- ML : Field of study where machines learn w/o being explicitly programmed.

  Arthur Samuel (1959)

  $\Rightarrow$ Checkers : learn by playing itself

  more training ~ better

  $\Rightarrow$ ~~Lots of data~~

ML :
  - Supervised $\leftarrow$ most common
  - Unsupervised
  - Recommender systems
  - Reinforcement Learning

Supervised

$$\underset{\text{input}}{X} \longrightarrow \underset{\text{output}}{Y}$$

Learn from "right answers"

| X	Y	Application
email	spam (T/F)	spam filter
audio	text transcript	speech recog
English	Spanish	translate
ad/ user info	click (T/F)	online advertising
image /radar	position of other cars	self-driving car
image of phone	defect	visual inspection

Regression : House prices prediction

price
(B 100k)

300
2..
1..

500   1000   1500   2000

size (ft²)
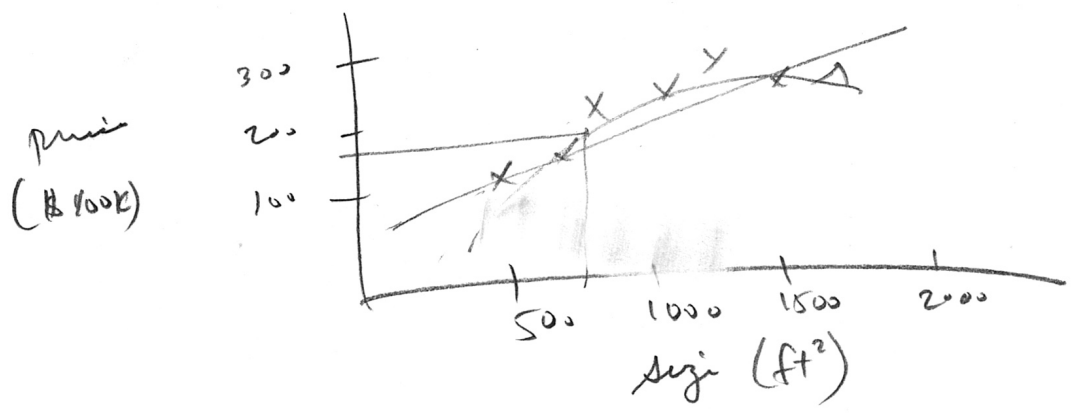
Regression ⇒ predicts # ⇒ ∞ possible outputs

Classification. Breast Cancer detection

malignant ✗   Benign ⊗
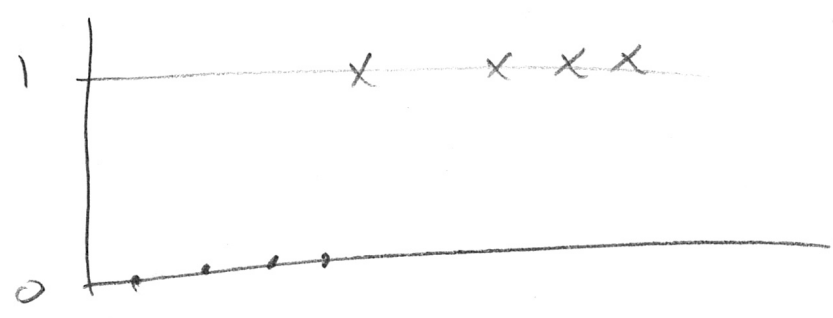
size	diagnosis
2	0
5	1
1	0
7	1

1
0

?
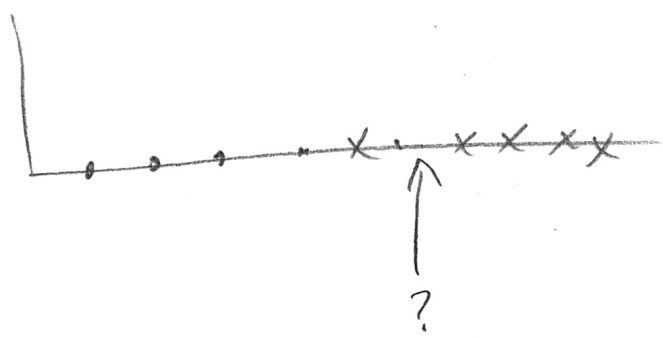
✗ type 1
△ type 2
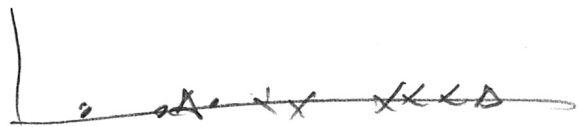
Classification → class category ← small # of outputs

2 or more inputs

benign → malignant

age

size

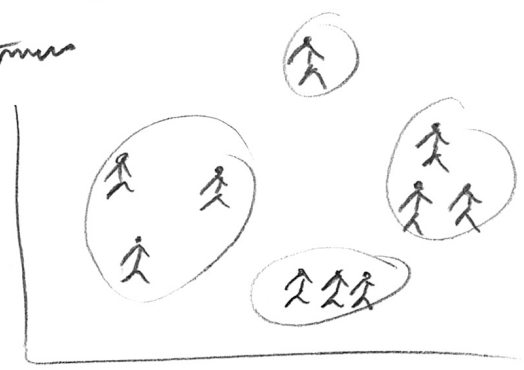Unsupervised
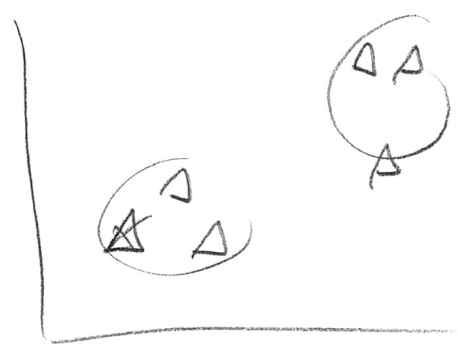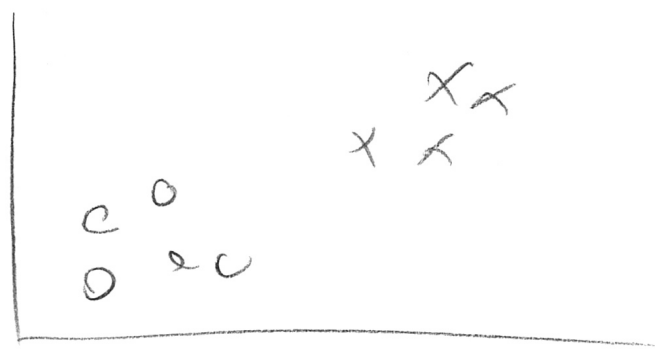
⇒ clustering in unlabeled data

• Example google news → articles w/ same keywords

customers

Other: • Dim reduction
Compress data to fewer #s

• Anomaly Detection
find unusual data points