Machine Learning

1. Review
2. Machine Learning (ML)
3. Types of ML
4. ML process
5. Project

Machine Learning

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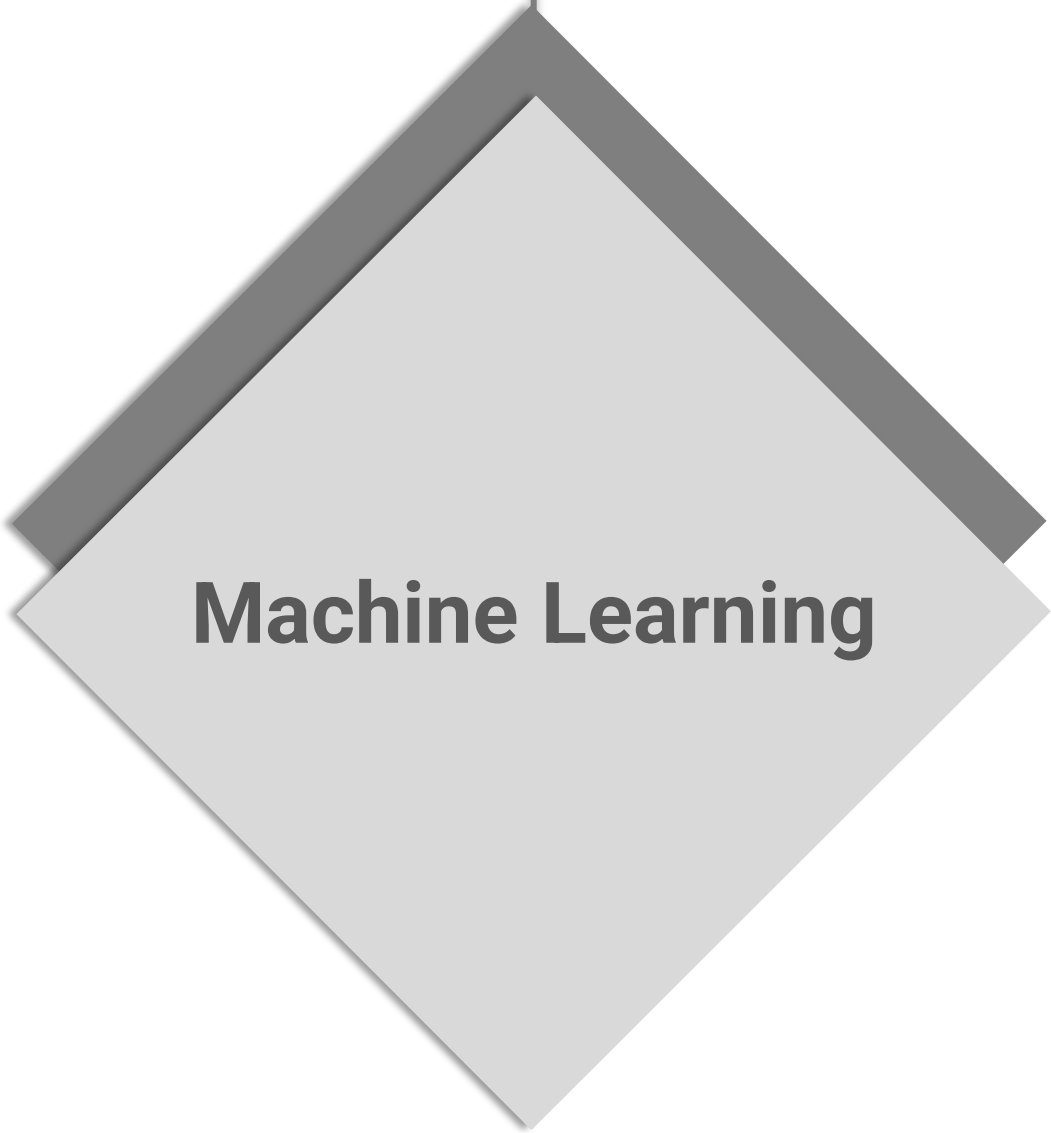


1. Review

How can we teach computers:

1- Rule-base

2- Machine Learning

3- Deep Learning

4- Reinforcement Learning

1. Review

How can we teach computers:

1- Rule-base

Rule:
If he covers his face, he is a Thief!

1. Review

How can we teach computers:

1- Rule-base

When can we use this method?

- When the rules are simple!
- Most importantly, we know the rules!

1. Review

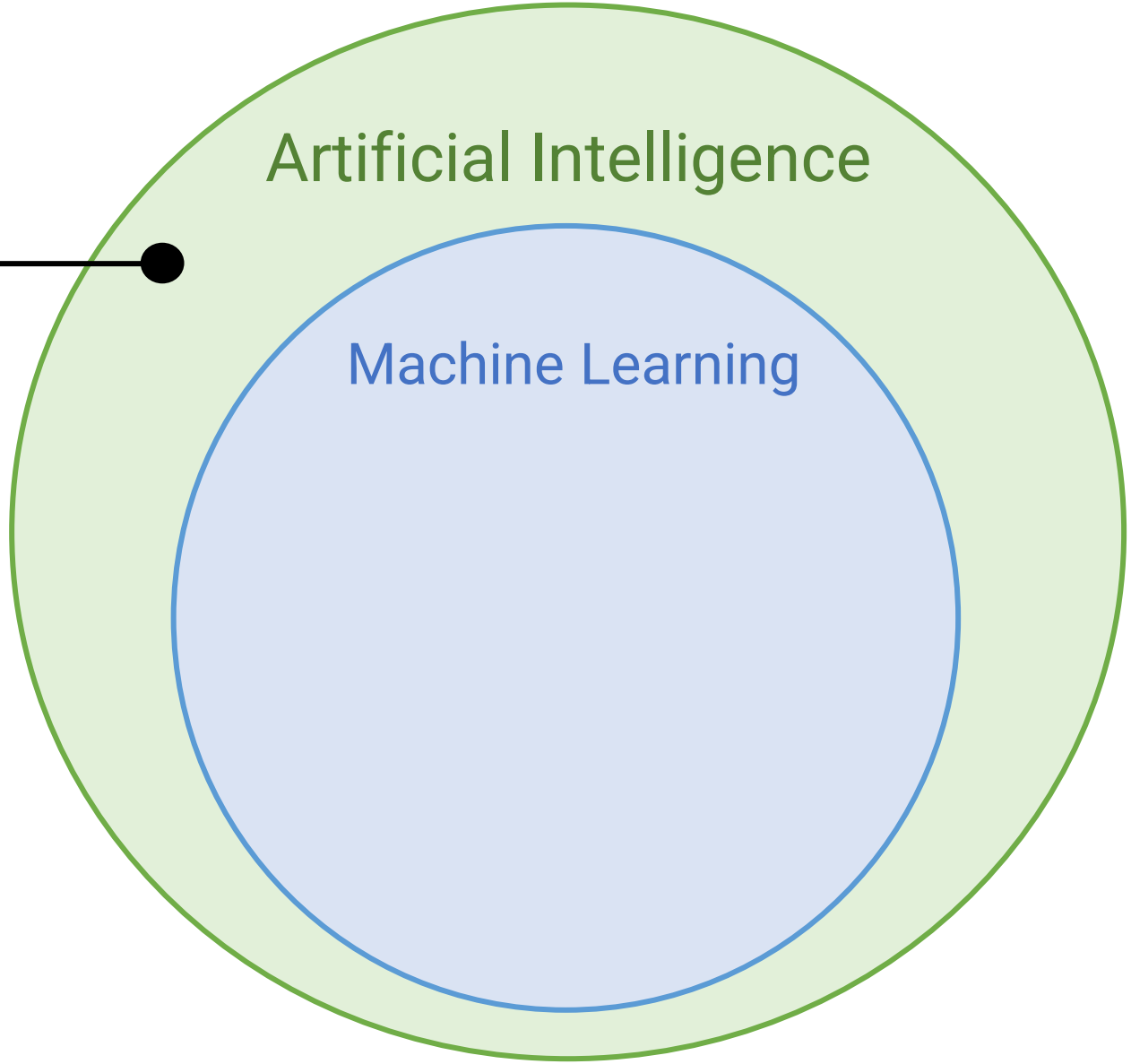
How can we teach computers:

1- Rule-base

Give me more examples!

1. Review

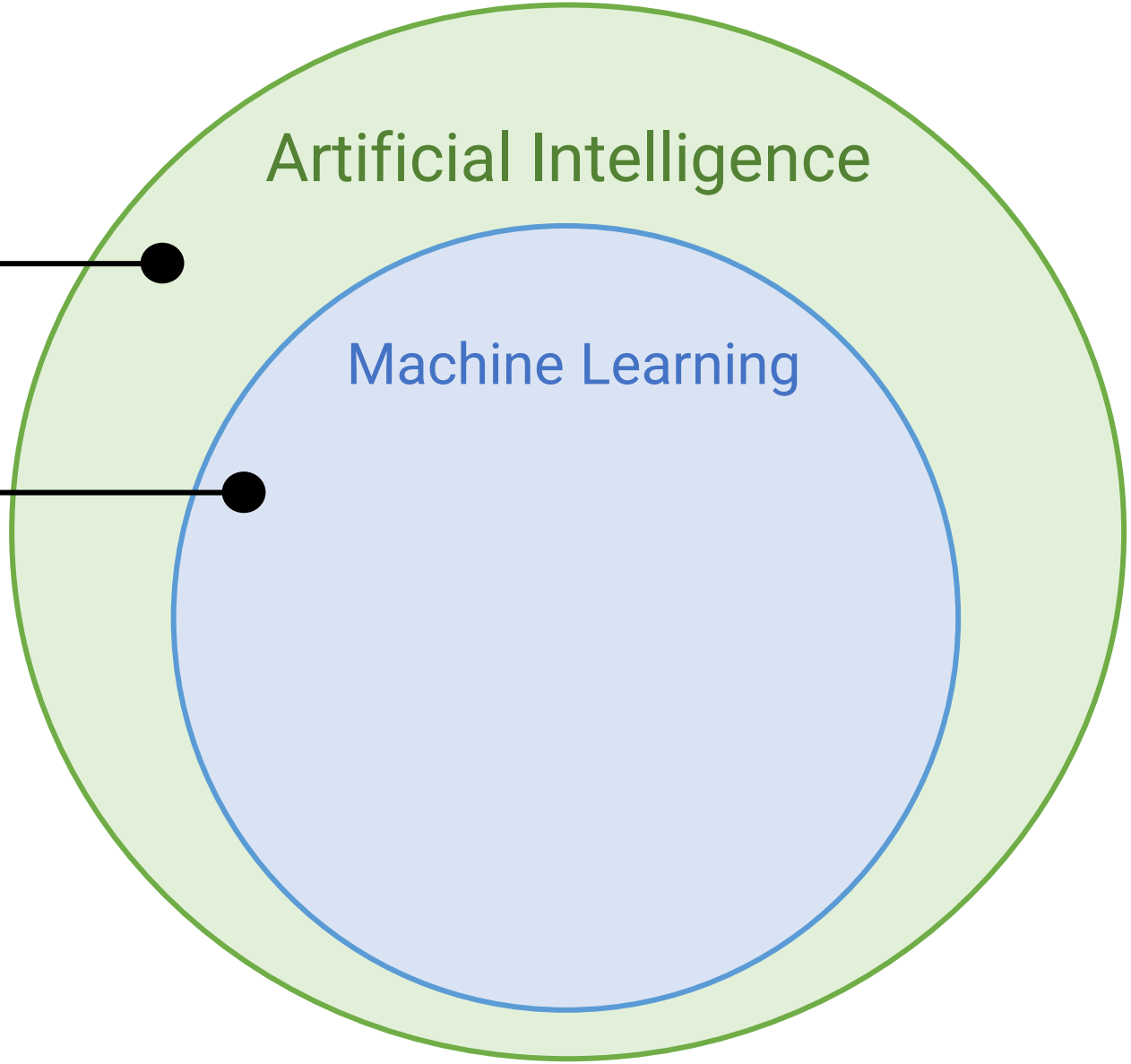
Rule-base



1. Review

Rule-base

Machine learning



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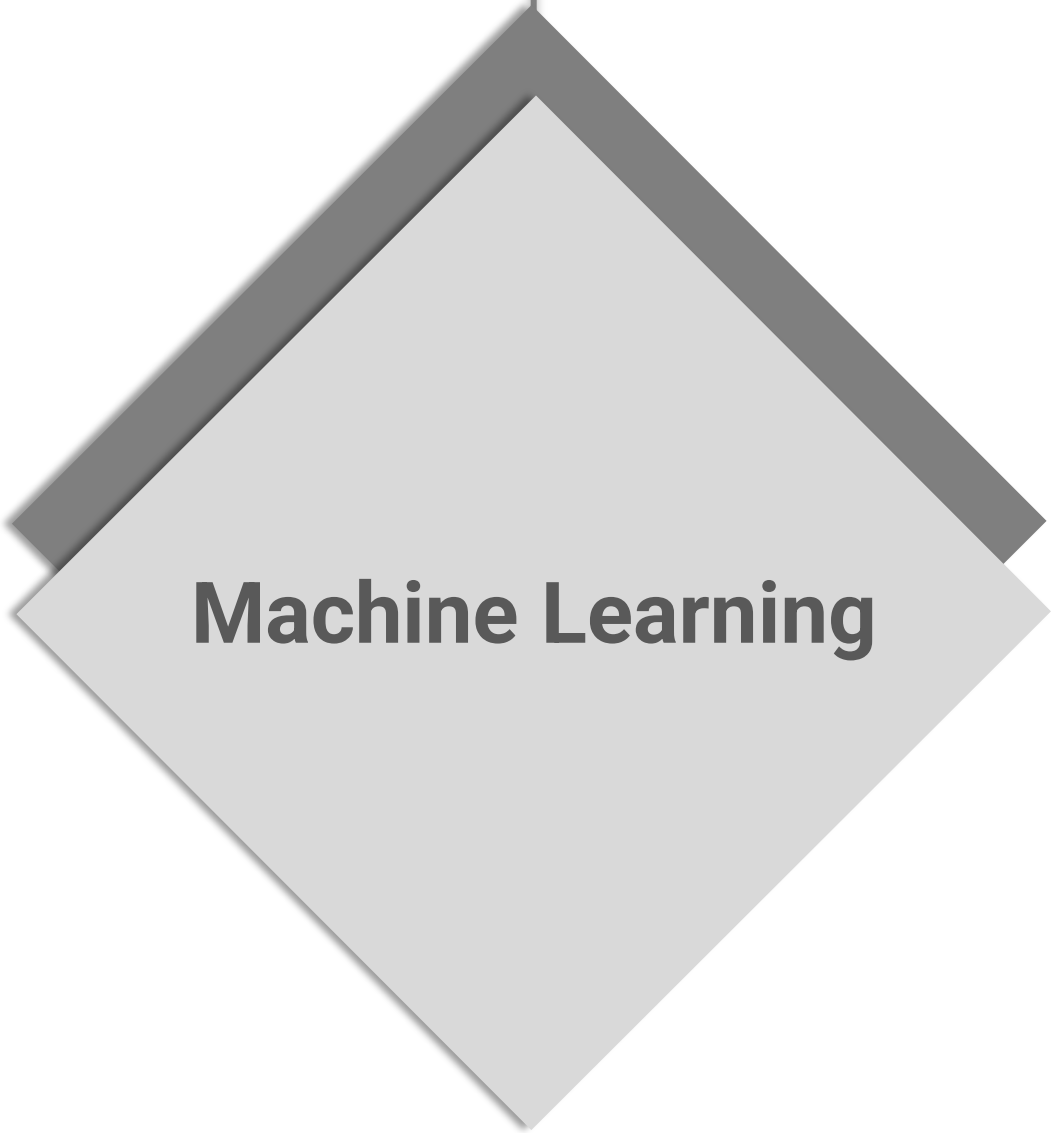

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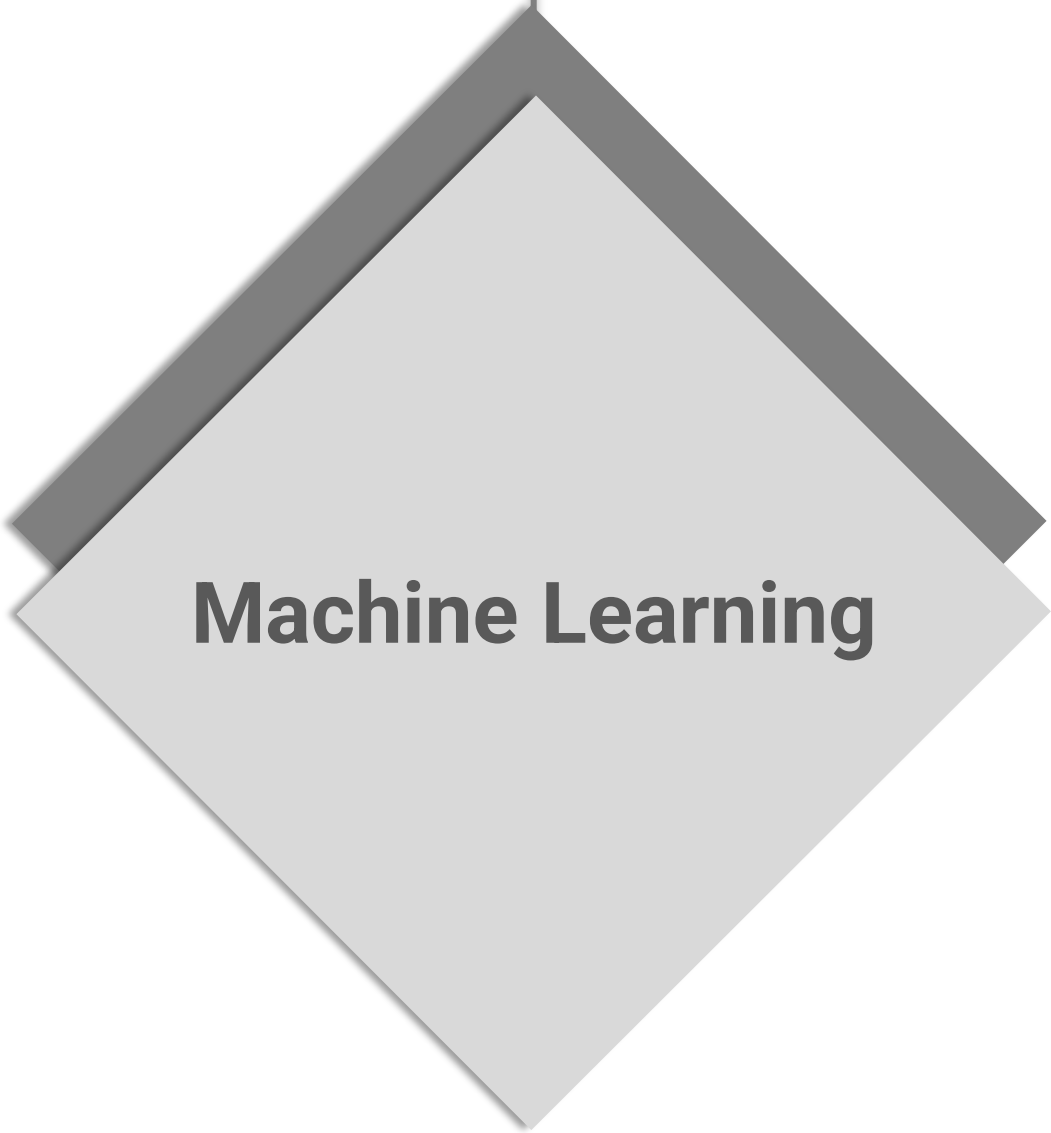

2. Machine Learning (ML)

Figuring out the rules is difficult and confusing
Even for humans

Like what?

2. Machine Learning (ML)

Examples:

Do I get a heart attack?

- Age
- Gender
- Work Type
- Localization
- BMI

2. Machine Learning (ML)

Examples:

Can I get a loan?

Income

Credit score

Job

Previous loans

Rent

2. Machine Learning (ML)

Cat or Dog?

2. Machine Learning (ML)

Cat or Dog?

How can you distinguish?

2. Machine Learning (ML)

2. Machine Learning (ML)

2. Machine Learning (ML)

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Machine Learning

Learn the rules yourself!
It is too hard for me to know the rules
The problem is too complicated to understand the rules
I will provide you with examples to figure out

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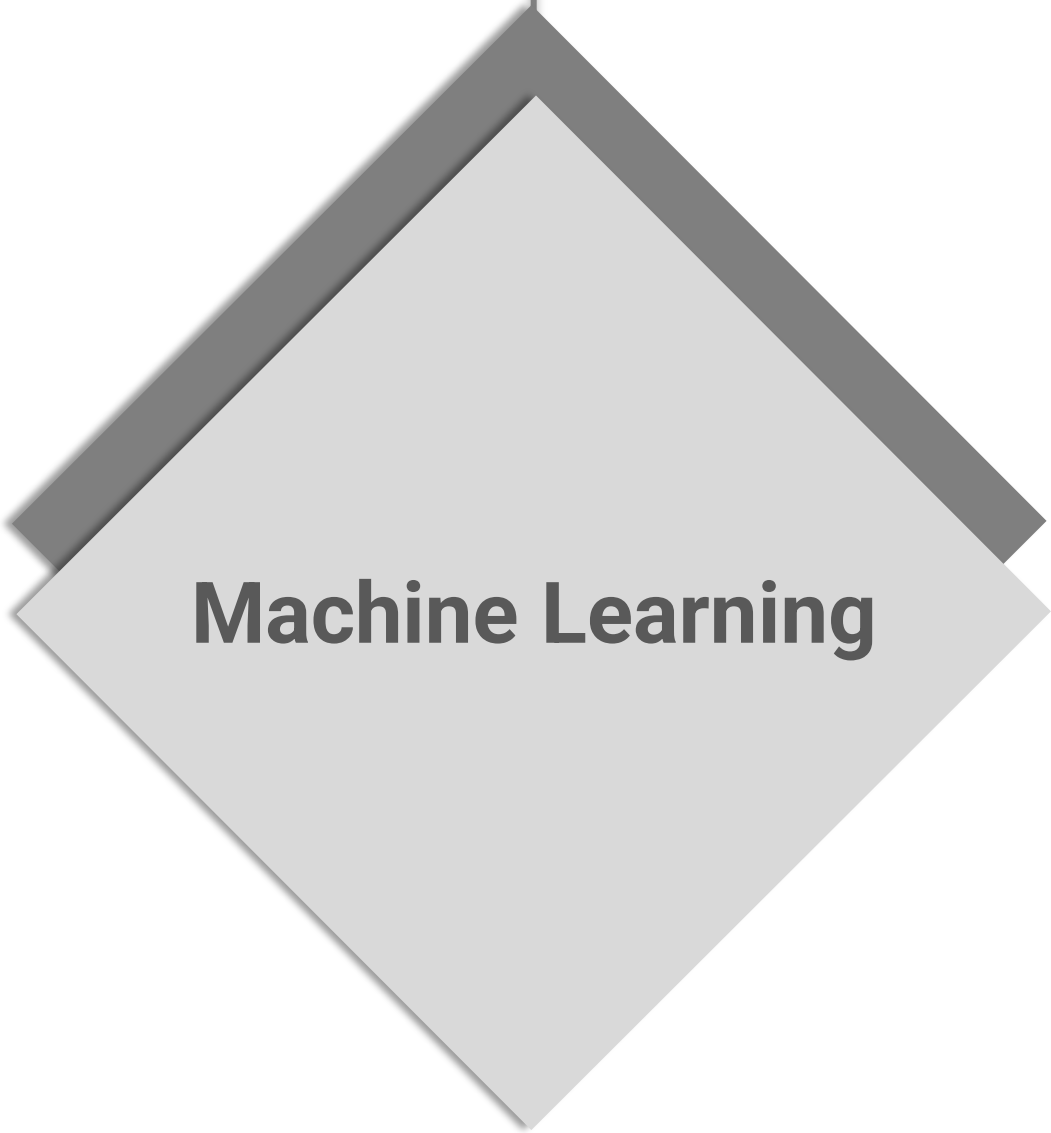

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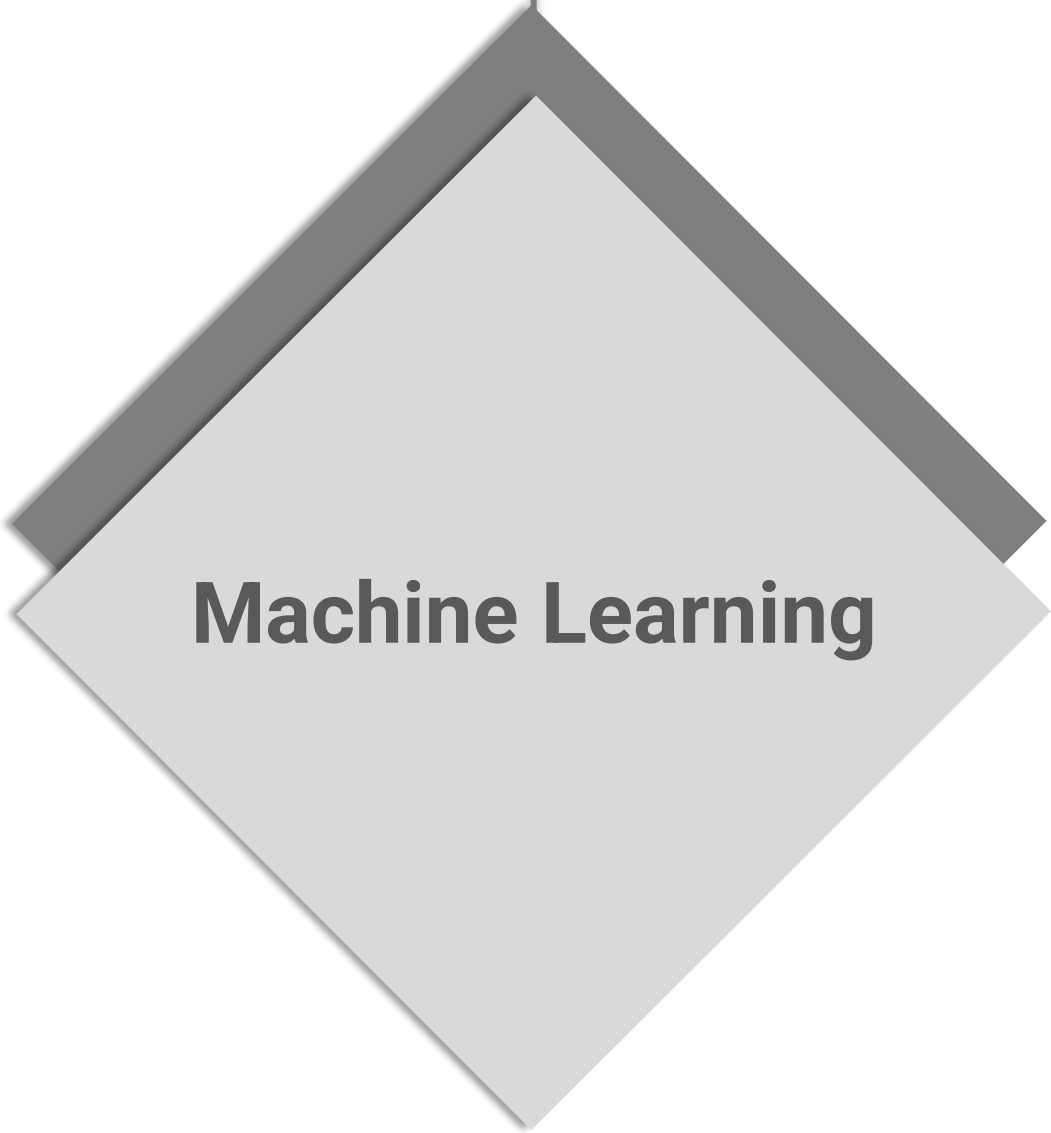


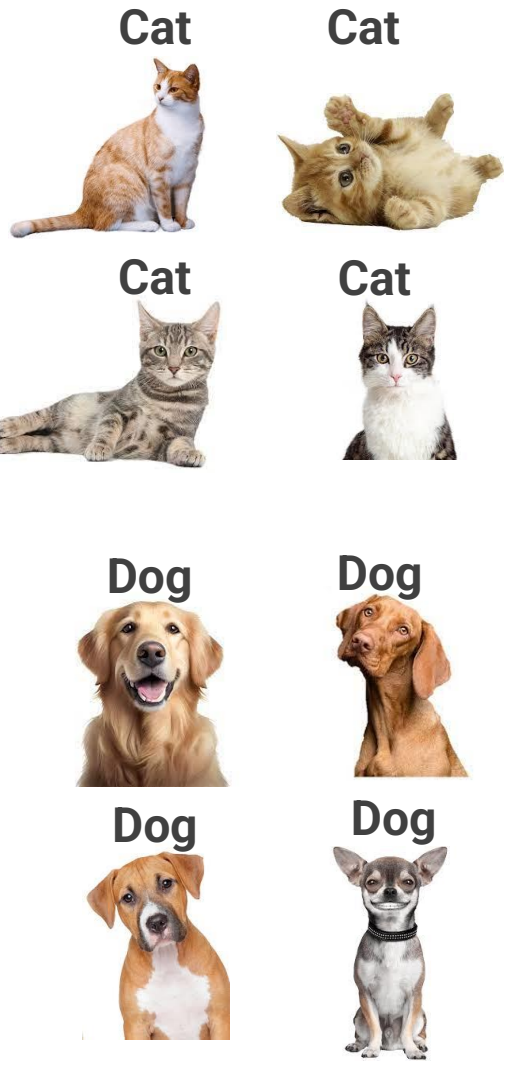
3. Types of ML

There are two types of problems that we use ML to solve:

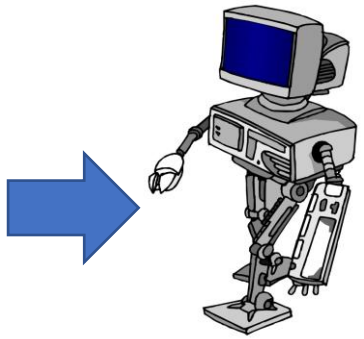
Supervised

Unsupervised

3. Types of ML



These are cats!



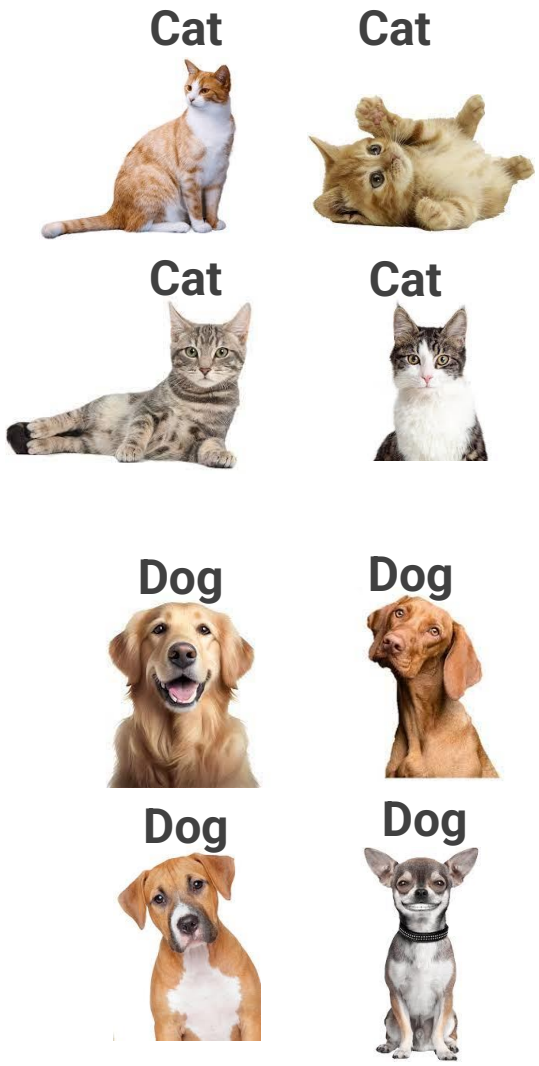
These are Dogs!

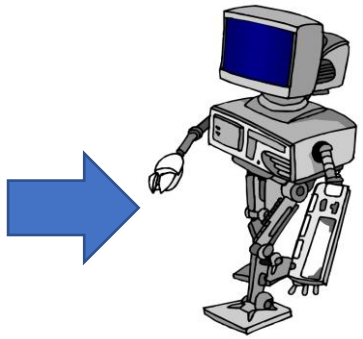
I guess this is a Cat!

I guess this is a Dog!

Supervised

3. Types of ML





Supervised

The data has label

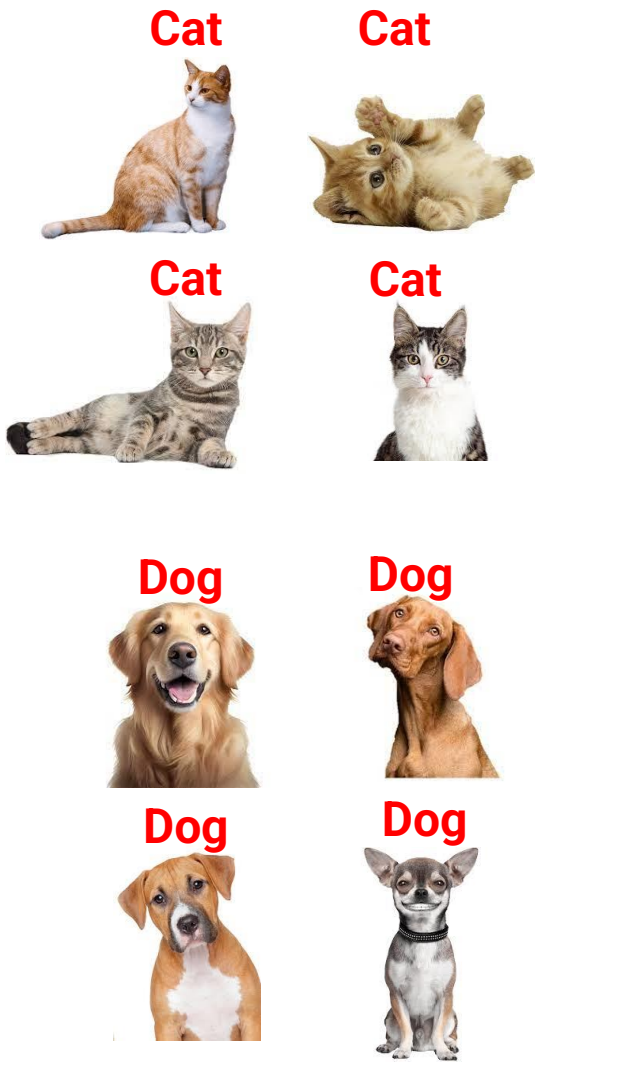
AI predicts the label and tries to classify based on its learning

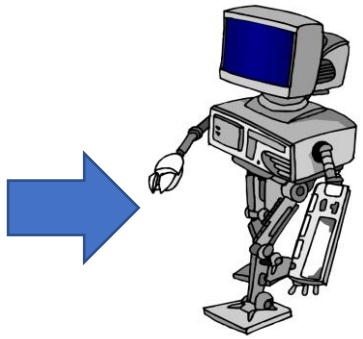
In other words, it tries to Classify

Supervised learning -> Classification

Supervised

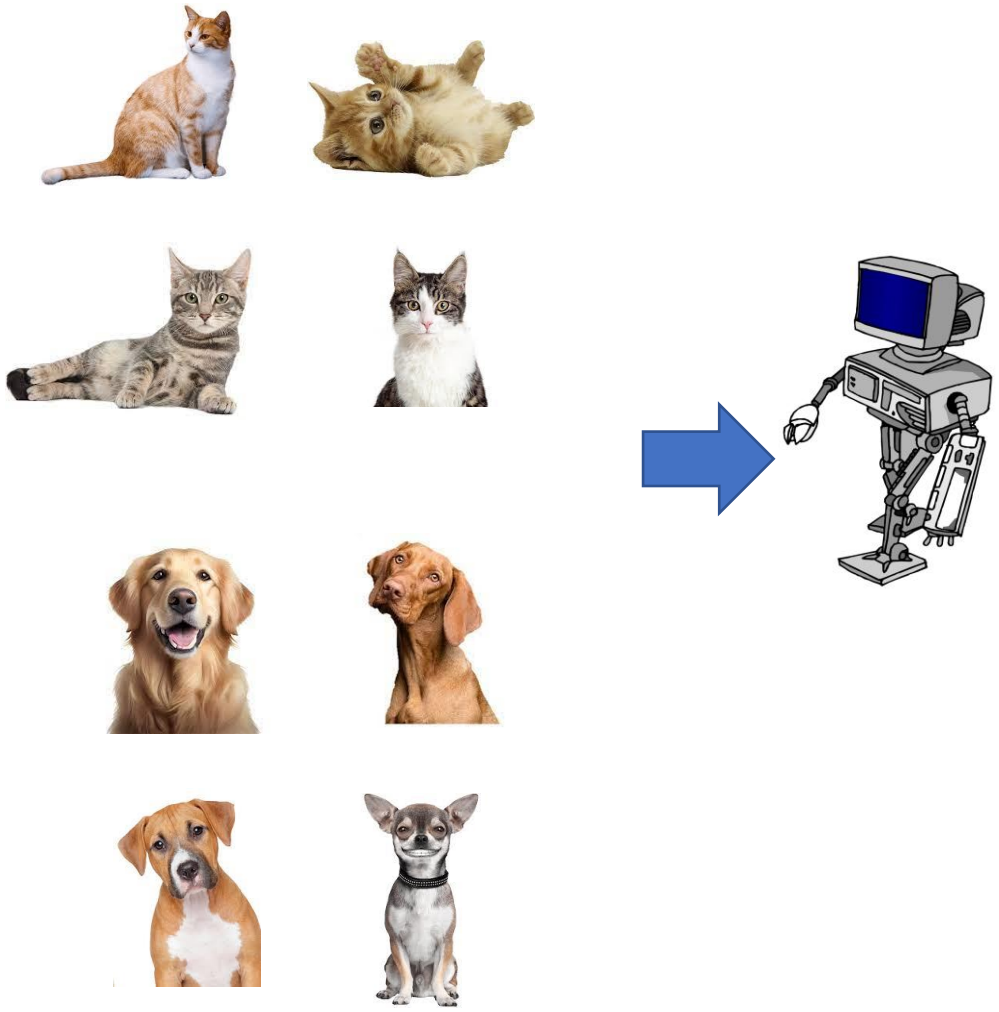
3. Types of ML





Unsupervised

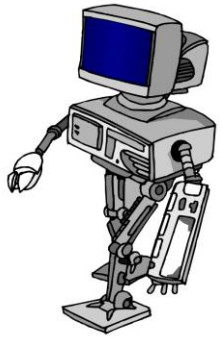
3. Types of ML



Unsupervised

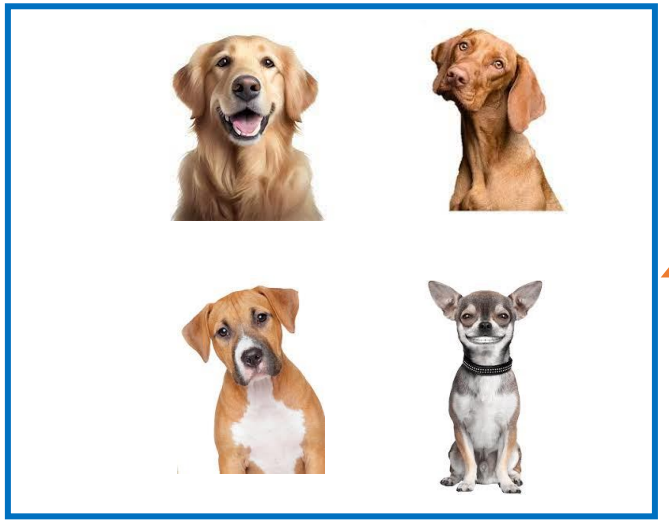
3. Types of ML

I think these are similar!



I guess this is similar to this group (or cluster)!

?



And these are similar to each other!

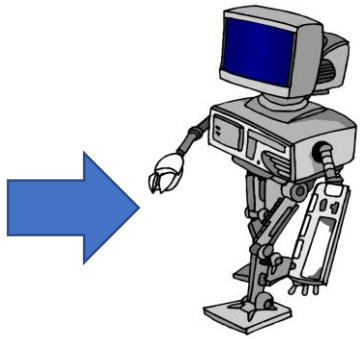
?

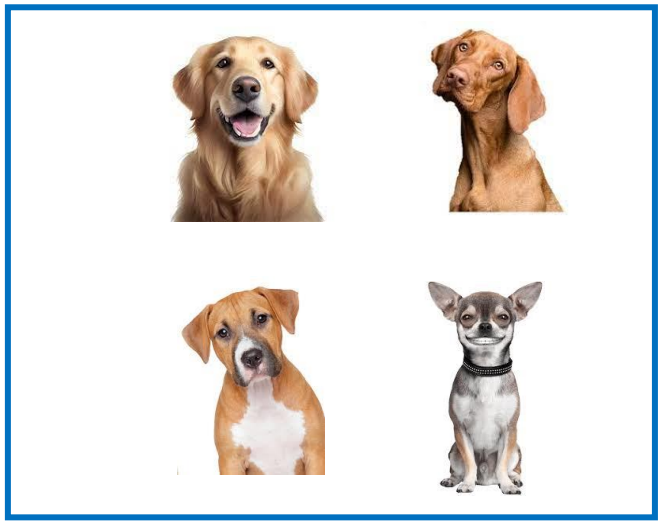
I guess this is similar to this group (or cluster)!

Unsupervised

3. Types of ML

I think these are similar!





And these are similar to each other!

Unsupervised

The data has NO label

AI tries to understand the similarities and find the patterns in data.
It tries to predict if the input is similar to which group (cluster)

In other words, it tries to find a cluster of similar data

Unsupervised learning -> Clustering

Unsupervised

3. Types of ML

Supervised (Classification) **OR** **Unsupervised (Clustering)**

Spam filter detection

3. Types of ML

Supervised (Classification) **OR** **Unsupervised (Clustering)**

Weather forecasting

3. Types of ML

Supervised (Classification) **OR** **Unsupervised (Clustering)**

Netflix Recommender systems

3. Types of ML

Supervised (Classification) **OR** **Unsupervised (Clustering)**

IPhone Face detection

3. Types of ML

Supervised (Classification) **OR** **Unsupervised (Clustering)**

Customer persona investigation for marketing

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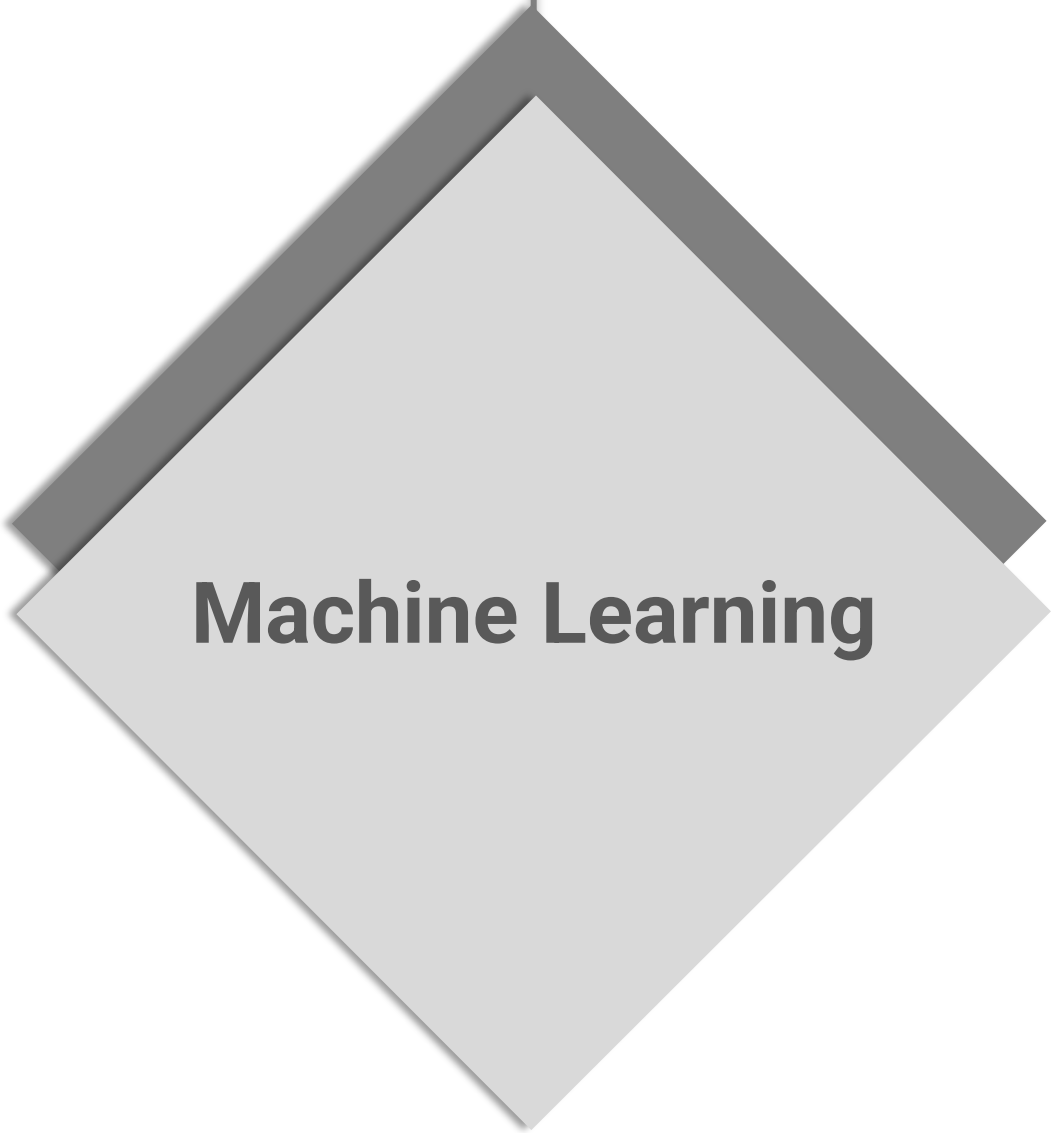

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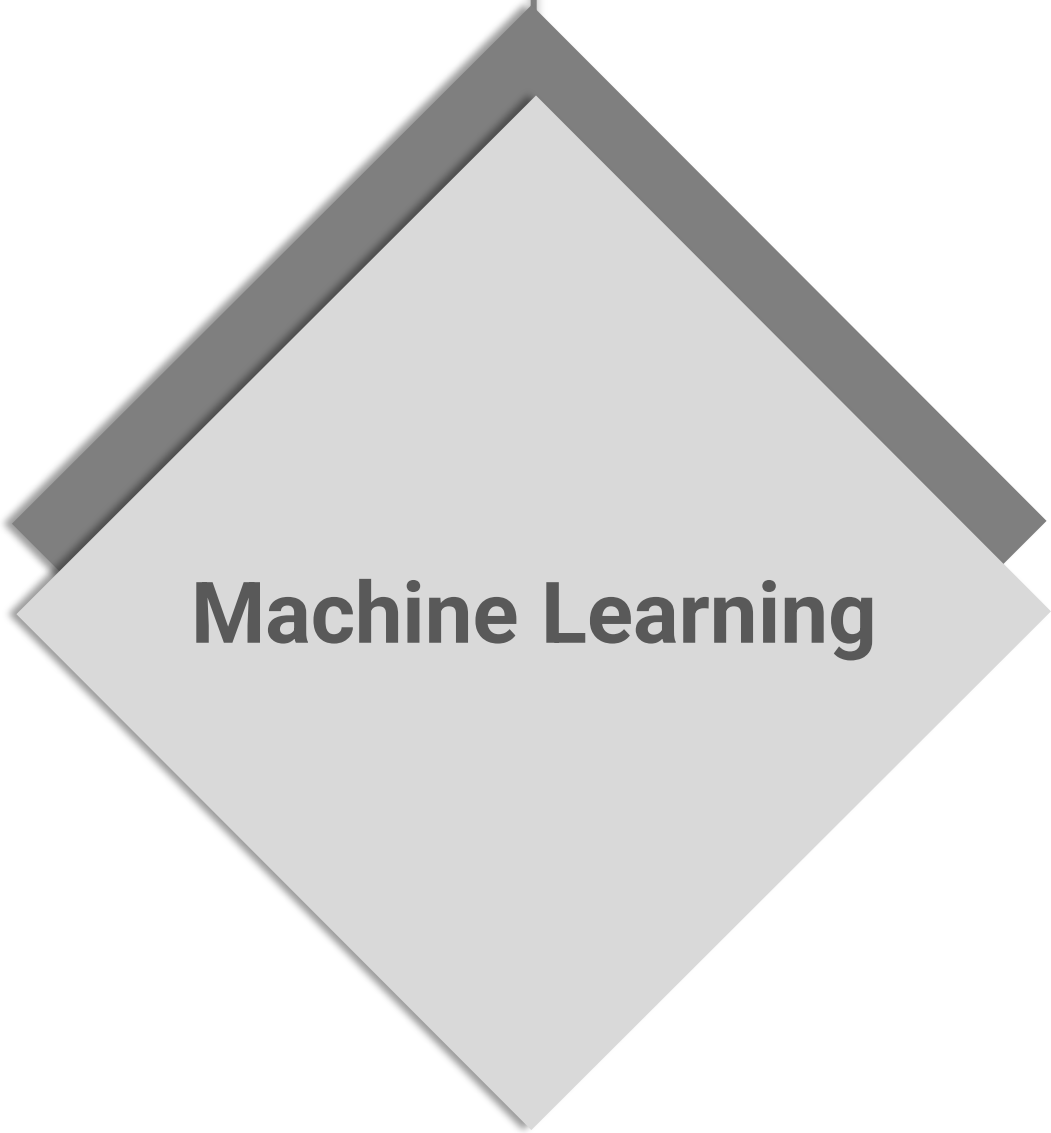

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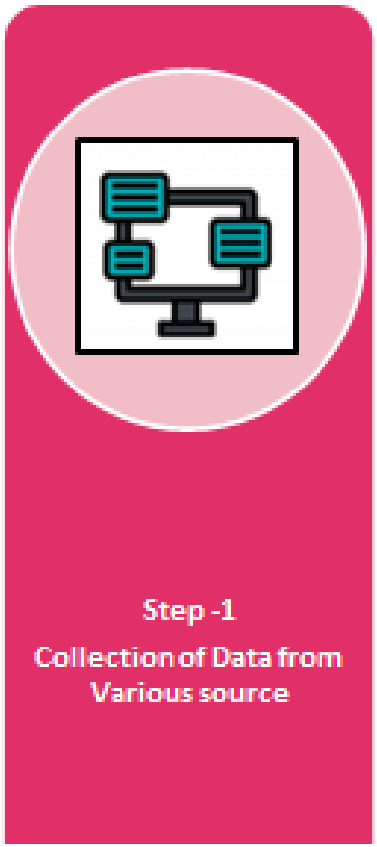

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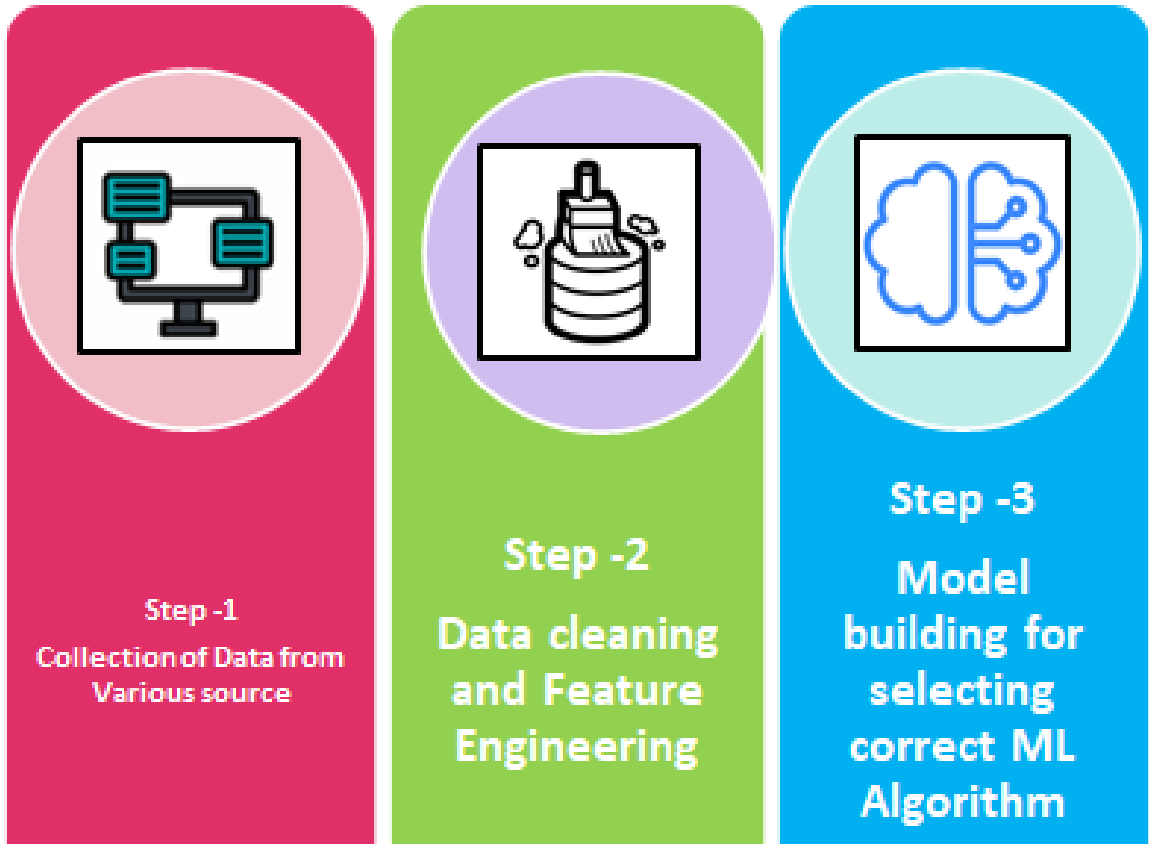

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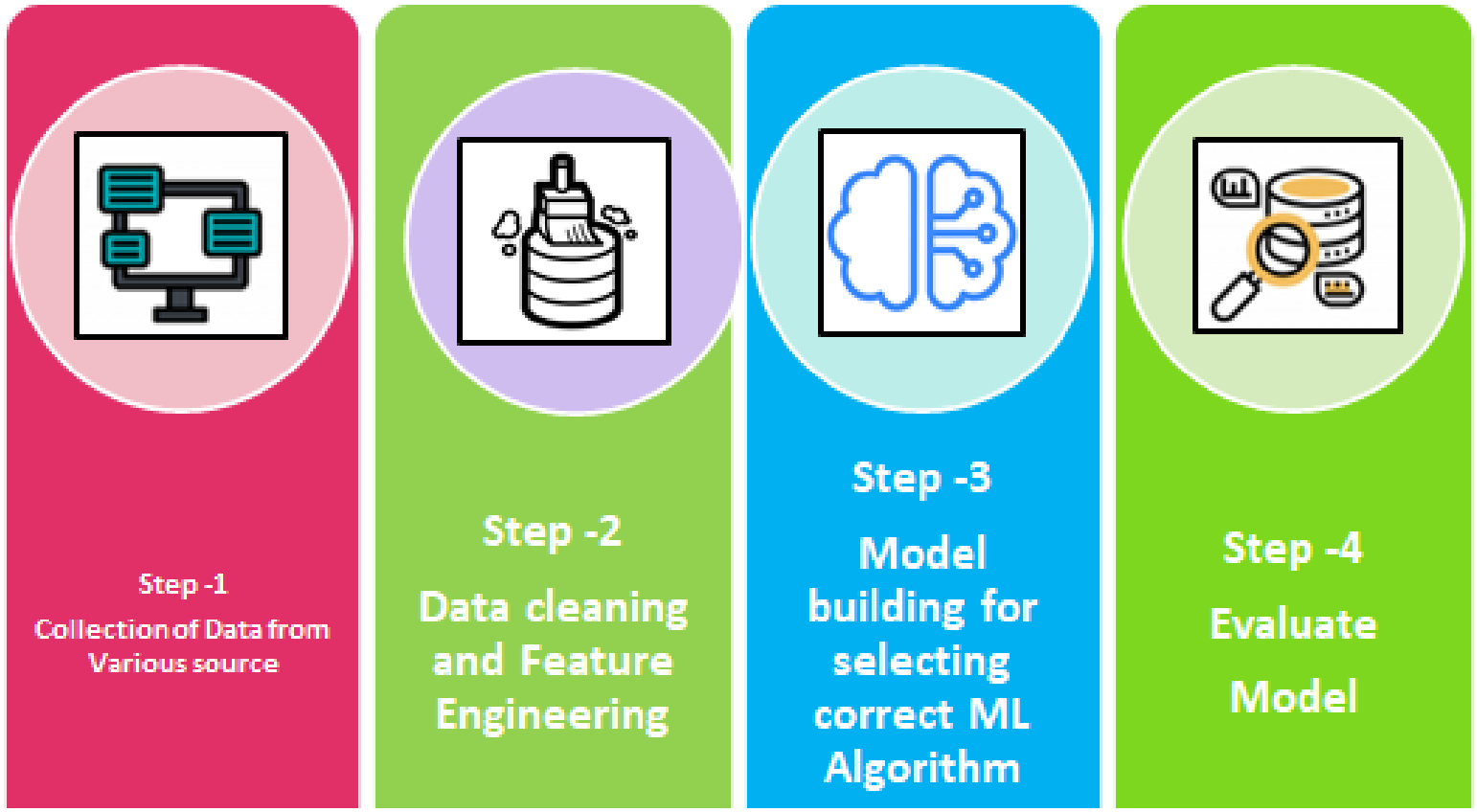

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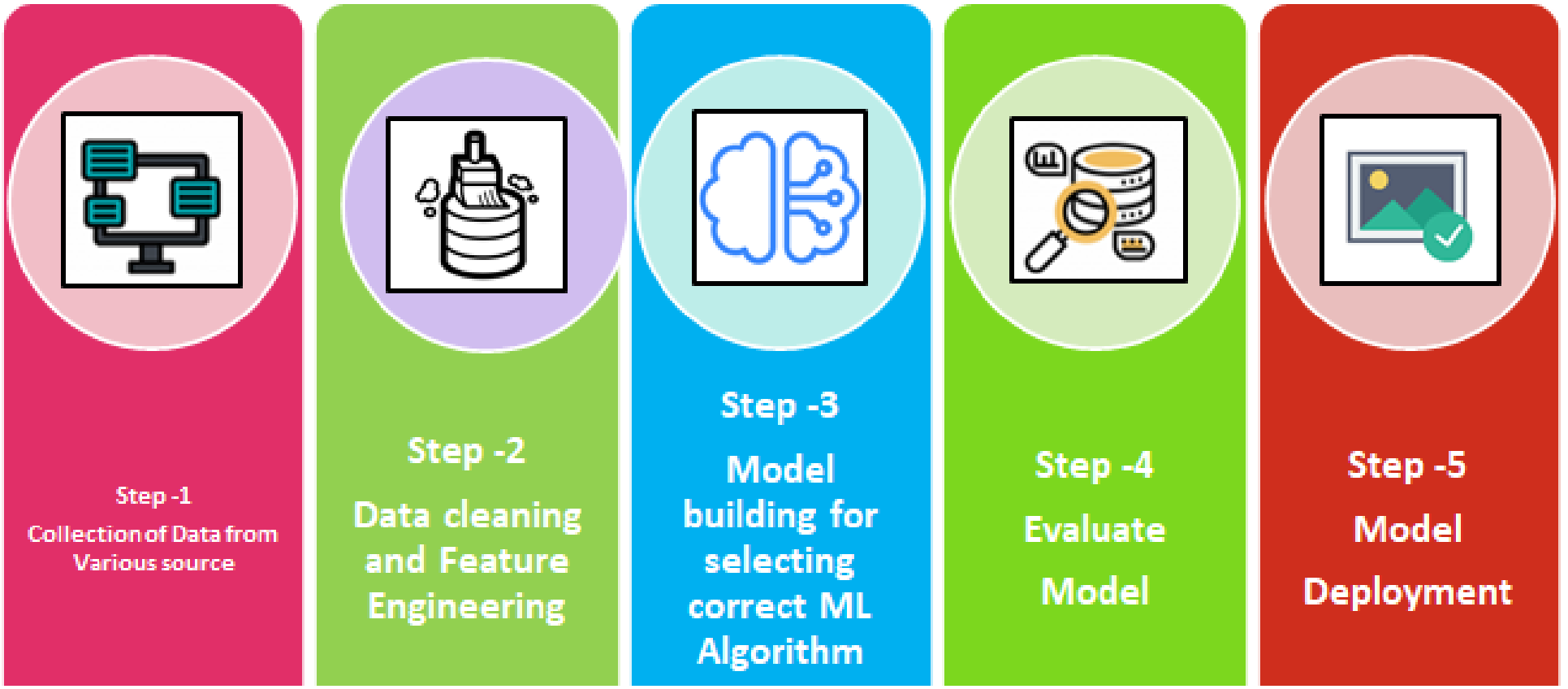

4. ML process

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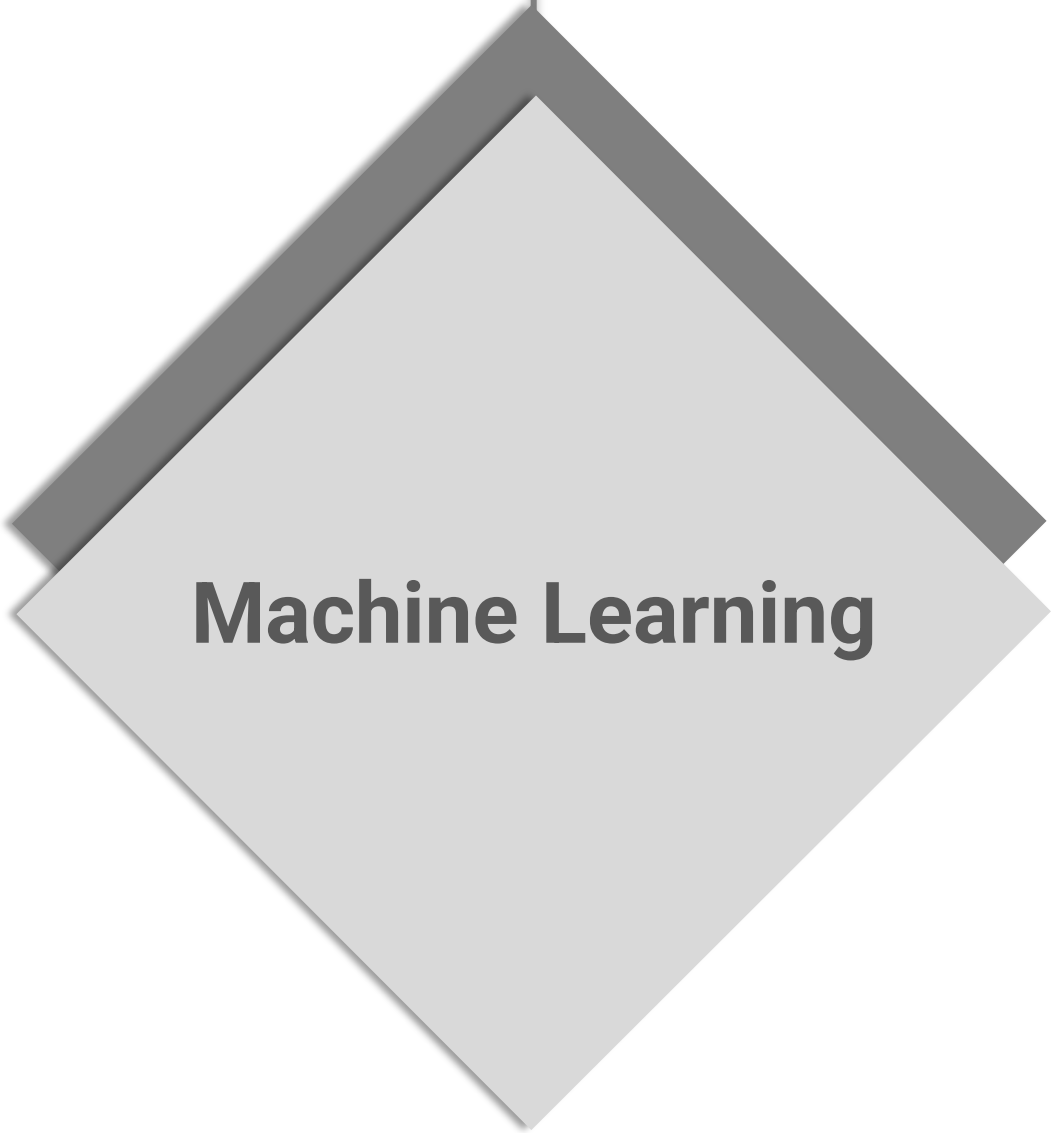

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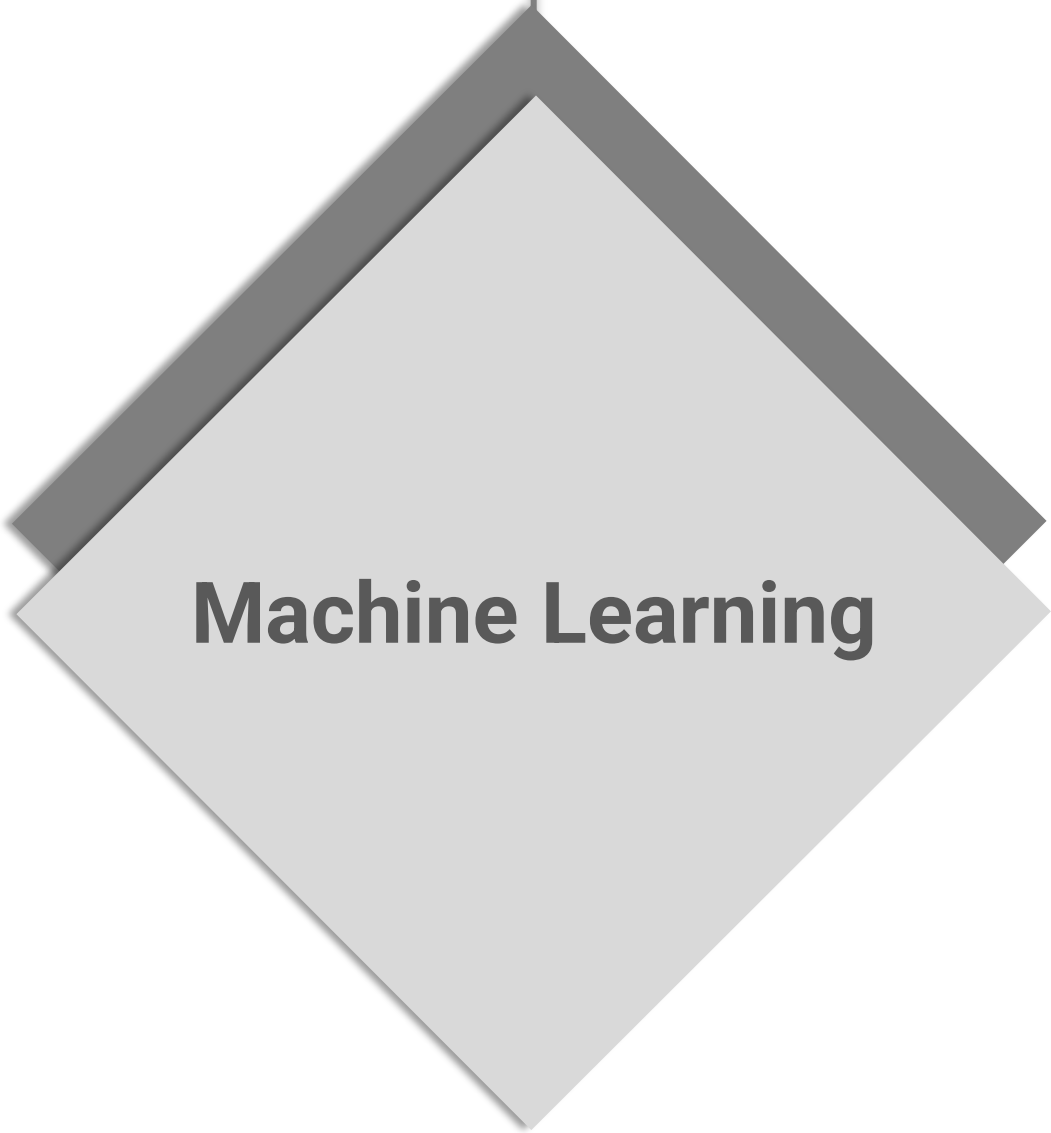


5. Project

Stroke prediction project

We have a dataset about medical records of people and whether they got a stroke or not.

We want to train an AI model to predict if a person get a stroke in future.

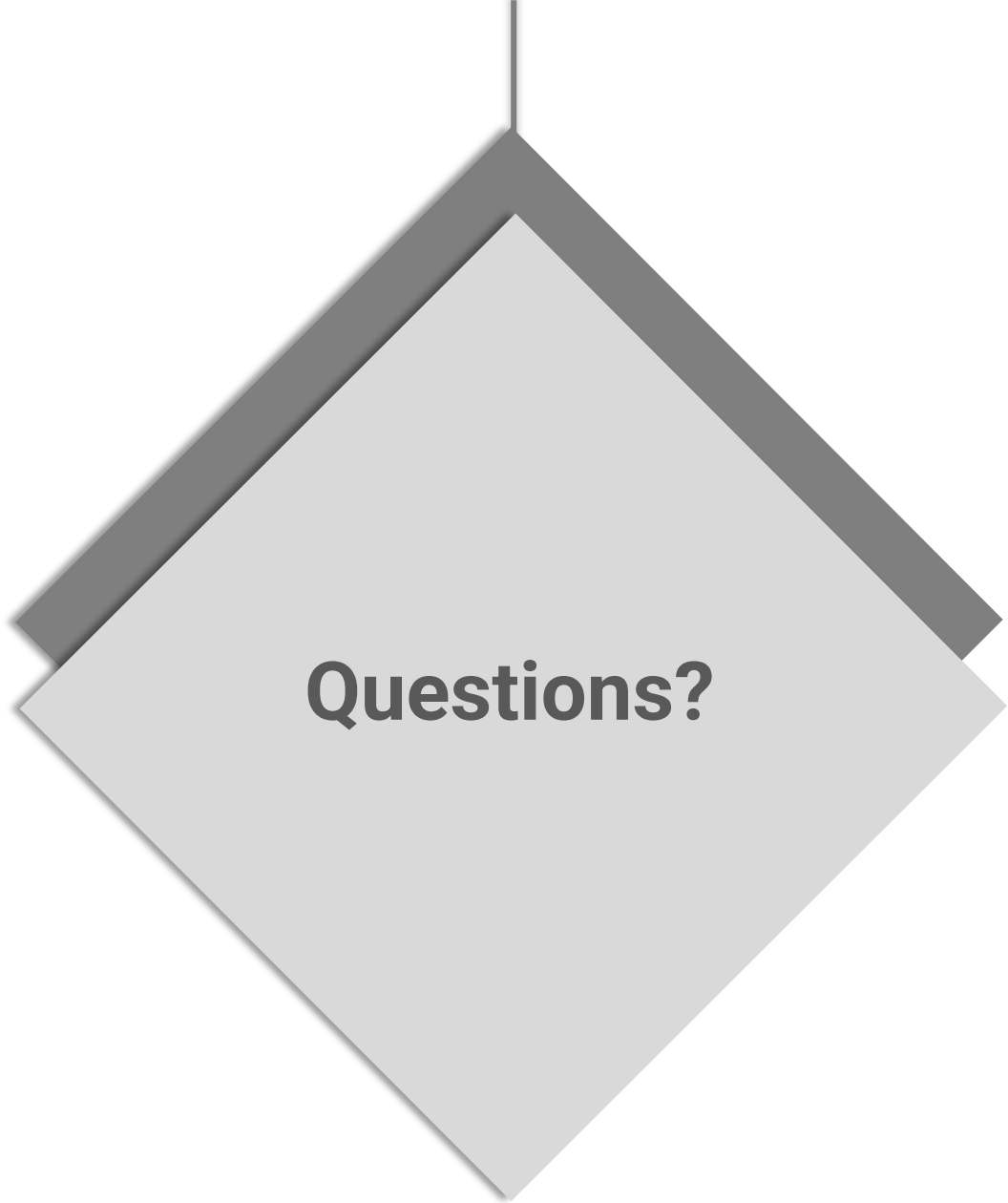
5. Project

Stroke prediction project

1. **id**: unique identifier
2. **gender**: "Male", "Female" or "Other“
3. **age**: age of the patient
4. **hypertension**: 0 if the patient doesn't have hypertension, 1 if the patient has hypertension
5. **heart_disease**: 0 if the patient doesn't have any heart diseases, 1 if the patient has a heart disease
6. **ever_married**: "No" or "Yes“
7. **work_type**: "children", "Govt_jov", "Never_worked", "Private" or "Self-employed“
8. **Residence_type**: "Rural" or "Urban“
9. **avg_glucose_level**: average glucose level in blood
10. **bmi**: body mass index
11. **smoking_status**: "formerly smoked", "never smoked", "smokes" or "Unknown"*
12. **stroke**: 1 if the patient had a stroke or 0 if not

Summary

- When should we use rule-based AI?
- Sometimes, it is hard to specify the rules (we don't know the rules, or it is difficult to tell)
- We use machine learning to let the computer learn the rules from the data by looking at so many examples.
- We have two main types of machine learning, supervised and unsupervised learning
  - Supervised: we have the labels, and we want to classify
  - Unsupervised: we DON'T have the label; we want to make clusters or groups of similar data
- The main process of training an AI using the machine learning method:
  - Collecting a proper dataset
  - Preparing the data
  - Choose an appropriate algorithm for our machine learning method
  - Train an AI model using the data and the algorithm
  - Testing the model
  - Using the model to perform a task



Homework

1. Explain an example of supervised learning:
   - What are the data?
   - What are the attributes and features of the data?
   - What are the labels?

2. Considering Stroke prediction projects
   - How can we use the result of this project in the real life?
   - How can this AI help doctor and patient?