Machine Learing - turning data into numbers and finding patterns in those numbers

code & math

```
AI
  Machine
  Learning
     Deep
     Learning
```
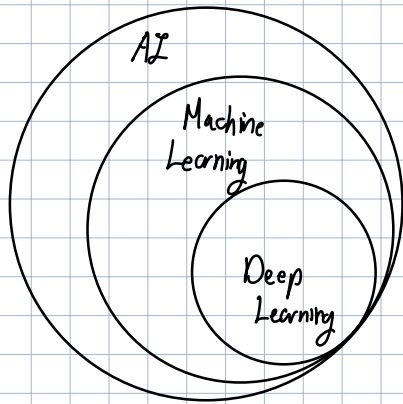
Traditional Programming : Inputs (Chicken, Vegetables) + Rules (cutting veg , Seasoning)

⇓

Roasted Chicken

(features)   (labels)

Machine Learning : algorithm Inputs + designed outputs ⇒ Rules.

figures out

Supervised learning

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1. Why ML / DL ?

- writting all the rules may be too much job.

- can you think of all the rules? (Too many , you may not know all).

\# Google number & rule of ML Handbook:

"If you can build a simple rule-based system that does not require machine learning, do that"

2. What deep Learning is good for?

    1. Problems with <u>long lists of rules.</u>

        - when the traditional approach fails, ML/DL may help.

    2. <u>Continually changing environments</u>

        - deep learning can adapt (learn) to new scenarios.

    3. Discovering insights within <u>large collections of data.</u>

        - imagine trying to hand-craft rules for what 1000 different kinds of food look like. (Too many!)

3. What deep Learning is NOT good for?

    ↗ reasoning millions of numbers? X.

    1. when you need <u>explainability.</u>

        - the patterns learned by a deep learning model are typically uninterpretable by a human.

    2. when the <u>traditional</u> approach is a <u>better option.</u>

        - If you can accomplish what you need with a simple rule-based system

    3. When <u>errors are unacceptable.</u>

        - Since the outputs of deep learning model aren't always predictable.

    4. <u>Not enough data.</u>

        - DL models usually require a fairly large amount of data to produce great results.

4. ML vs DL.

Structured data	vs.	Unstructured data

(ML): 1. table of numbers.
(rows & columns)

2. dmlc XGBoost.

algorithm : Gradient boosted machine

ex.) • Gradient boosted models.
• Random forest
• Naive Bayes
• many more ...

("shallow algorithms")

(DL): 1. Natural Language.
(texts on Wikipedia)

2. Images (burger, cats)

3. Audio

Algorithm : neural network.

ex) • Neural networks,
• Fully connected neural network.
• CNN
• Recurrent neural network.
• Transformers.
• many more ...

5. What are neural networks?

Read Deep Learning Chapter 1~4.