

Machine Learning



1. Review



2. Machine Learning (ML)



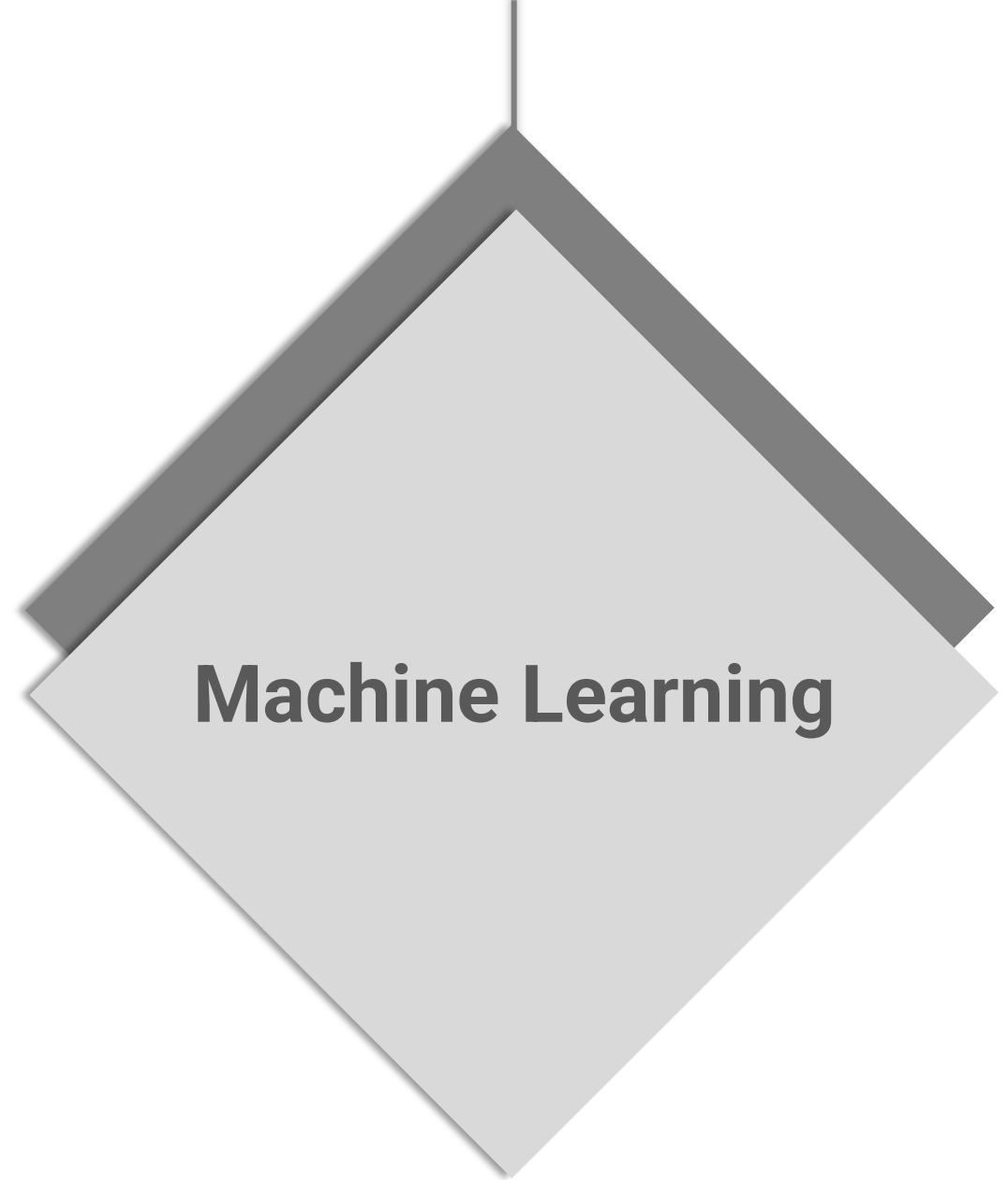
3. Types of ML



4. ML process



5. Project





1. Review



2. Machine Learning (ML)



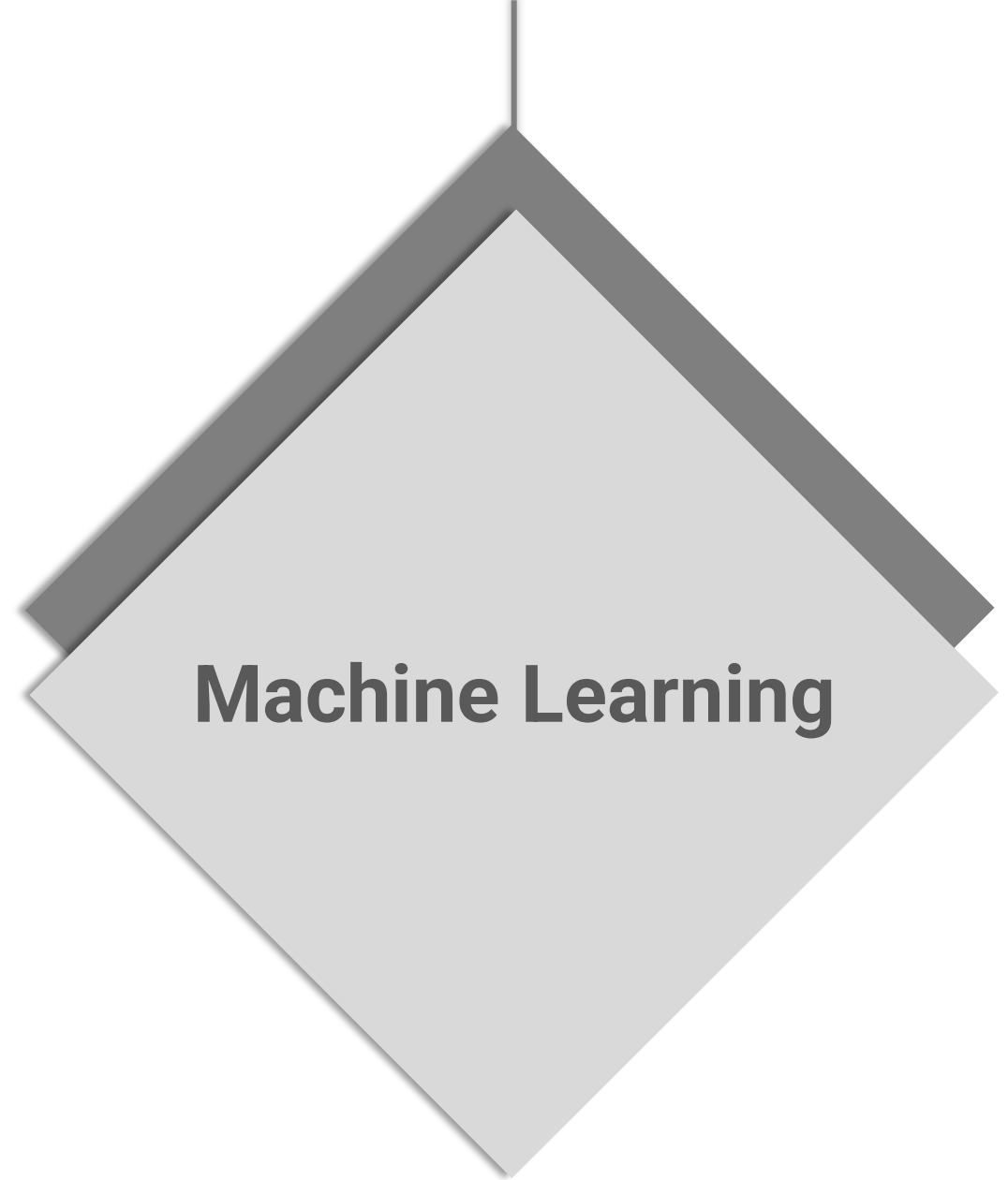
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1. Review

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:

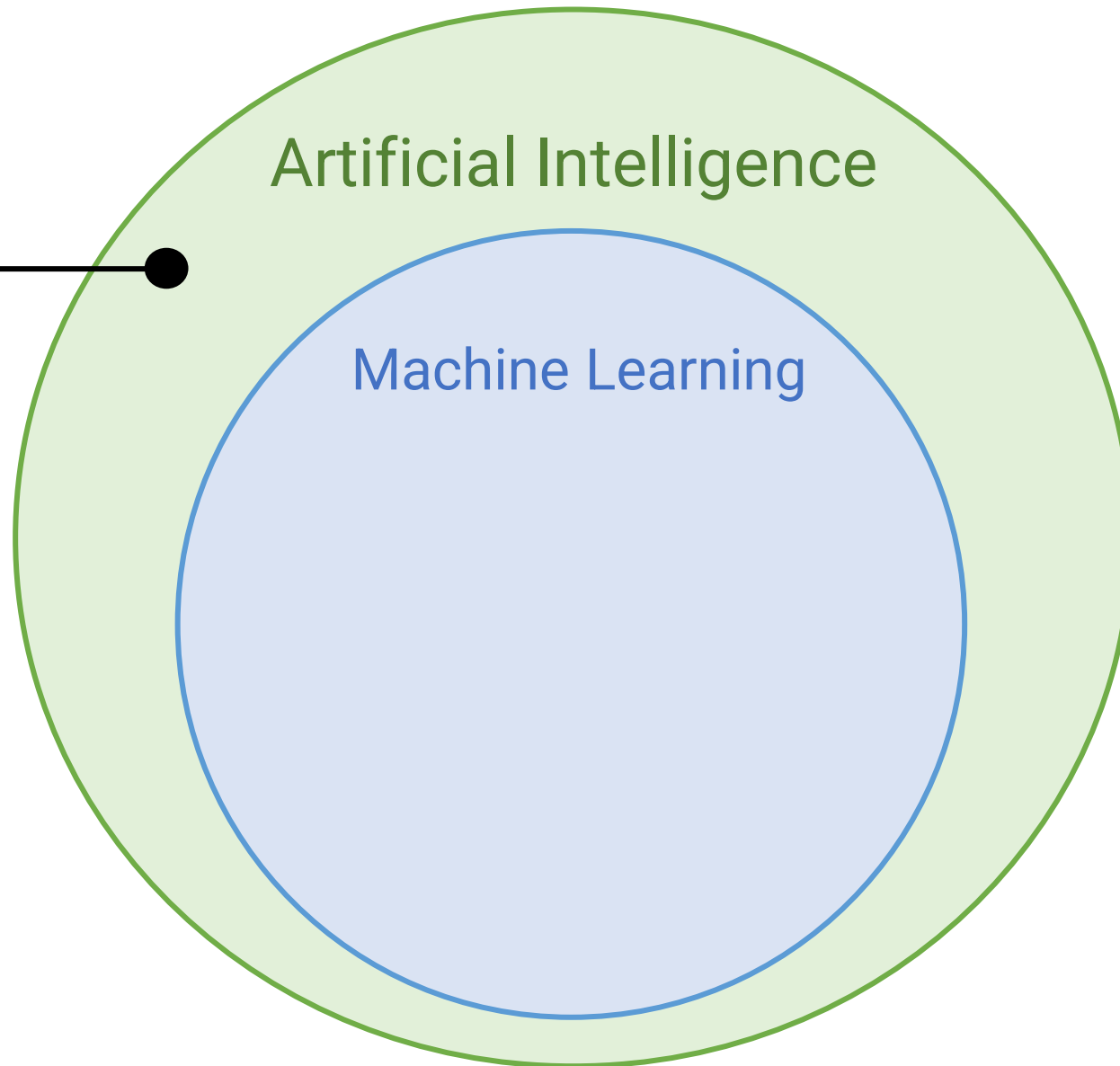
1- Rule-base

Give me more examples!



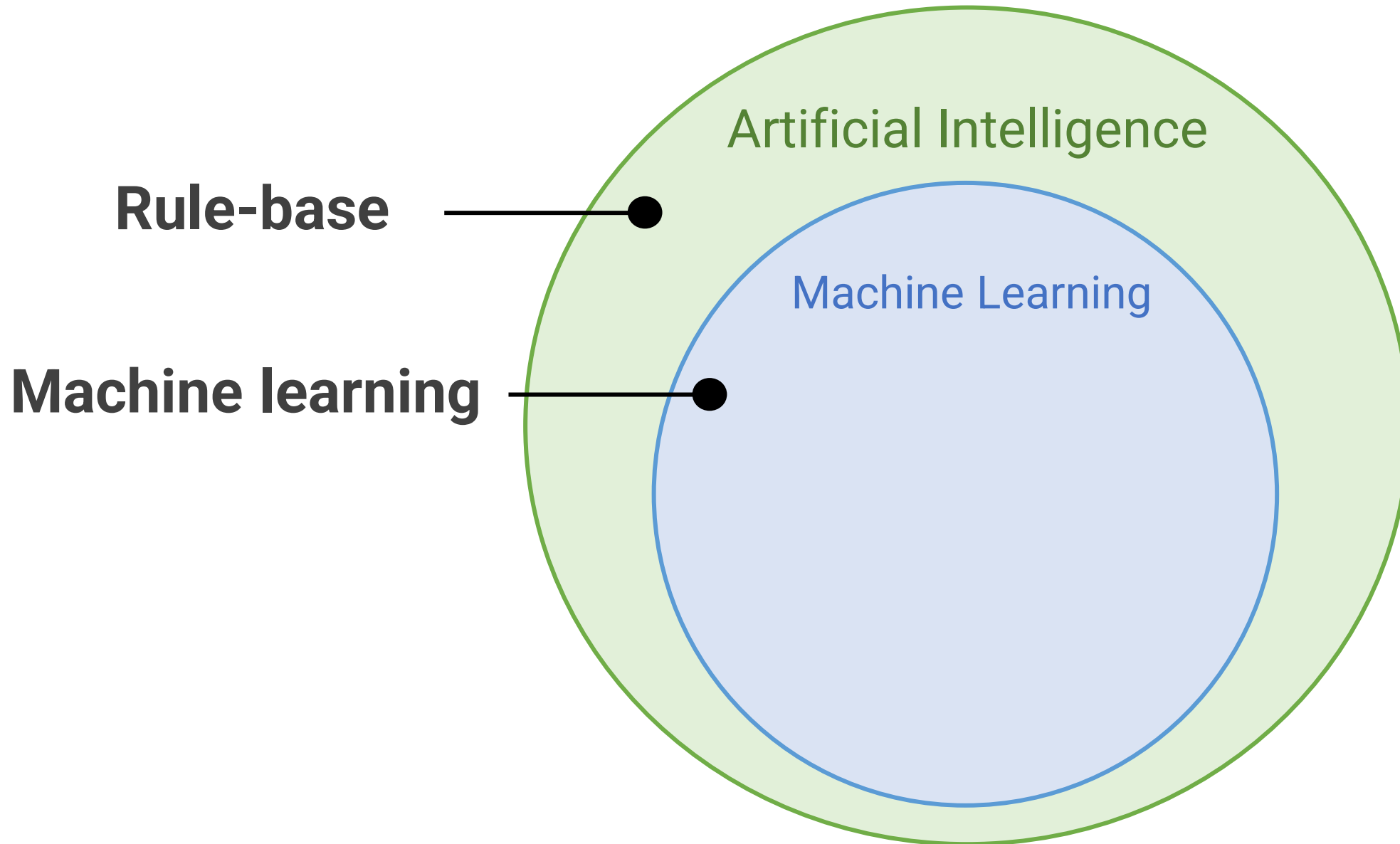
1. Review

Rule-base





1. Review





1. Review



2. Machine Learning (ML)



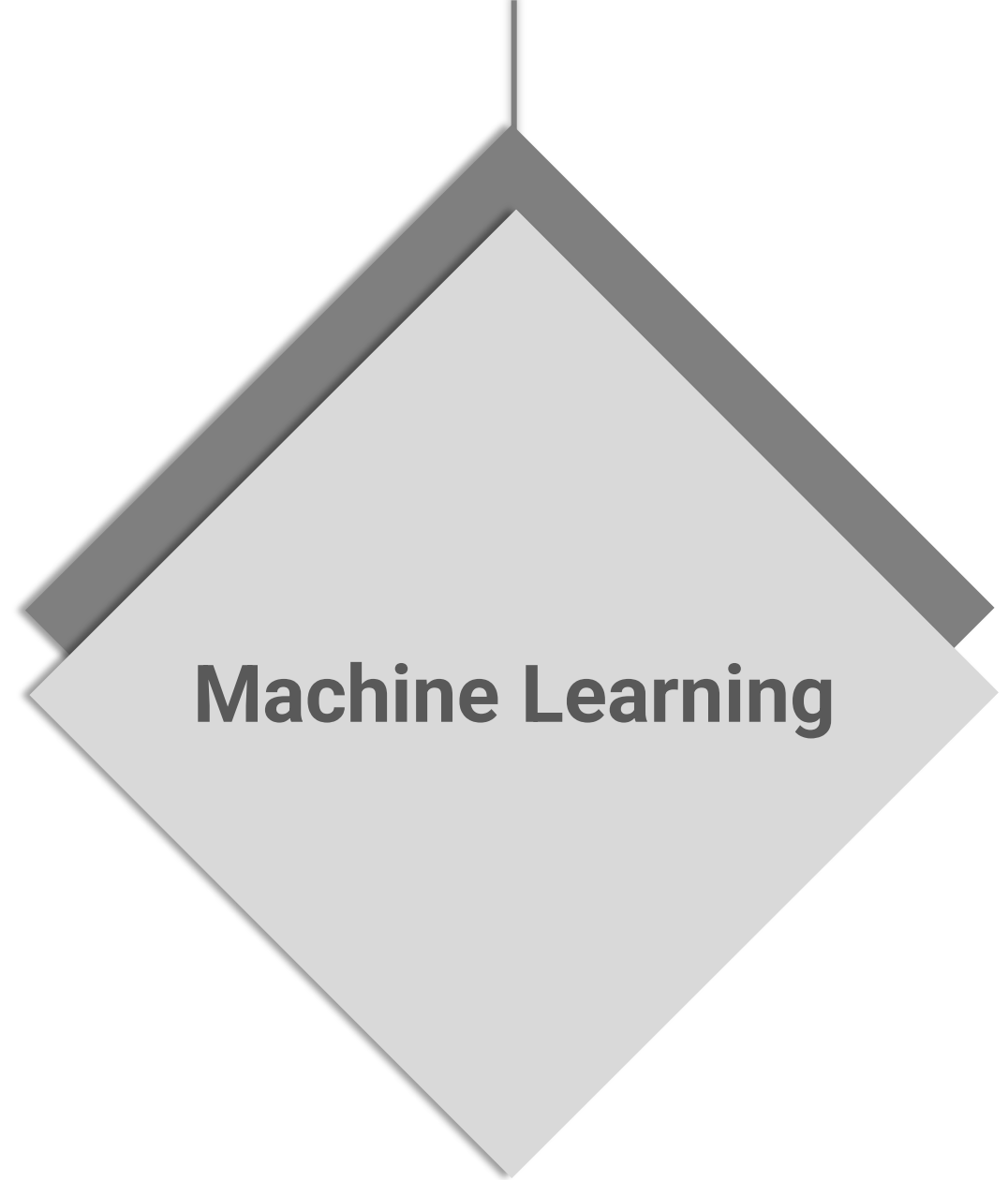
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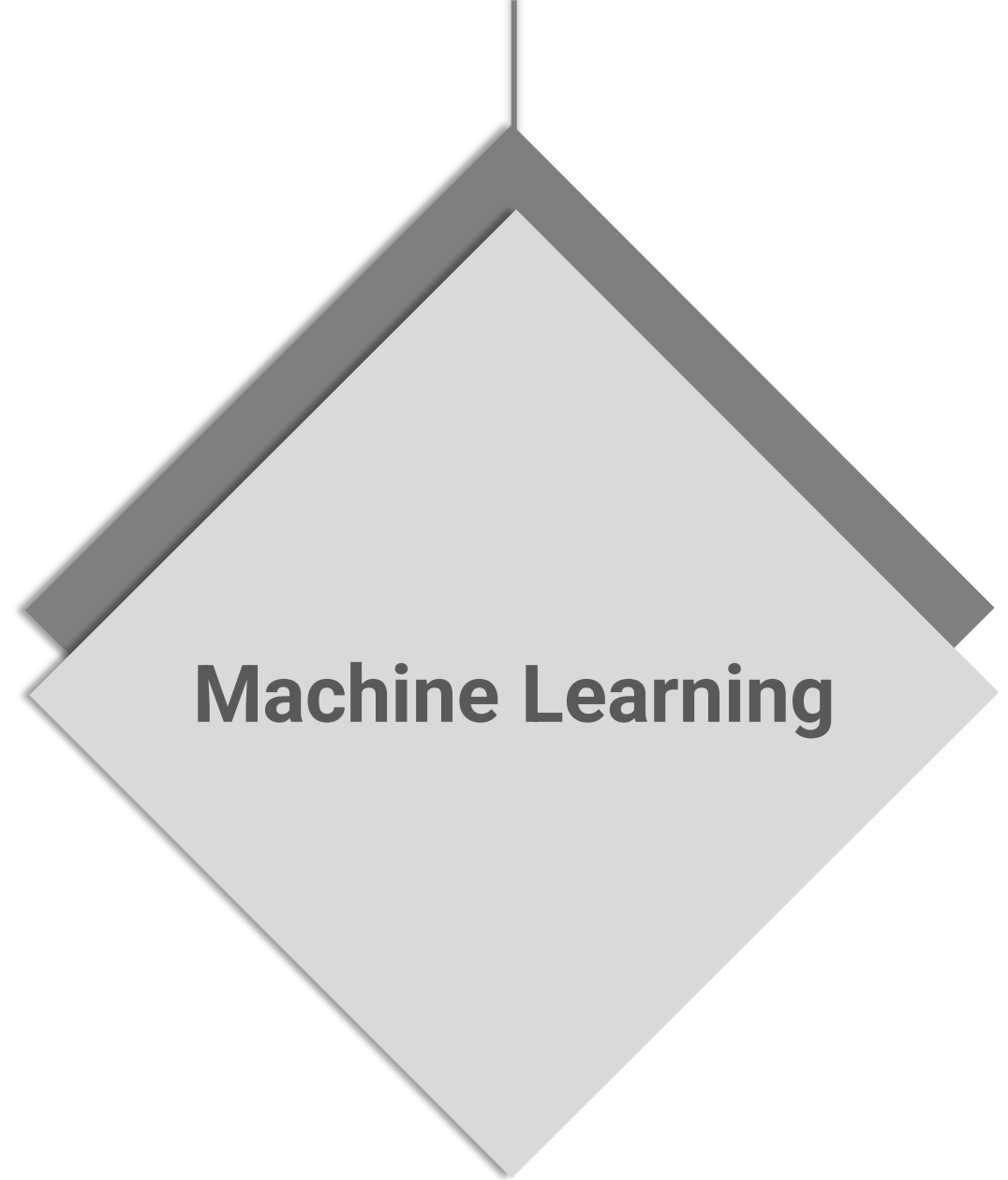
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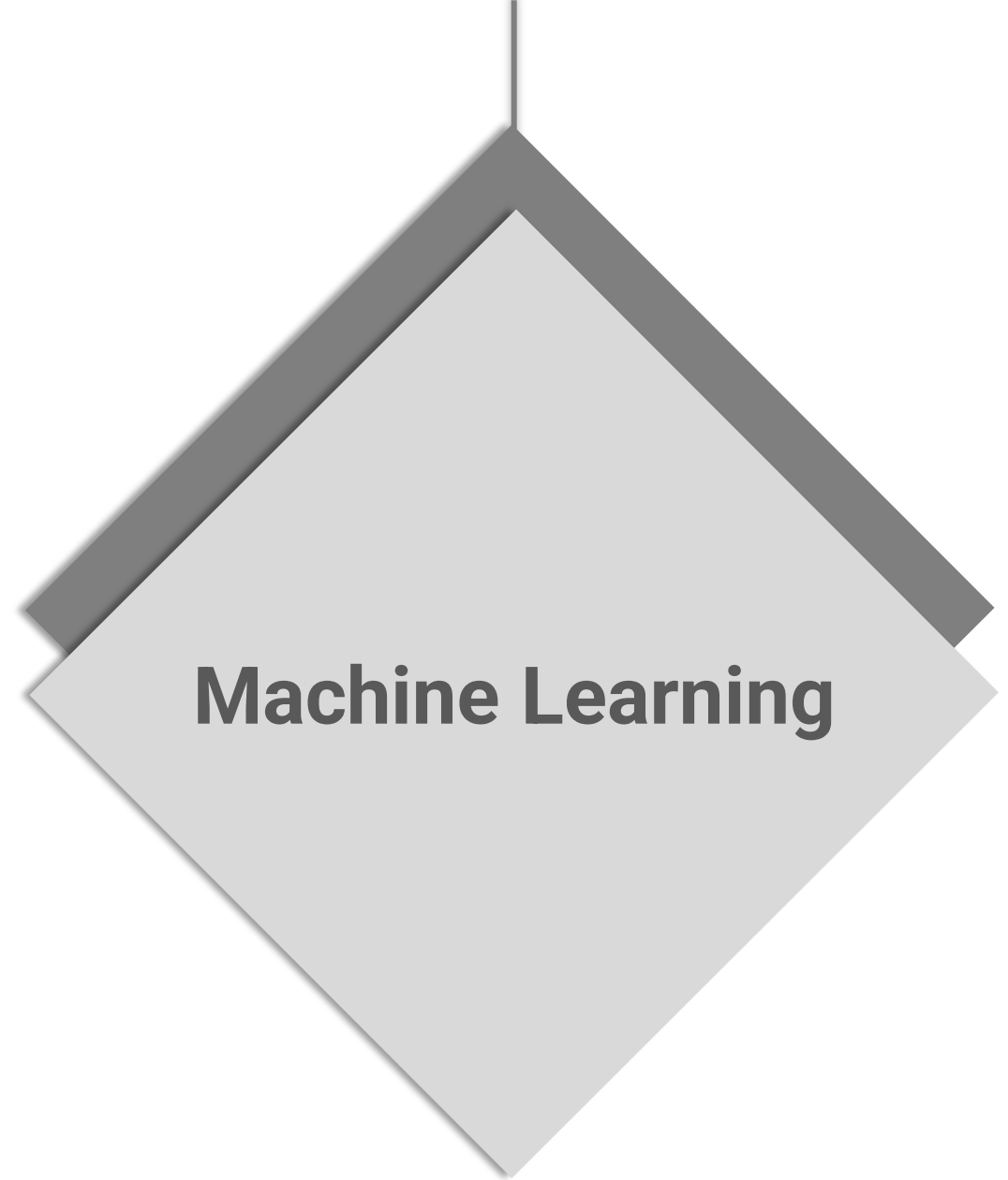
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2. Machine Learning (ML)

**Figuring out the rules is difficult and confusing
Even for humans**

Like what?



2. Machine Learning (ML)

Examples:

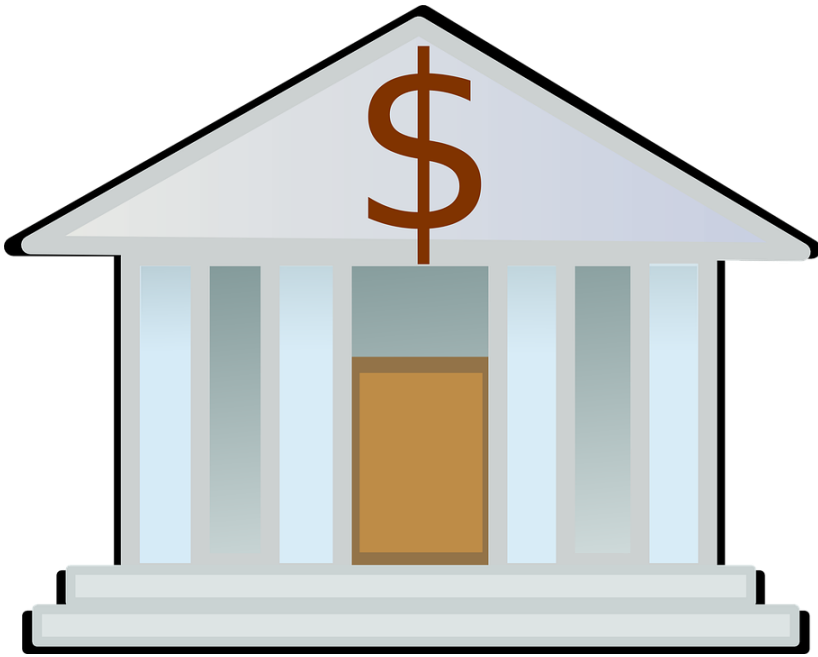
Do I get a heart attack?



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)





2. Machine Learning (ML)

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



1. Review



2. Machine Learning (ML)



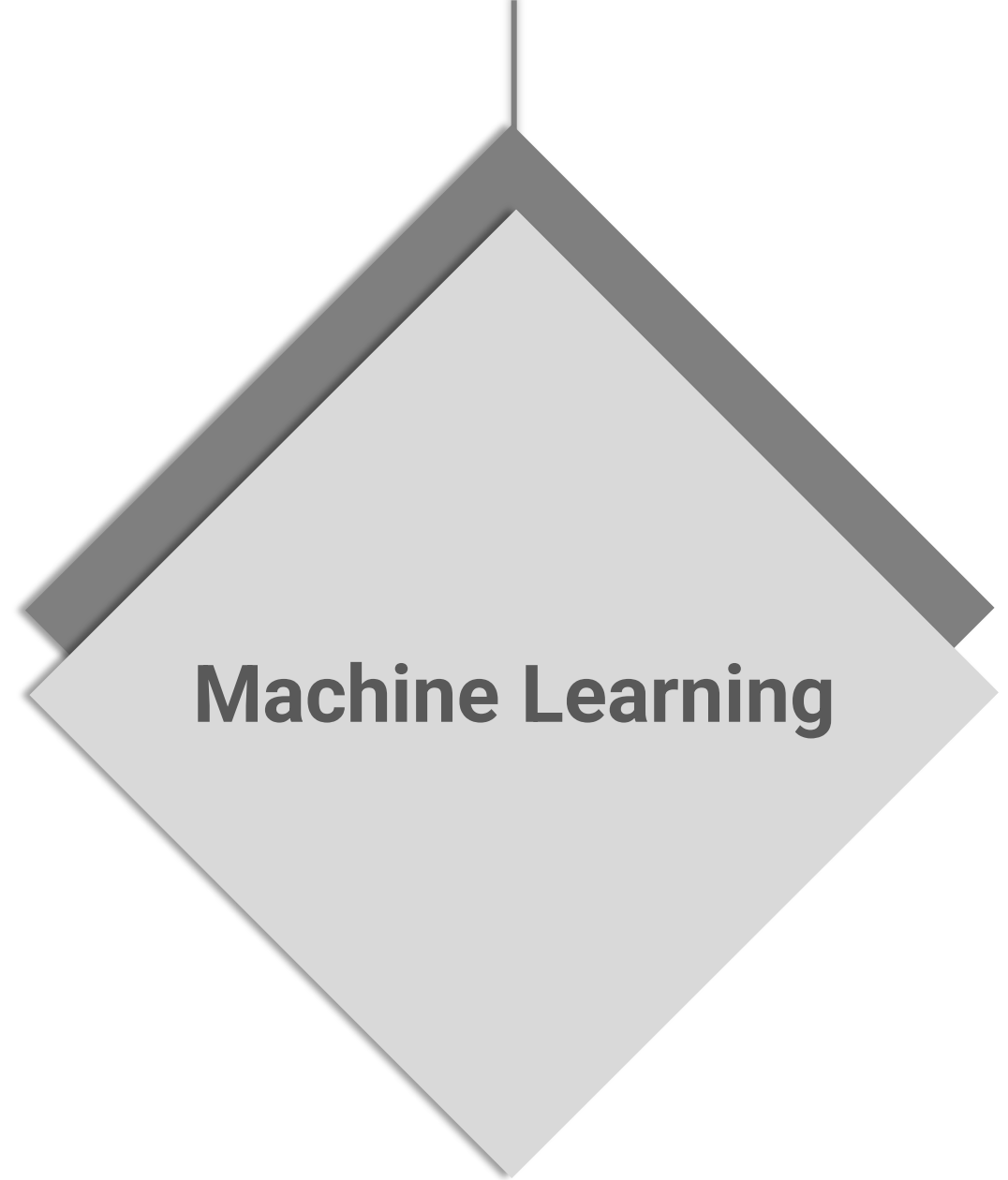
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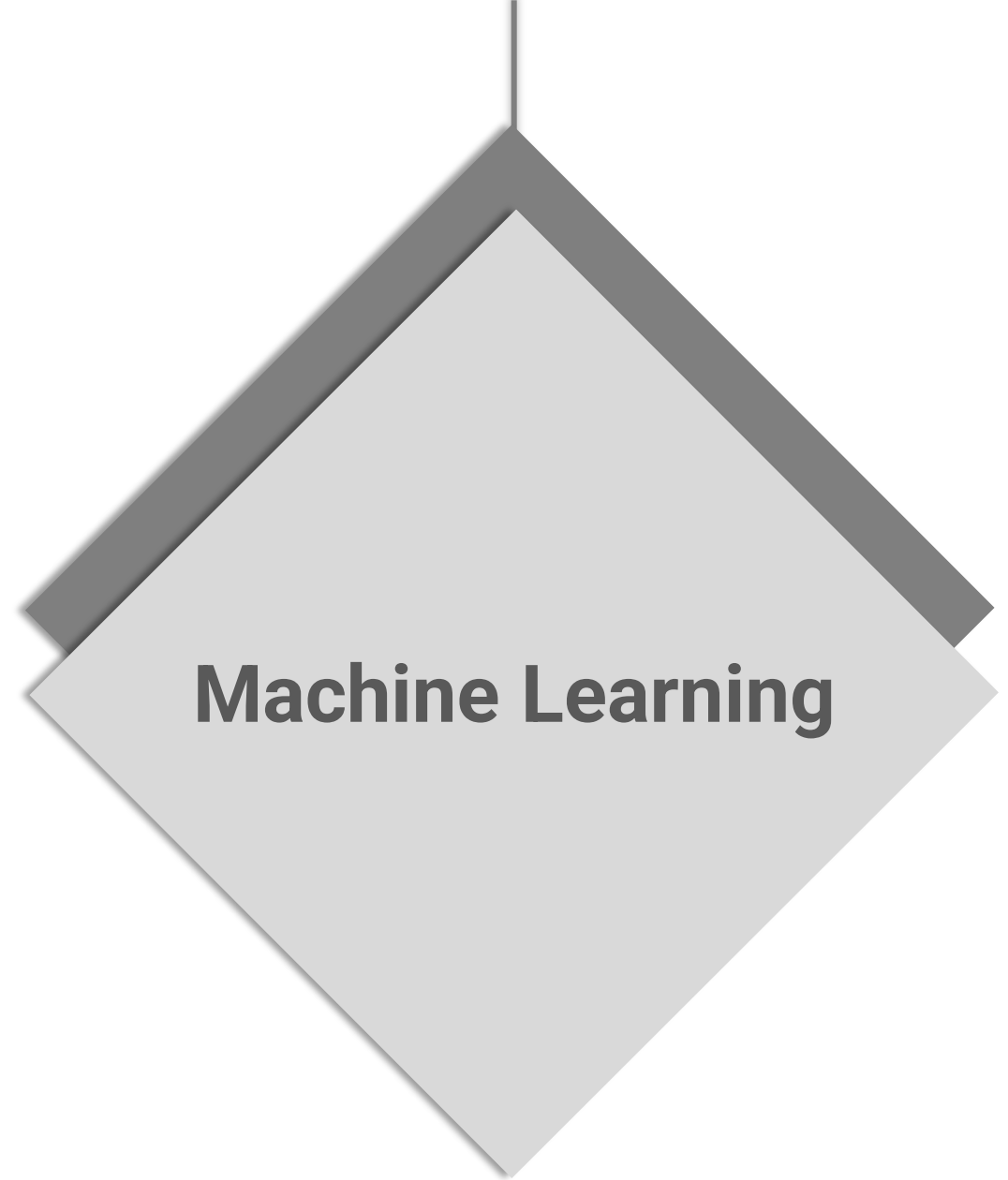
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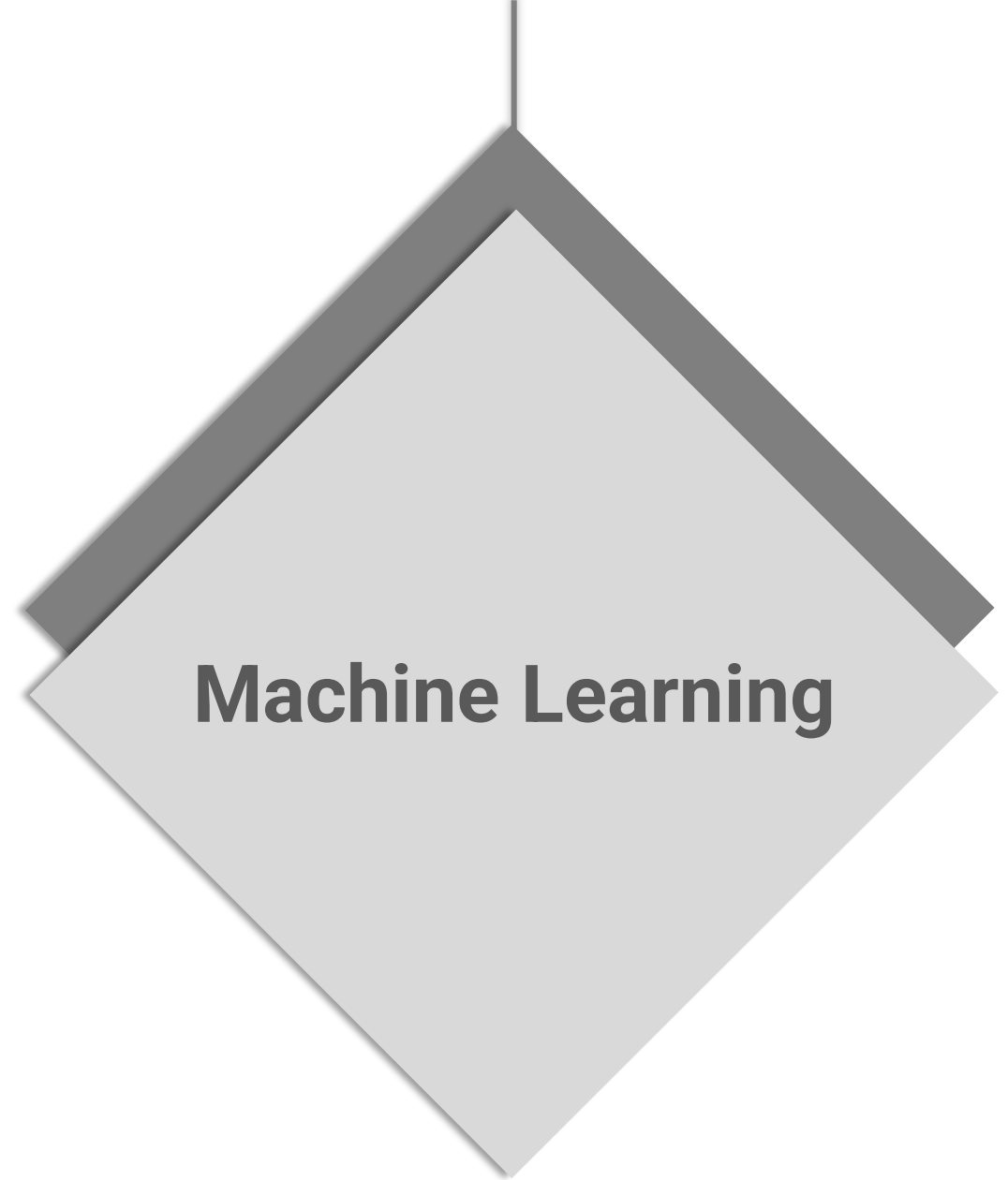
3. Types of ML



4. ML process



5. Project





3. Types of ML

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

Supervised

Unsupervised



3. Types of ML

Cat



Cat



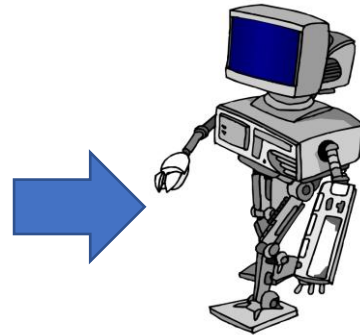
Cat



Cat



These are cats!



Dog



Dog



Dog



Dog



These are Dogs!

Supervised



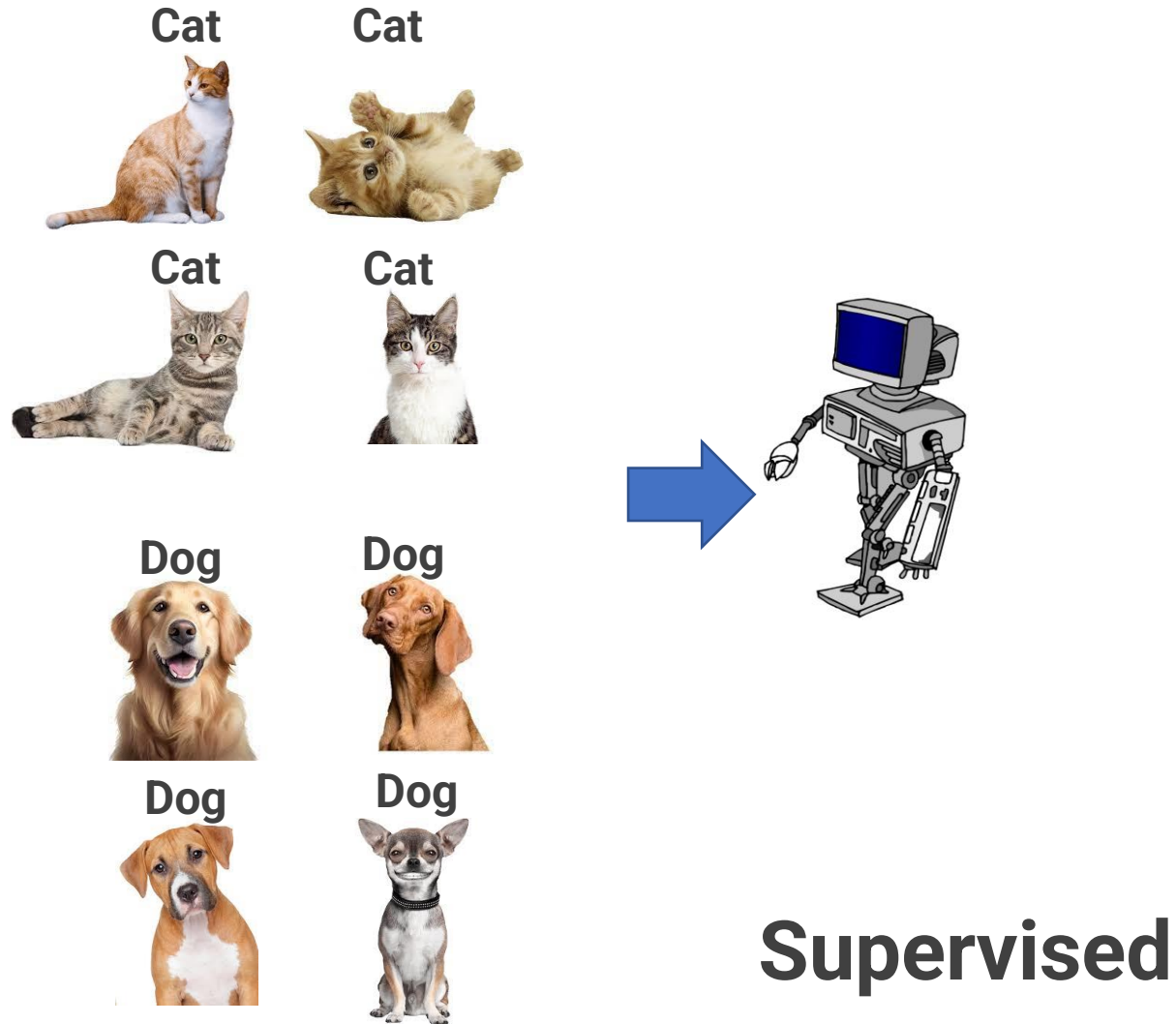
I guess this is a **Cat**!



I guess this is a **Dog**!



3. Types of ML



Supervised

The data has **label**

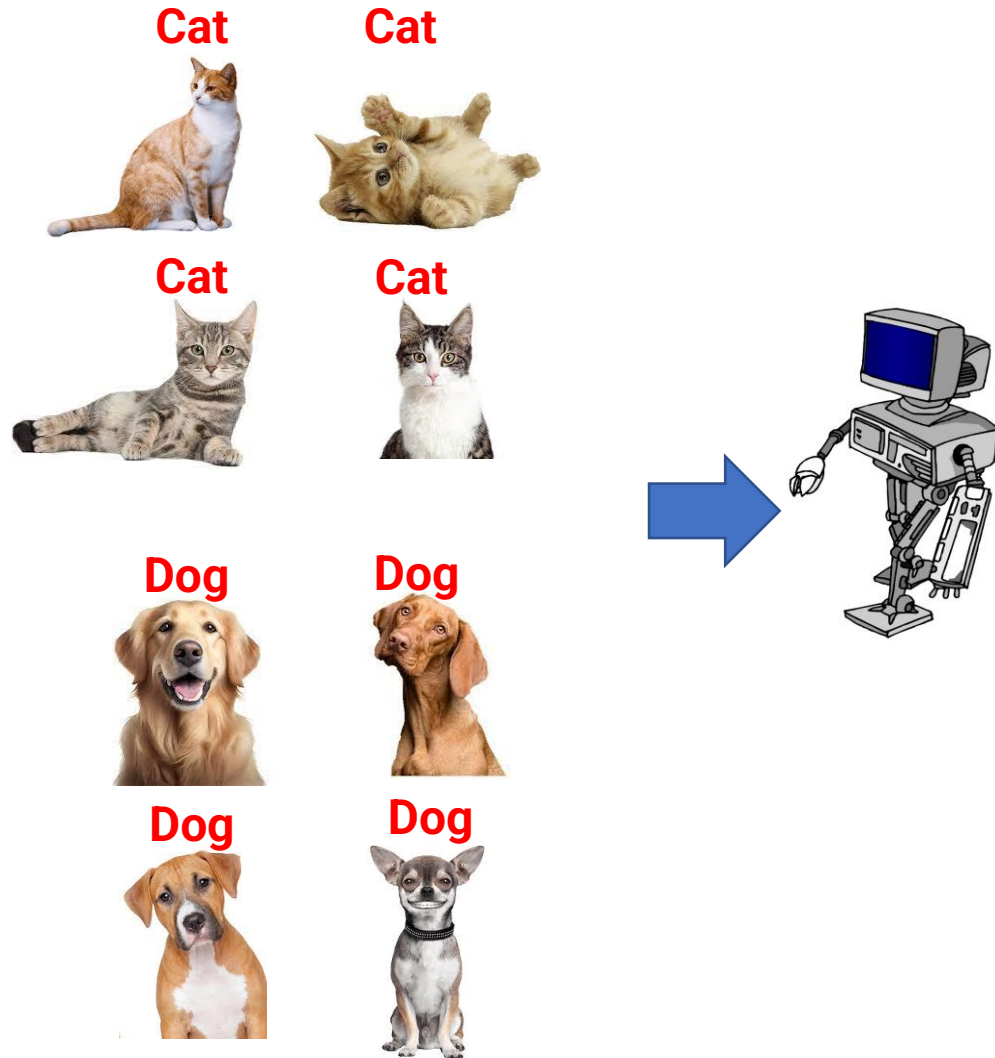
AI predicts the label and tries to classify based on its learning

In other words, it tries to **Classify**

Supervised learning -> Classification



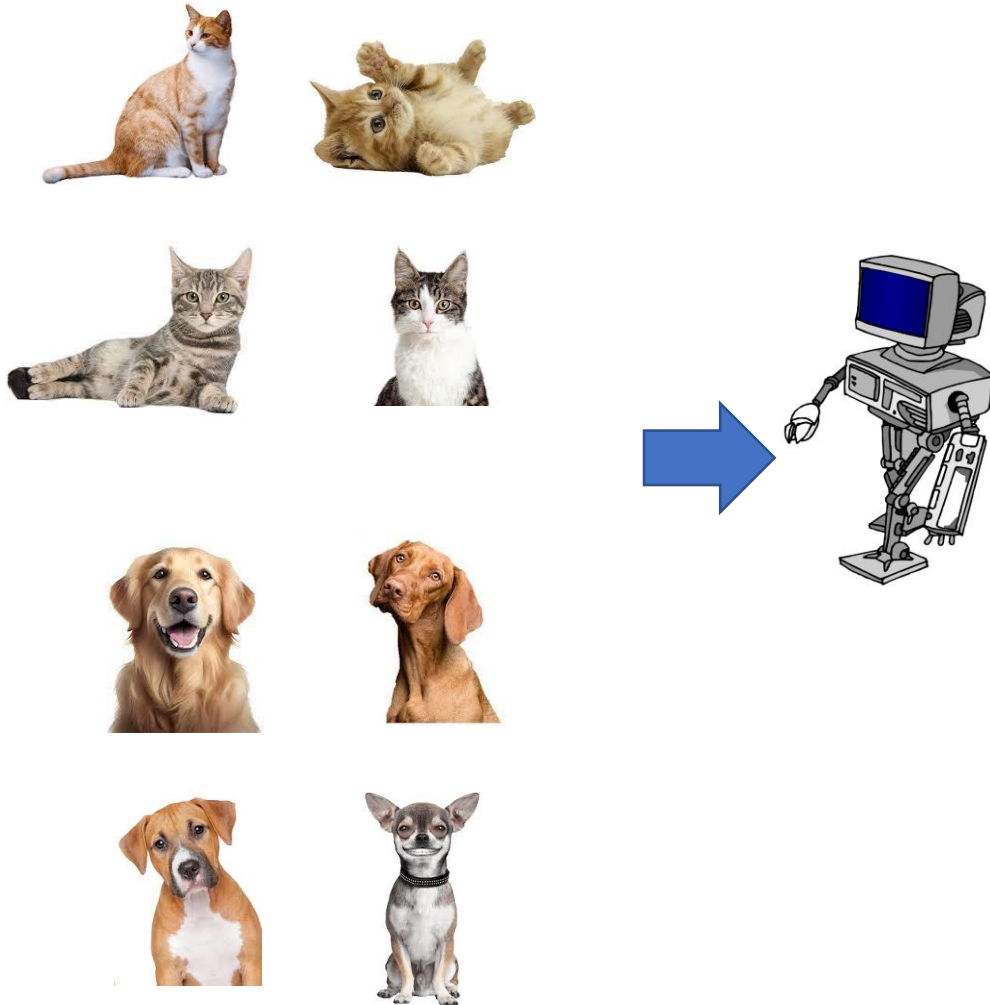
3. Types of ML



Unsupervised



3. Types of ML



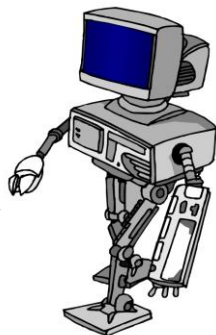
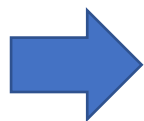
Unsupervised



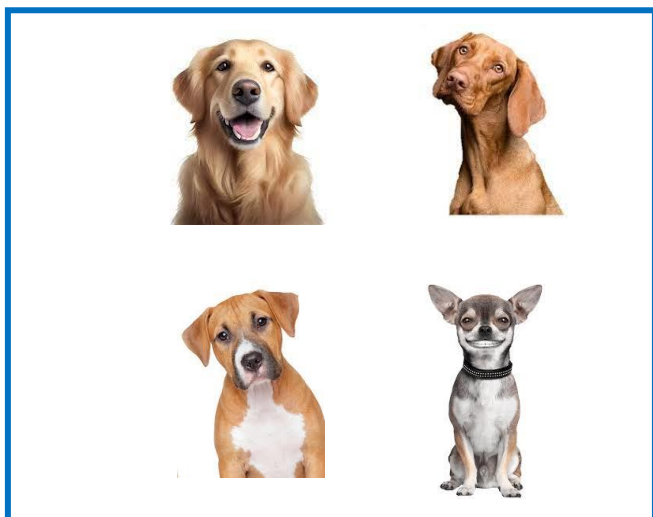
3. Types of ML



I think these
are similar!



And these are similar
to each other!



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



?



?

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

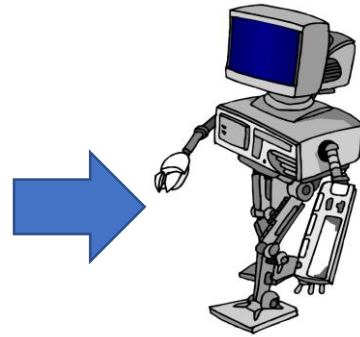
Unsupervised



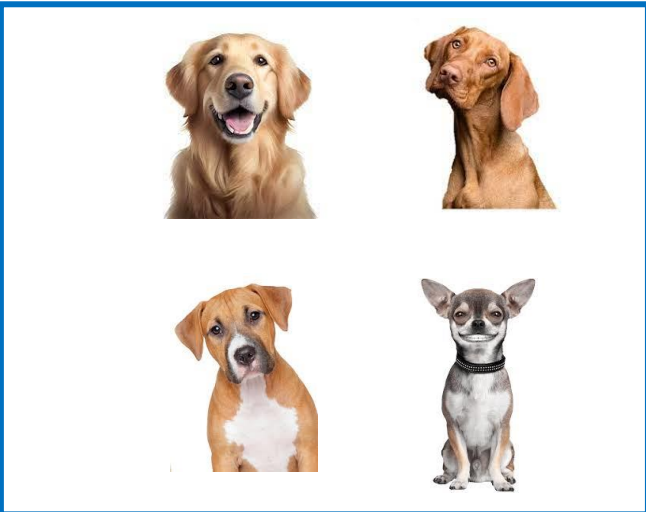
3. Types of ML



I think these
are similar!



And these are similar
to each other!



Unsupervised

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**

Supervised learning -> **Clustering**



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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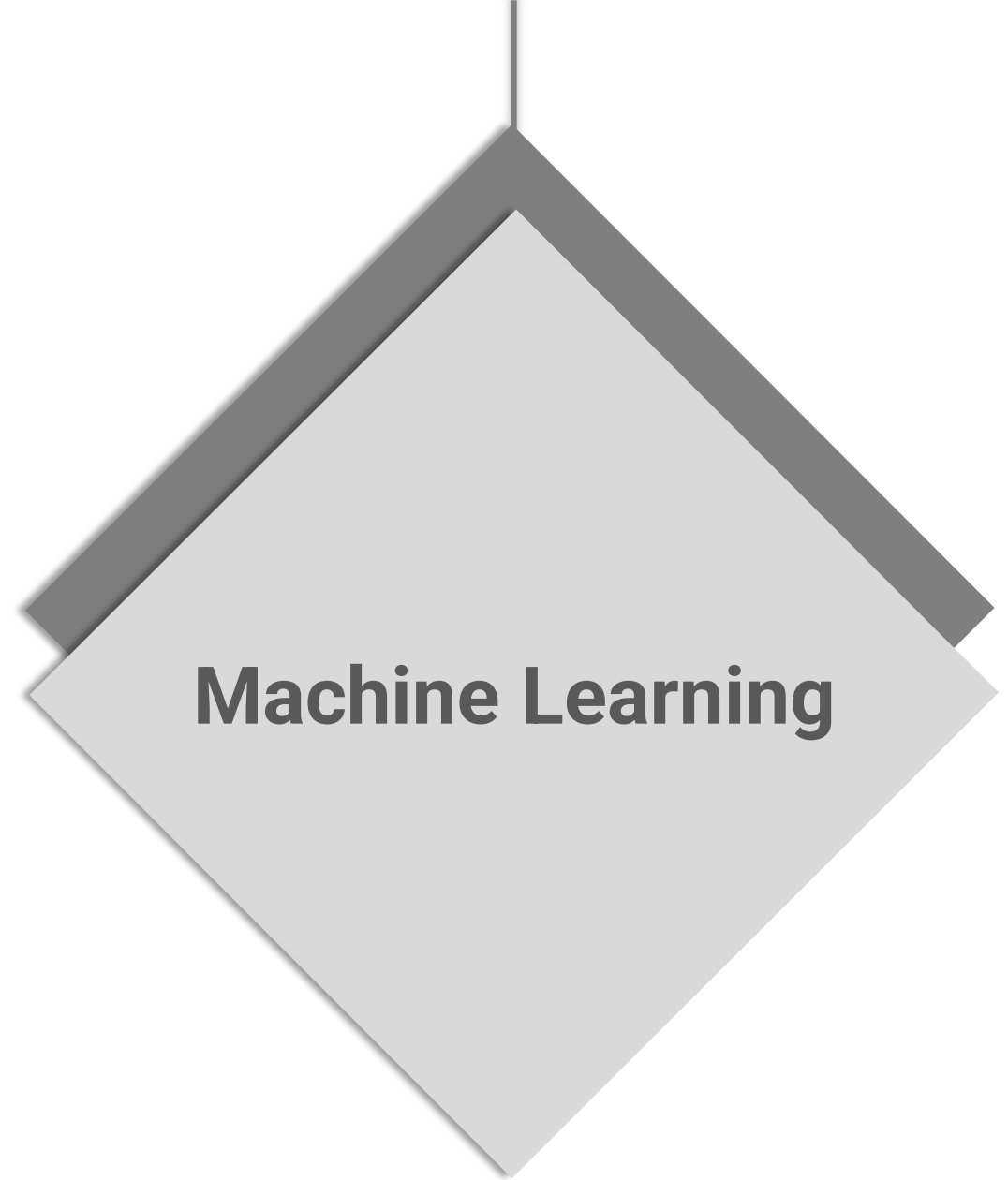
3. Types of ML



4. ML process



5. Project





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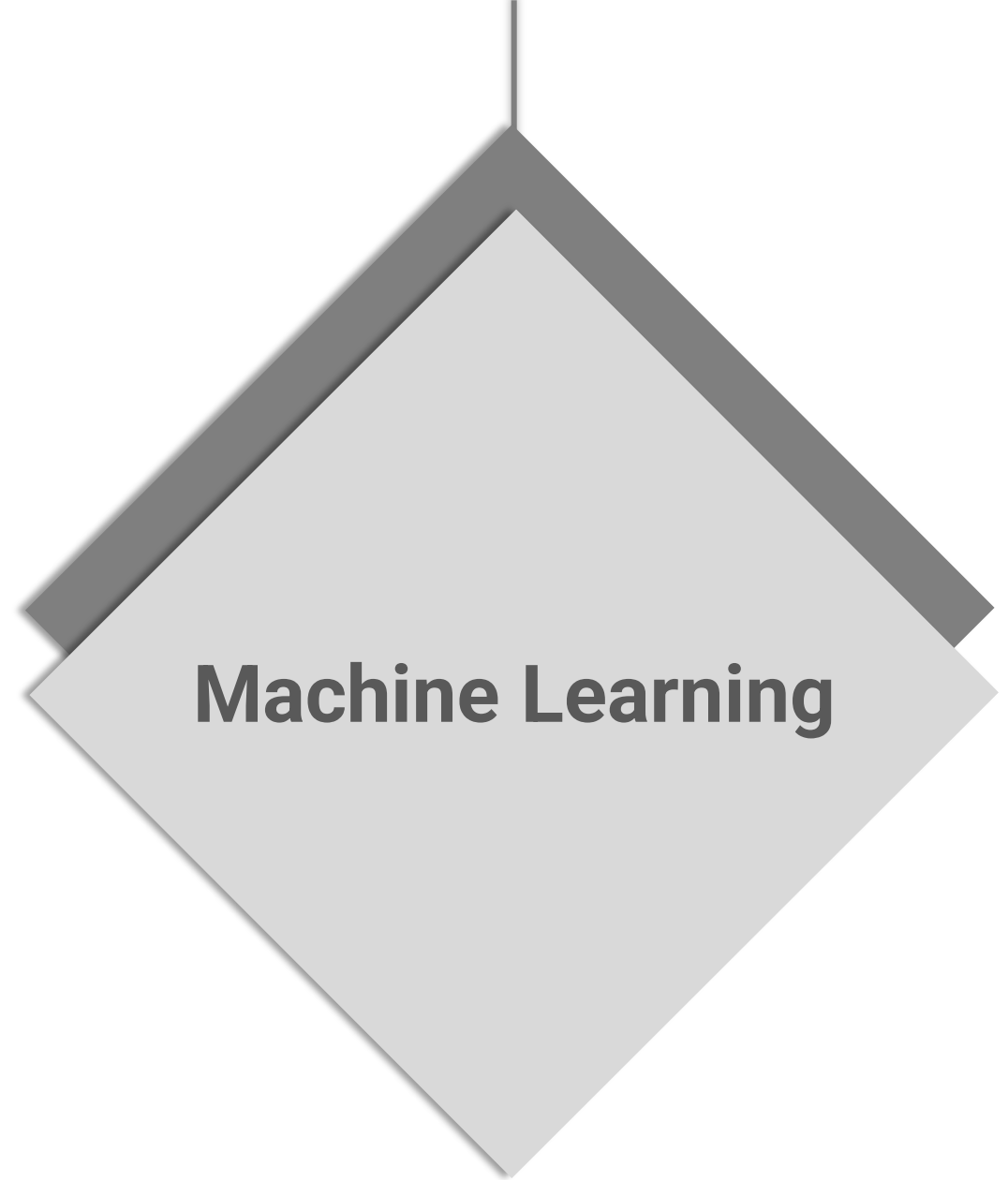
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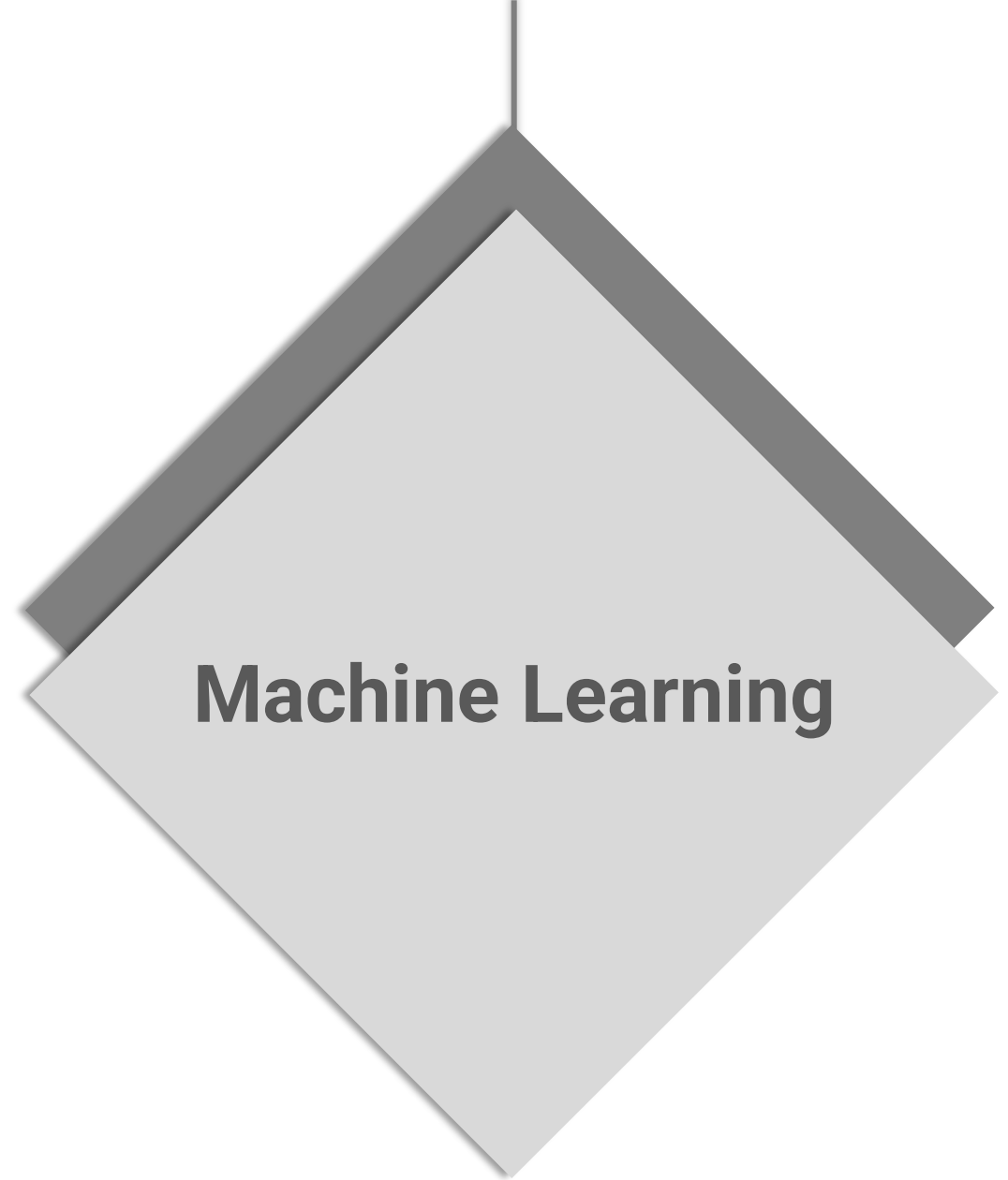
3. Types of ML



4. ML process

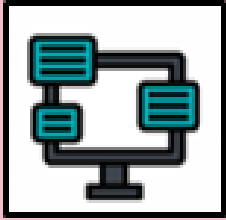


5. Project





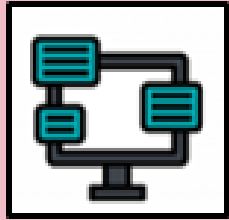
4. ML process



Step -1
Collection of Data from
Various source



4. ML process



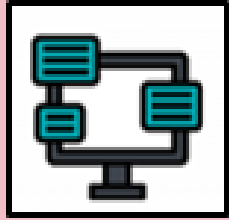
Step -1
Collection of Data from
Various source



Step -2
Data cleaning
and Feature
Engineering



4. ML process



Step -1
Collection of Data from
Various source



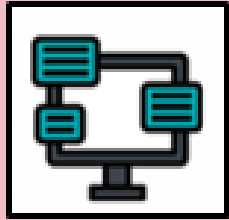
Step -2
Data cleaning
and Feature
Engineering



Step -3
Model
building for
selecting
correct ML
Algorithm



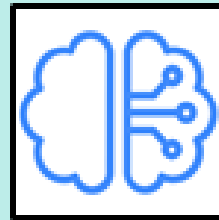
4. ML process



Step -1
Collection of Data from
Various source



Step -2
Data cleaning
and Feature
Engineering



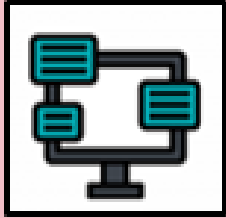
Step -3
Model
building for
selecting
correct ML
Algorithm




Step -4
Evaluate
Model



4. ML process




Step -1
Collection of Data from
Various source




Step -2
Data cleaning
and Feature
Engineering



Step -3
Model
building for
selecting
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Algorithm



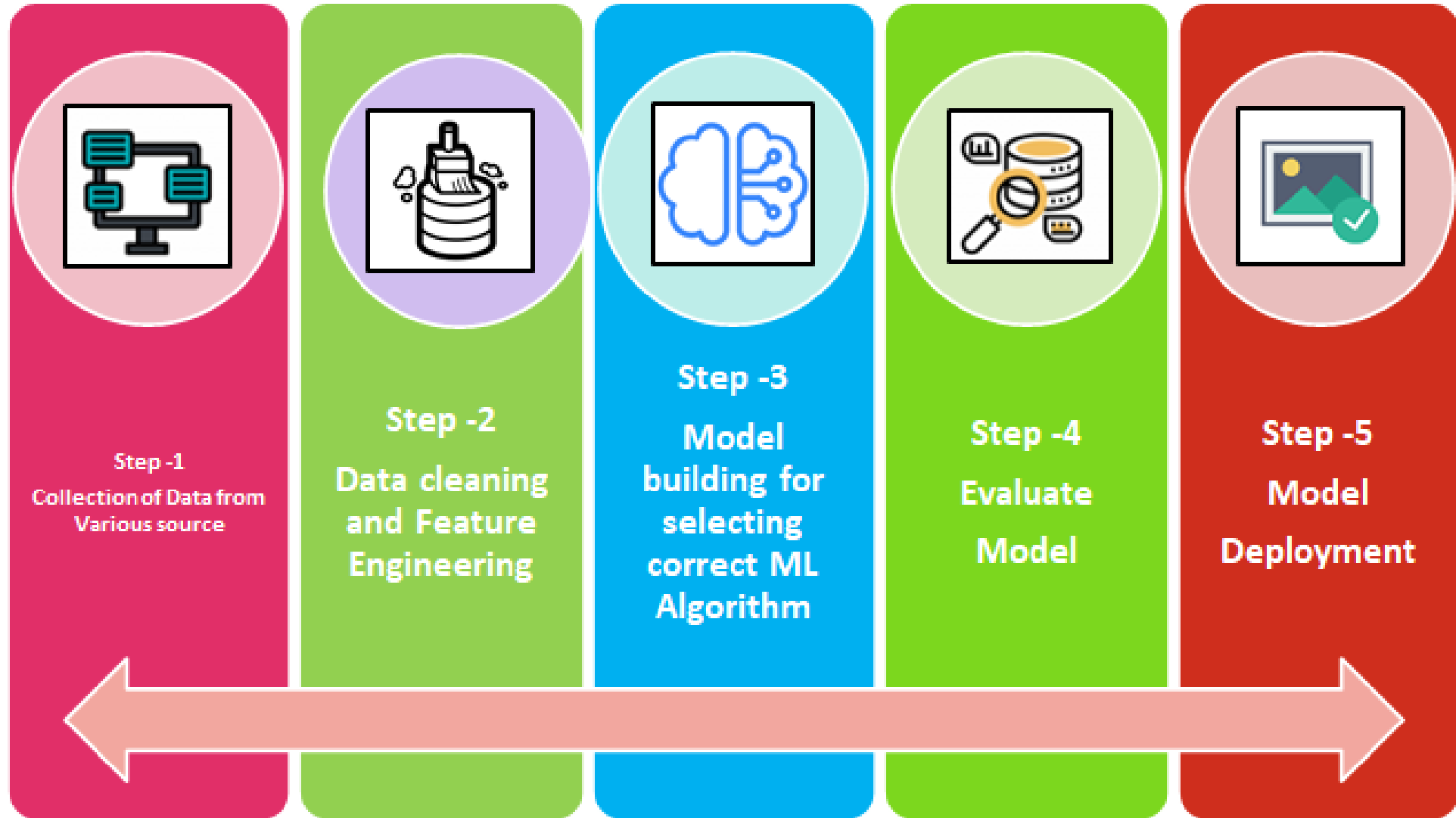
Step -4
Evaluate
Model



Step -5
Model
Deployment



4. ML process





1. Review



2. Machine Learning (ML)



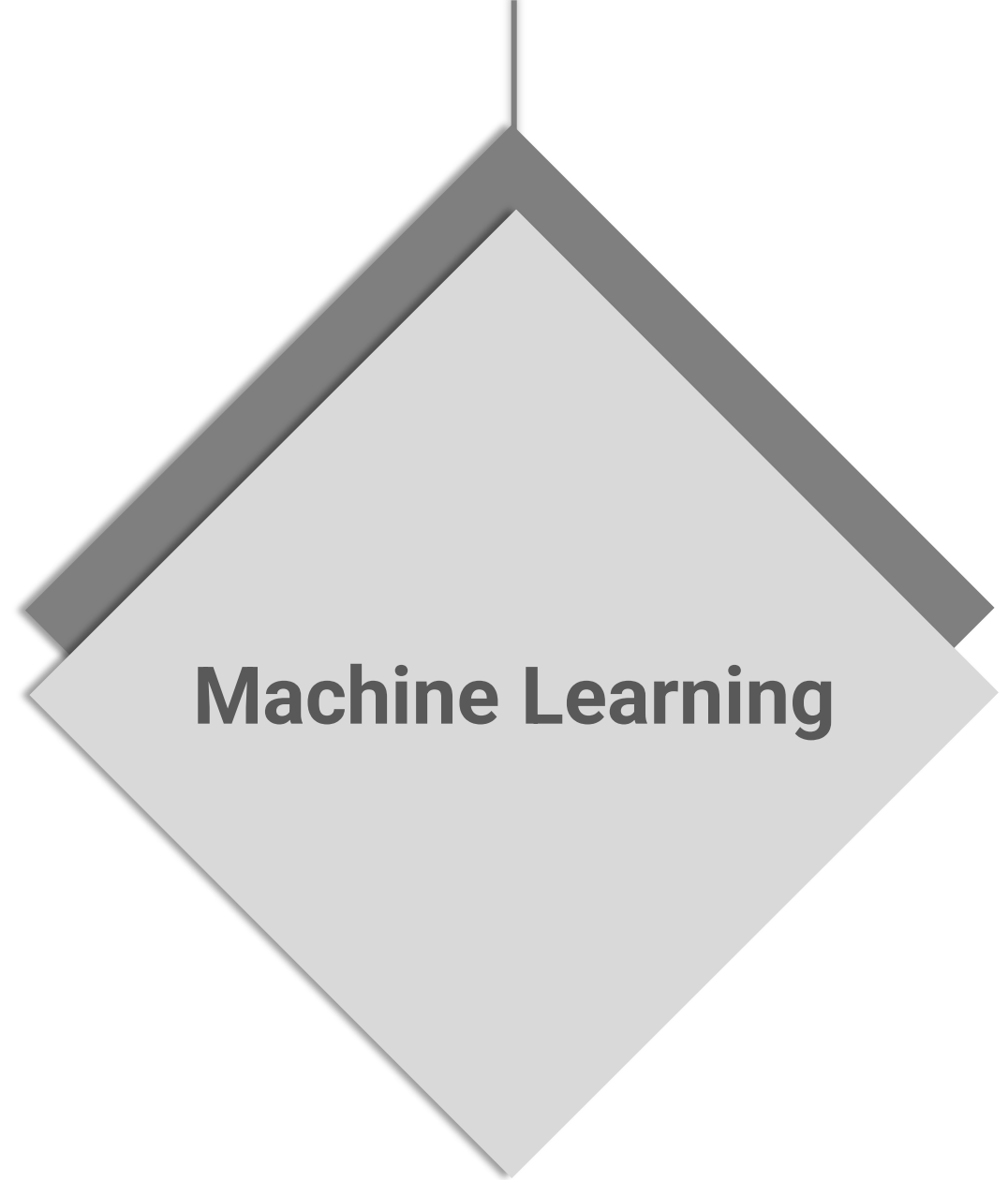
3. Types of ML



4. ML process



5. Project





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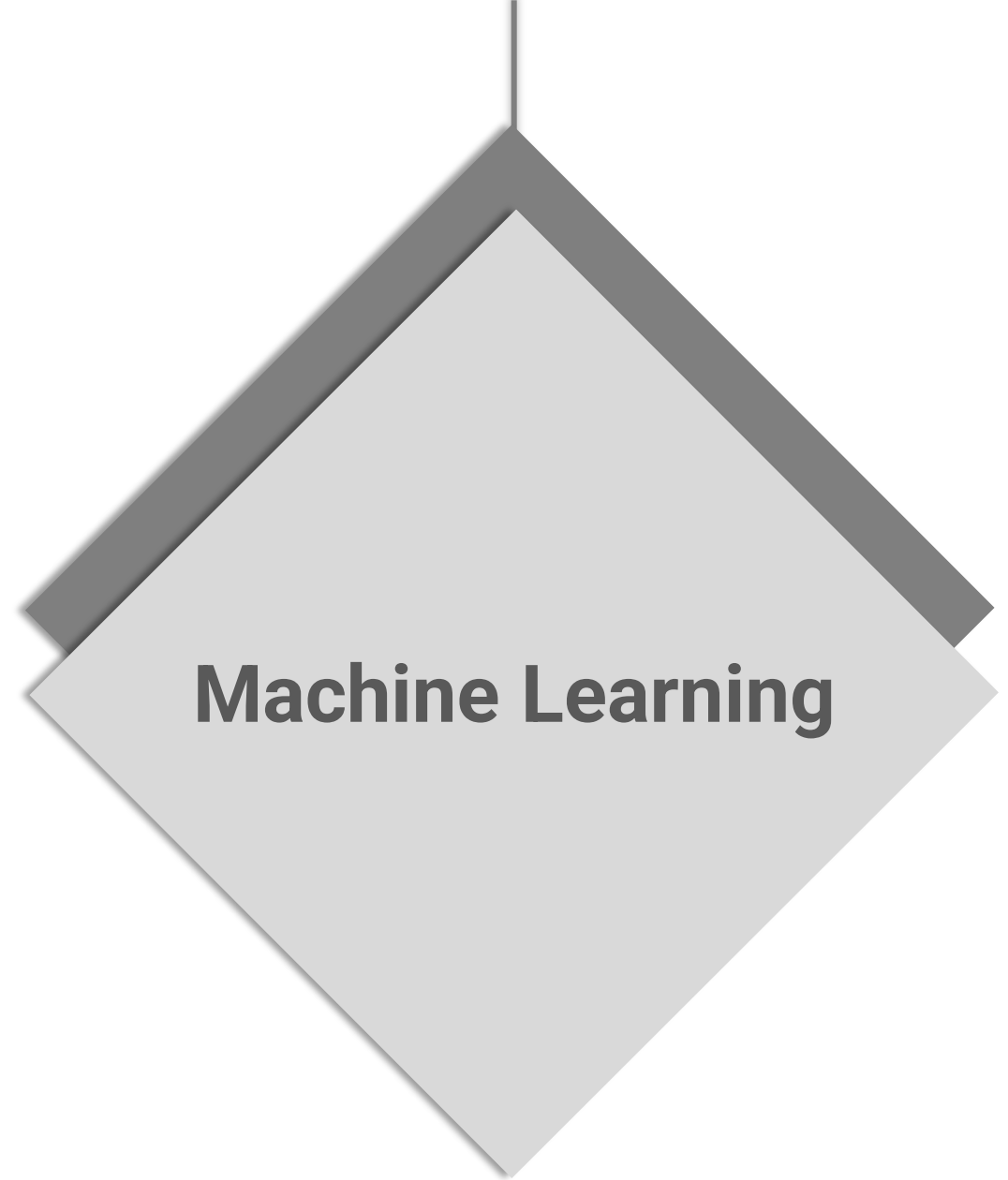
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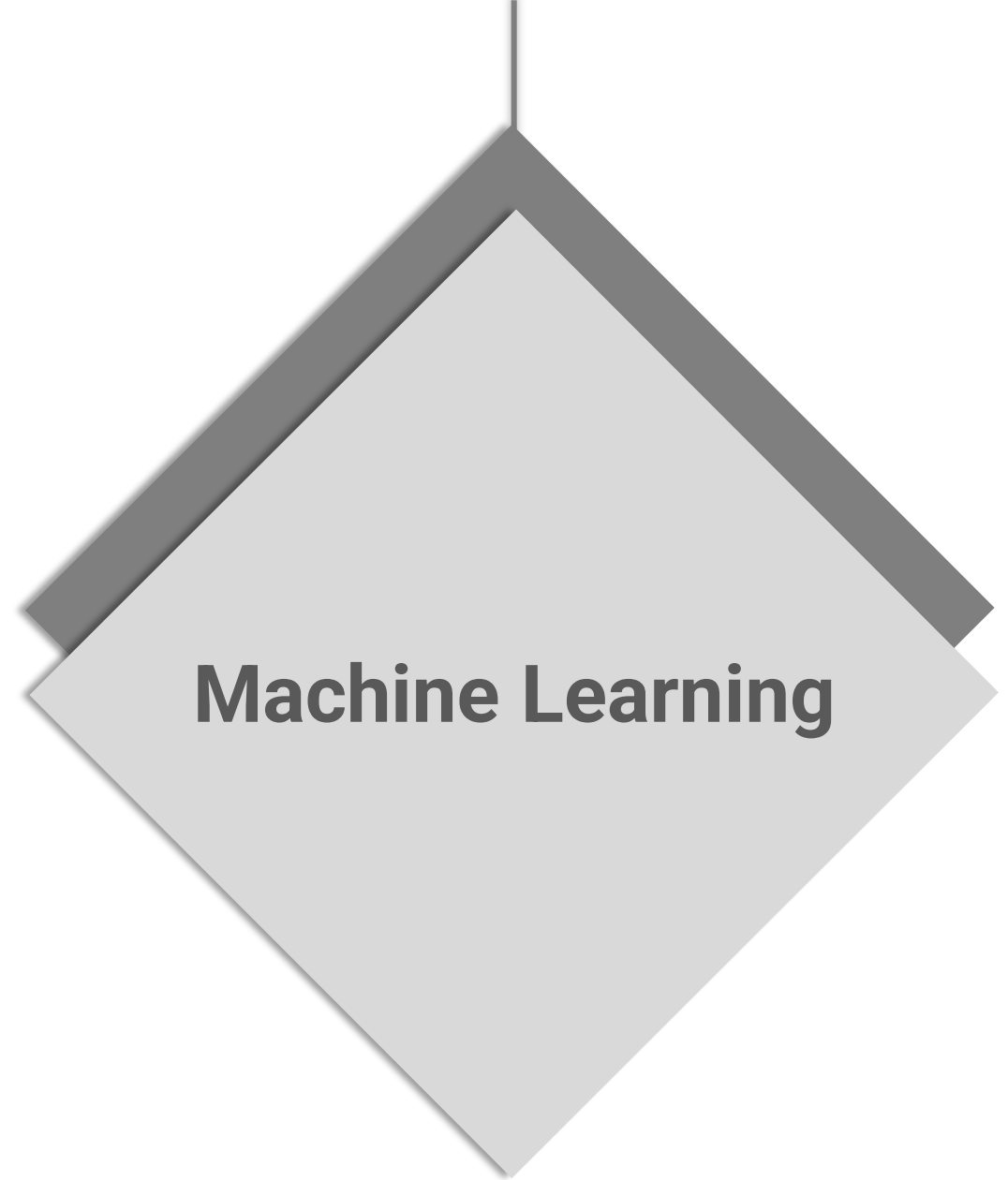
3. Types of ML



4. ML process



5. Project





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



Questions?



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?