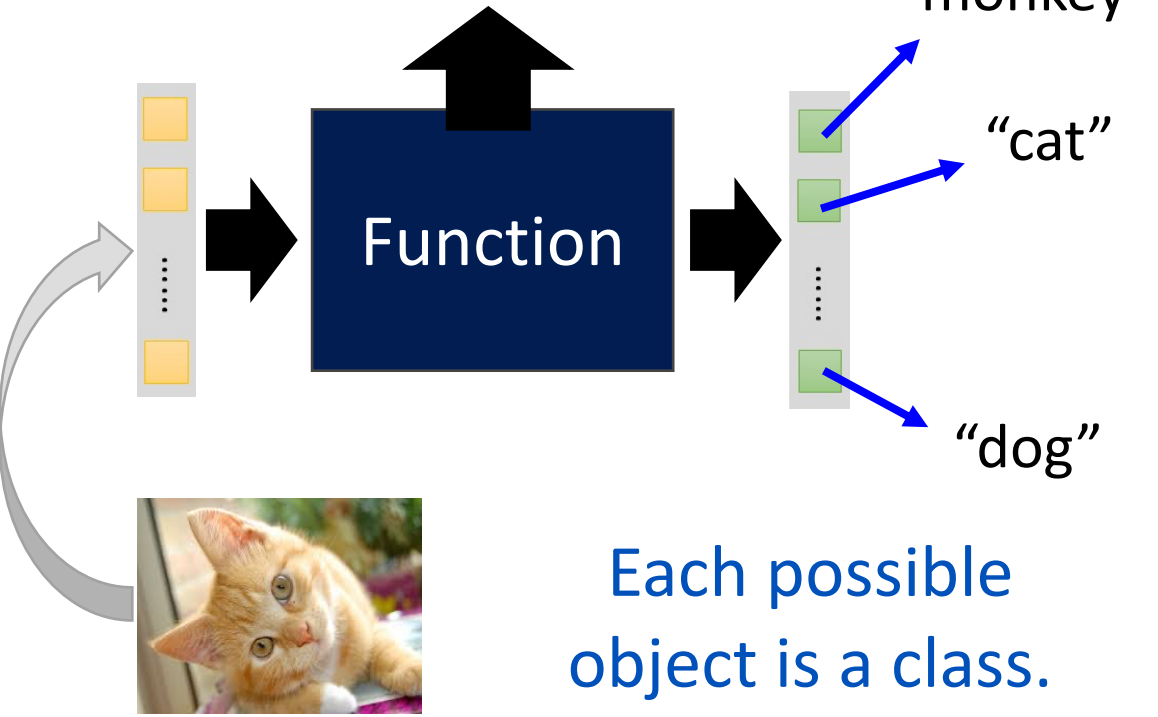
Deep Learning

- Deep learning, SVM, decision tree ….
  - Using different ways to represent a function
- Using neural network to represent a function



Classification—Deep Learning: Part I

Hierarchical Structure



Each possible object is a class.

Training Data


"monkey"


"cat"

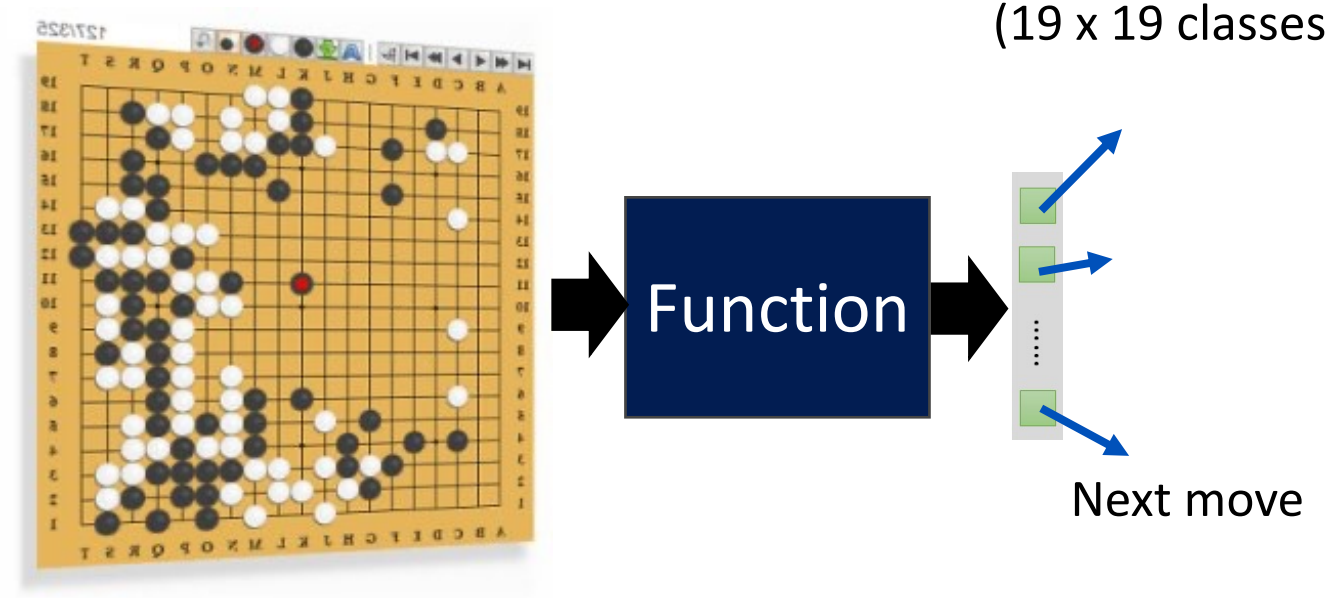

"dog"

Classification—Deep Learning: Part II

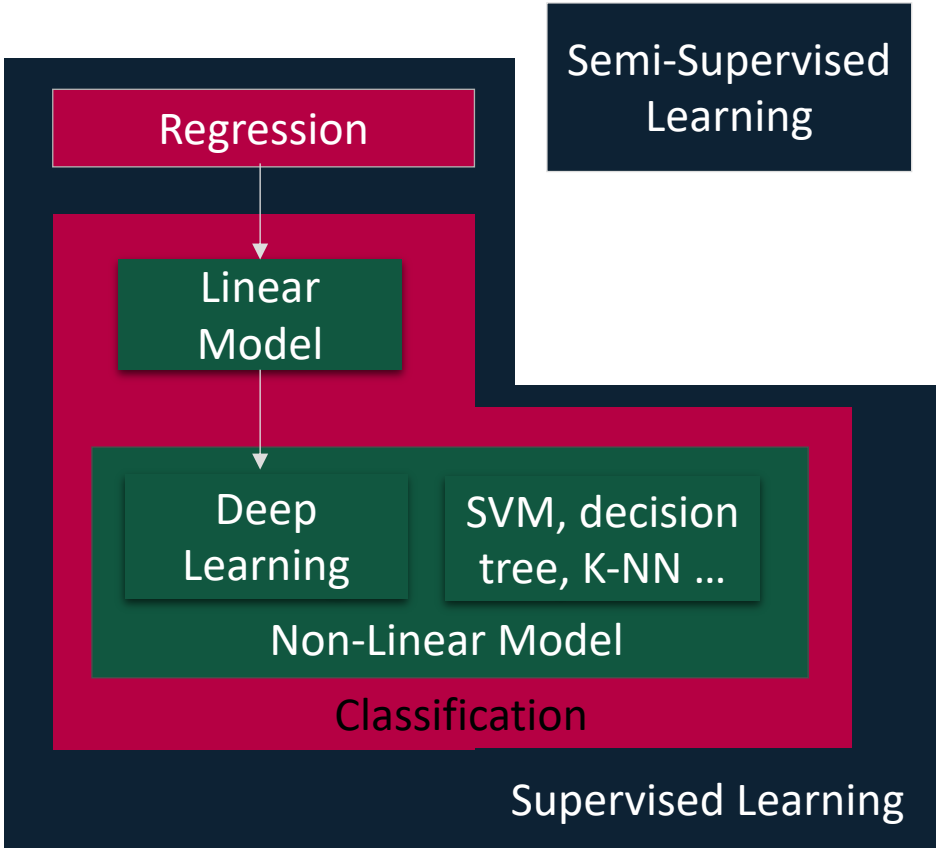
Playing GO

Each position is a class.

(19 x 19 classes)



Learning Map: Part III



Hard to collect a large amount of labelled data

Free: stock, clicks, house
Expensive: diagnosis, drug trial, chip design

Training data:

Input/output pair of target function

Function output = label

Semi-Supervised Learning

For example, recognizing cats and dogs

- Labelled data

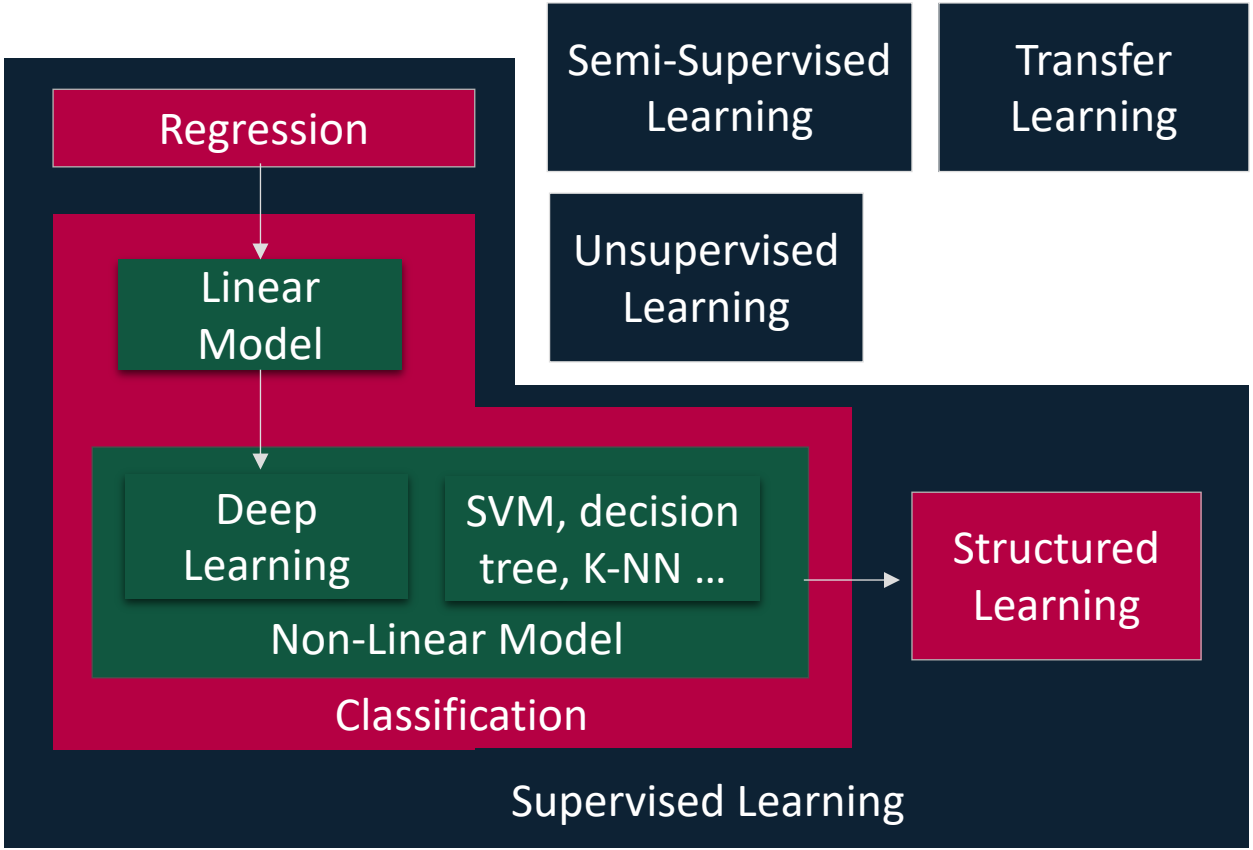
cat

dog

- Unlabeled data




(Images of cats and dogs)



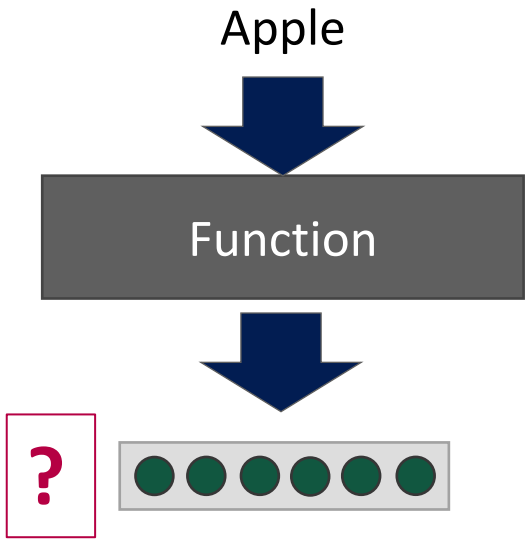
Learning Map: Part IV

Unsupervised Learning: Part I

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

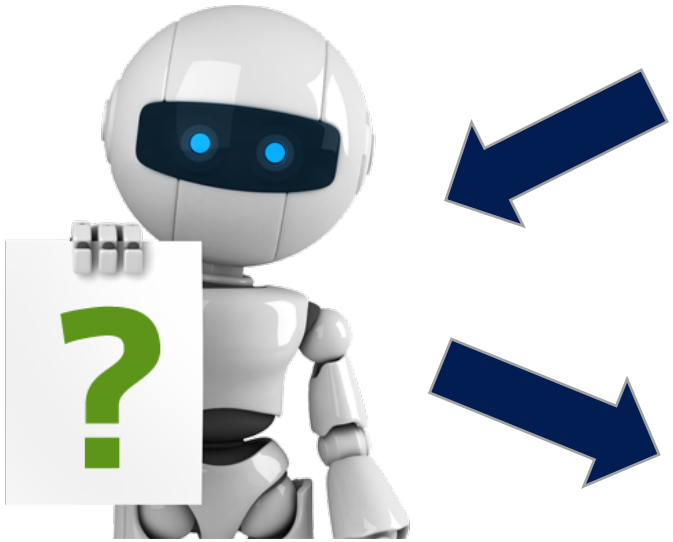
Unsupervised Learning: Part II

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

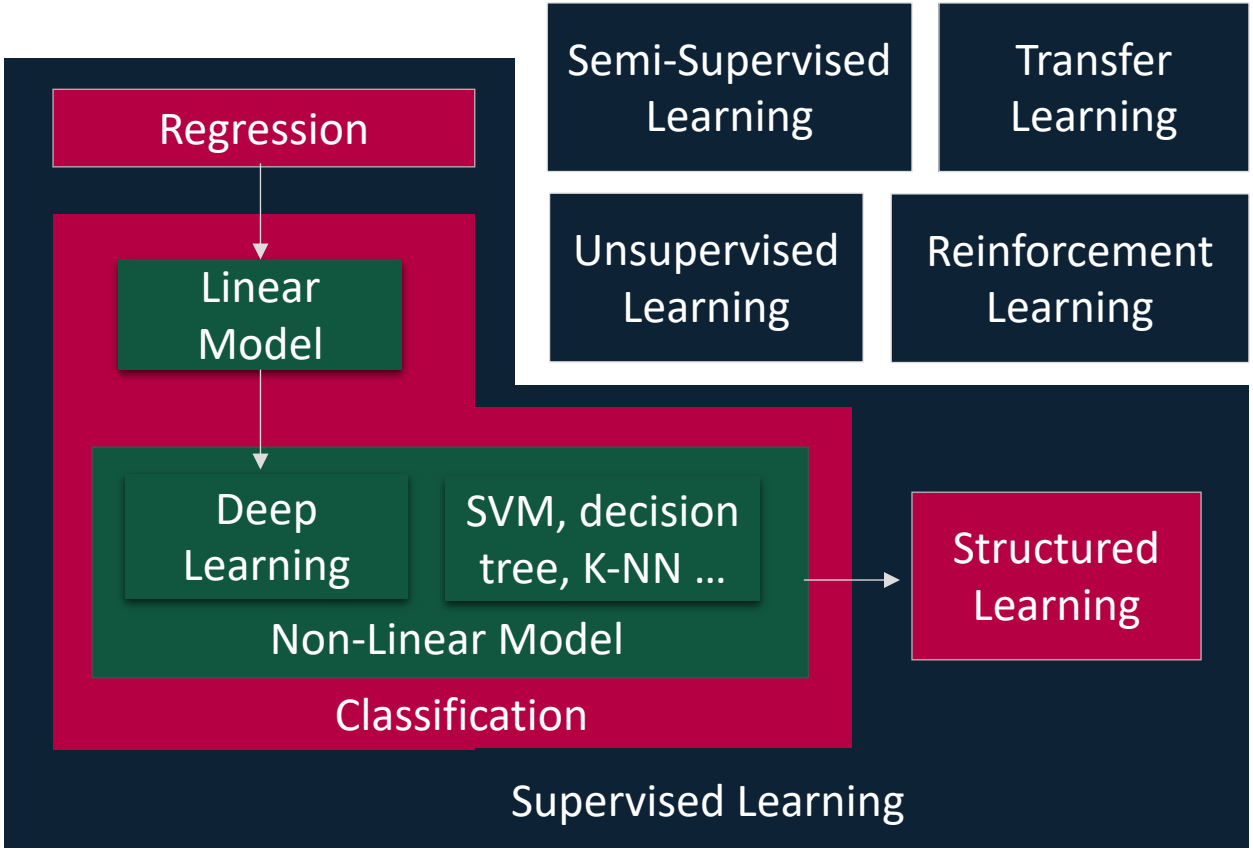


Training data is a lot of text.

Unsupervised Learning: Part III



Draw something!



Learning Map: Part V

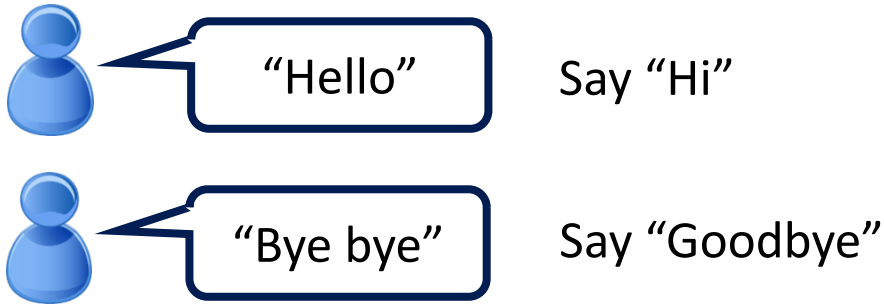
Reinforcement Learning

Deep Reinforcement Learning: AI = RL + DL

Supervised Versus Reinforcement

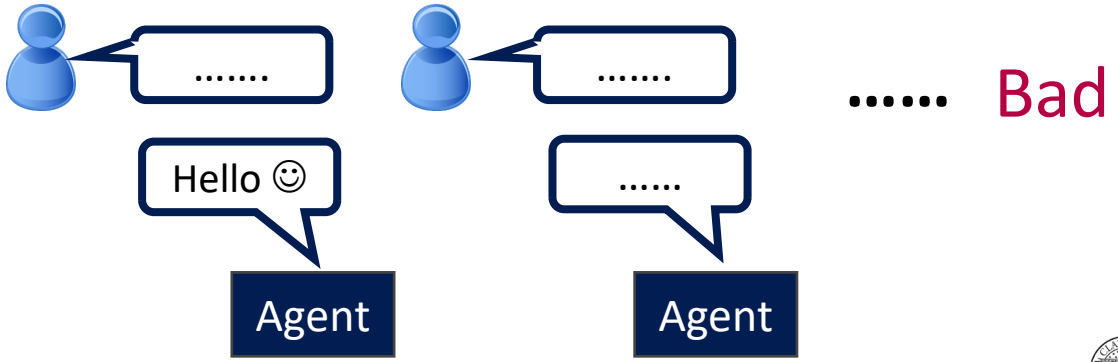
Supervised

Learning from teacher



Reinforcement

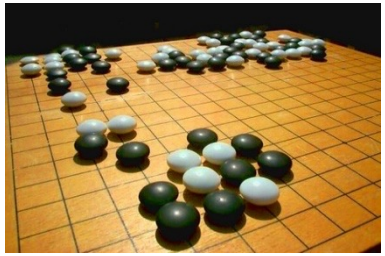
Learning from critics



Supervised Versus Reinforcement, Continued

- Supervised:

Next move:
“5-5”

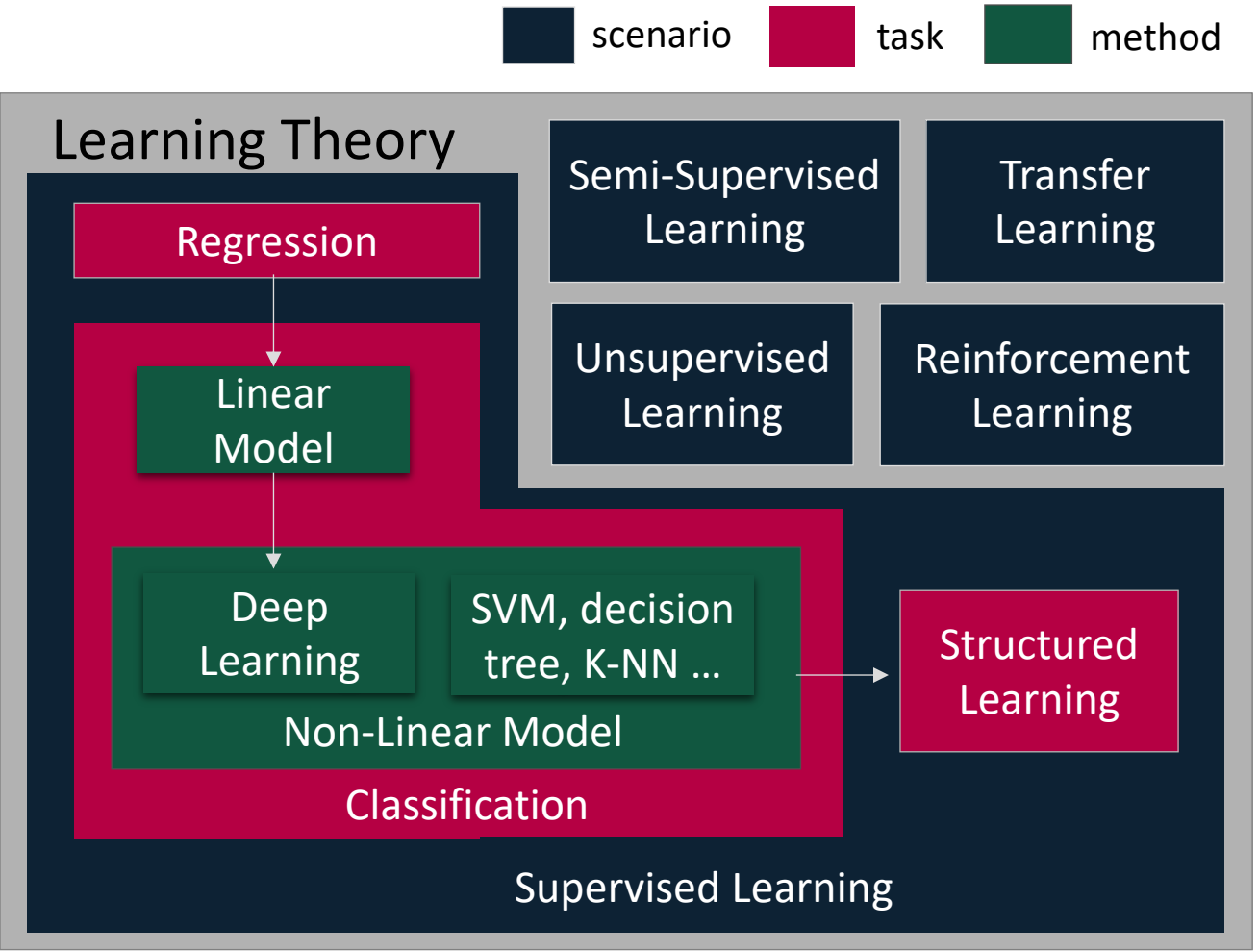


Next move:
“3-3”

- Reinforcement Learning:

First move → …… many moves …… → Win!

Alpha Go is supervised learning + reinforcement learning.



Learning Map: Part VI