

# Andrew Ng Course Note 1

Shu Wang

May 15 2023

## 1 Introduction

Two main types of machine learning algorithms:

Supervised Machine Learning and Unsupervised Machine learning.

Supervised Machine Learning is used most in real-world applications, with rapid advancements.

Reinforcement Learning: not too common.

## 2 Supervised Machine Learning

Supervised Machine Learning refers to algorithms that learns  $x$  to  $y$ , or input to output mappings.

$X \longrightarrow Y$

input  $\longrightarrow$  output label

Key characteristics: Give learning algorithms examples to learn from, including the "right answers".

"Right answers" refers to the correct labels  $y$  for a given input  $x$ .

The learning algorithm learns to input alone, give reasonable prediction of output.

Examples:

Input(X)	Output(Y)	Application
Email	Spam?(0 or 1)	Spam filtering
Audio	text transcripts	speech recognition
English	Spanish	machine translation
ad,user info	Click?(0 or 1)	Online Advertising
image,radar info	Position of Cars	Self-driving car
Image of Phone	Defect?(0 or 1)	Visual Inspection

Regression: Housing price prediction.

Fitting straight lines,curves,etc.

Systematically choose the most appropriate line/curve to fit into the data. This is an example of supervised learning. A typical example of regression.

Regression: predict a number,infinately many possible outputs.

Classification: Breast Cancer Detection

Size	Diagnosis
2	0
5	0
1	0
7	1
...	...

Regression: predict infinitely many number of possible numbers.

Two possible outputs: Classification

Classification problem can have more than two possible output categories.

Classification predict categories

small number of possible outputs

Two or more inputs: Find boundaries to separate categories.

Regression	Classification
Predict a number	predict categories
Infinitely many possible outputs	Small number of possible outputs

### 3 Unsupervised Machine Learning

Supervised ML	Unsupervised ML
Learn from data labeled with the "right answers"	Find something interesting in unlabeled data

No label is given, find structure/pattern in the data.

Not trying to supervise the algorithm to give output, algorithm need to figure out by themselves what pattern/structure is hidden.

Unsupervised Machine Learning:

Takes data without labels and tries to automatically group them into clusters.

Anomaly detection:

find unusual data points.

Dimensionality reduction:

compress data using fewer numbers