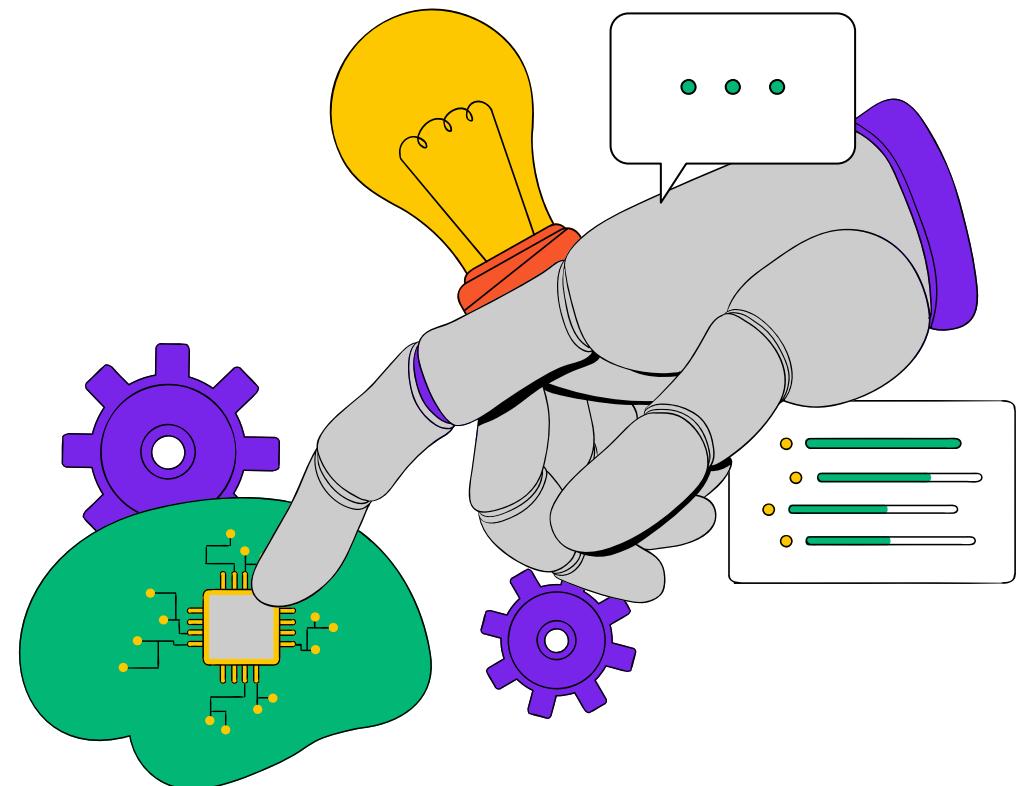




**VISION &
INNOVATION
CLUB**



Hands-On Machine Learning Workshop



About Me

- 4th Year Student at "ESI Alger" Computer Systems Option.
- Technical Department Co-manager at School of AI Algiers.
- I Love Data Science <3 !

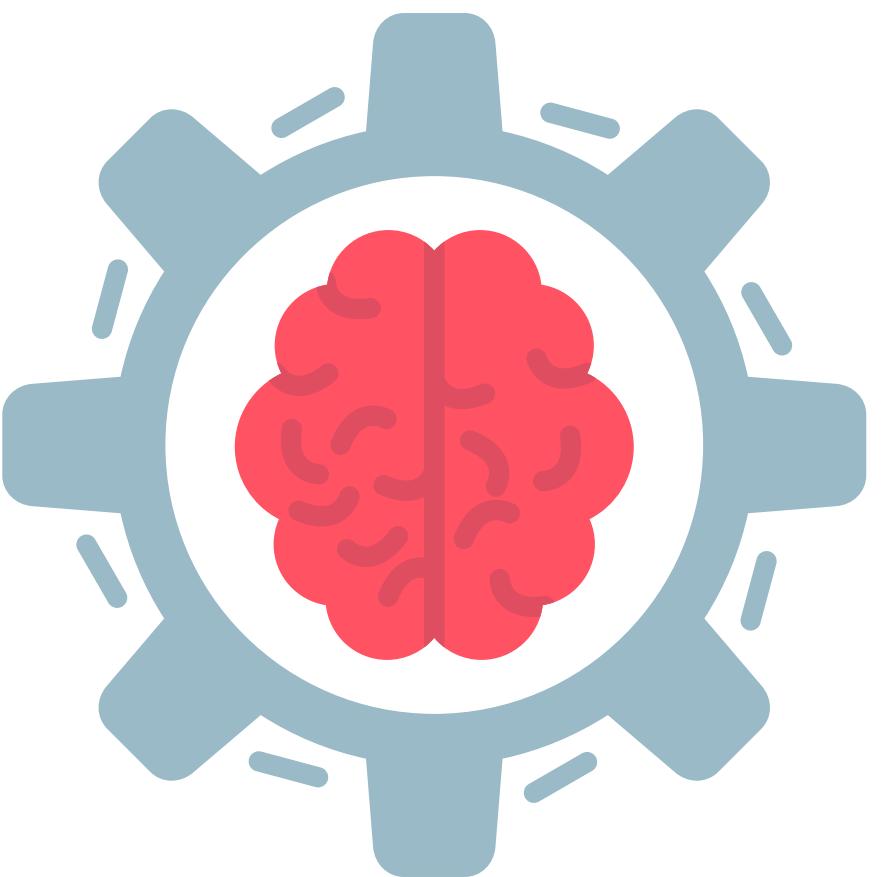




Plan

- Overview of Machine Learning
- Types of ML
- Problems encountered
- Where to go Next

What is not Machine Learning ?

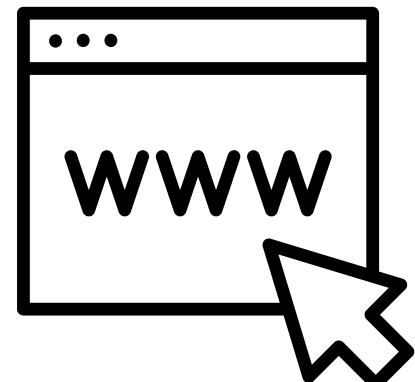


**Answer: Dumb Programming
(Databases, Rule-based systems,
autonomous systems, Regex Parsers ..etc)**

Easy Problems

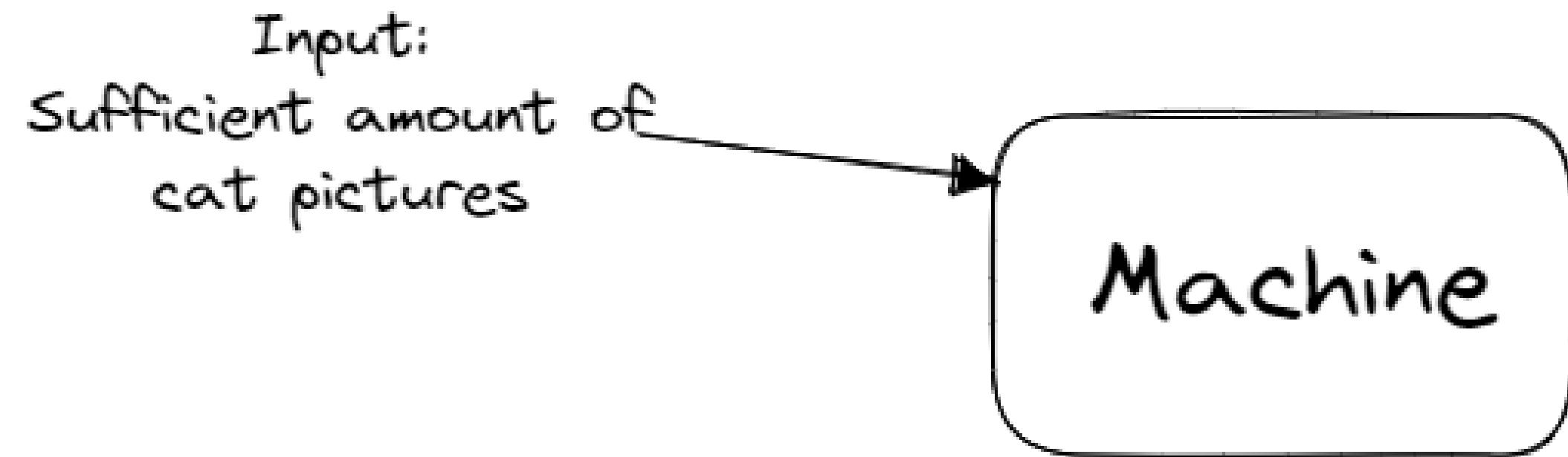
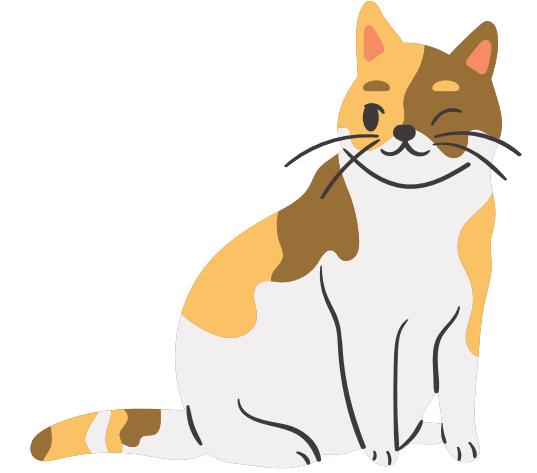
```
1 import re
2
3 def find_emails(s):
4
5     email_pattern = r'\b[A-Za-z0-9._%+-]+@[A-Za-z0-9.-]+\.[A-Z|a-z]{2,}\b'
6
7     matches = re.findall(email_pattern, s)
8
9     return matches
10
11
12 text = "Please send an email to example@domain.com or info@company.net for more information."
13 print("Emails found:", find_emails(text))
```

Scraping emails from web pages



Machine Learning Approach

Complex Problems

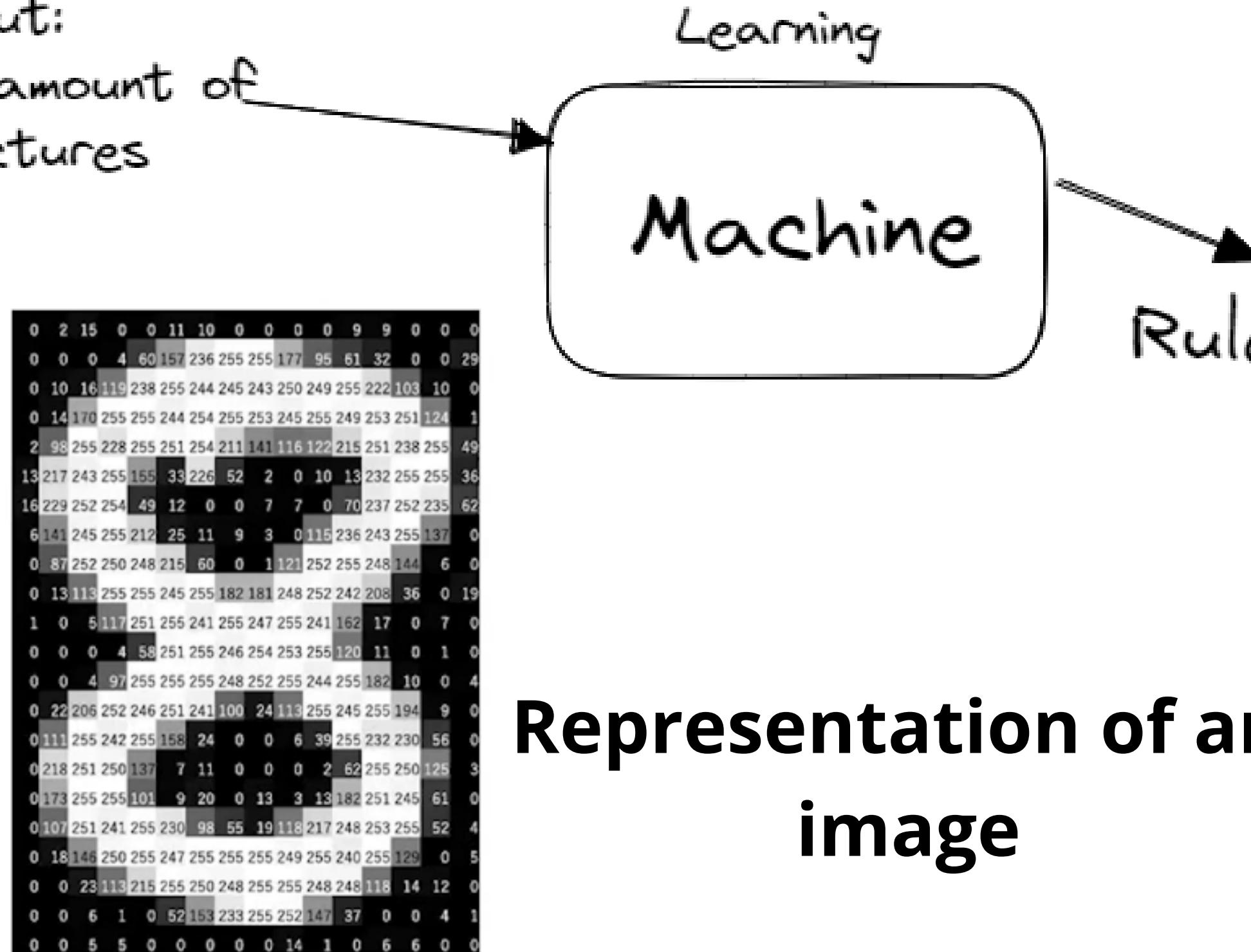


Machine Learning Approach

Complex Problems



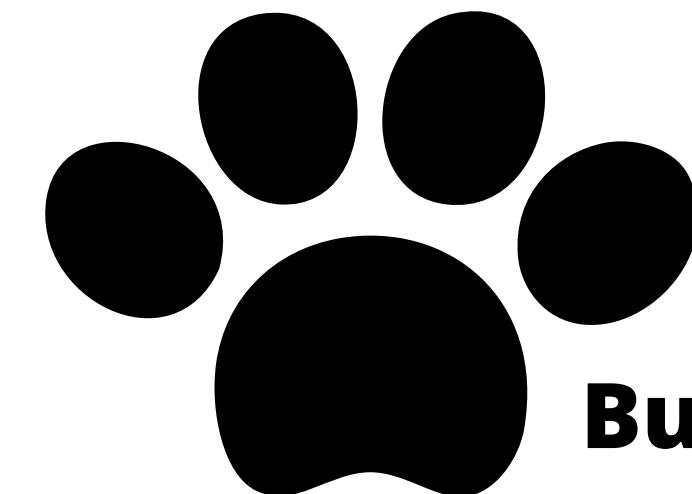
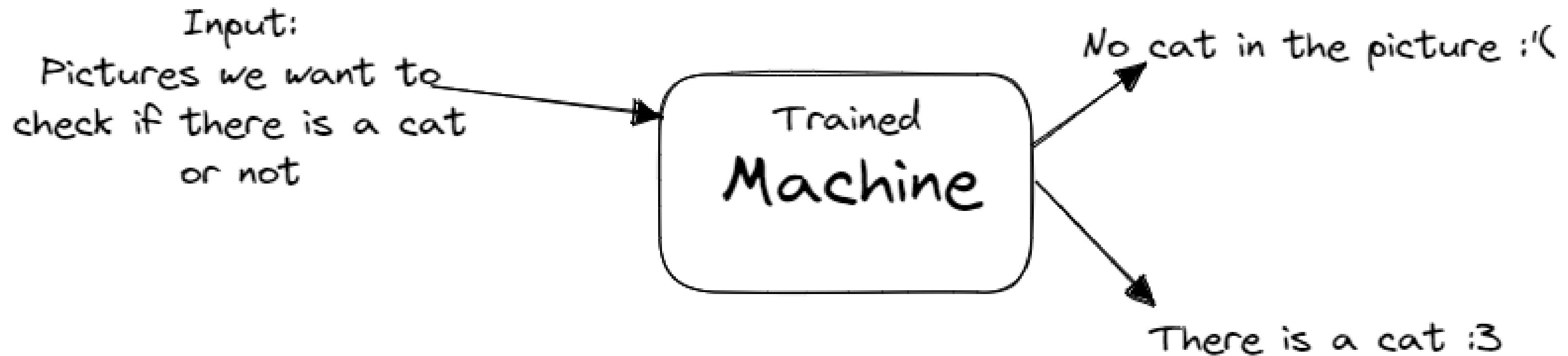
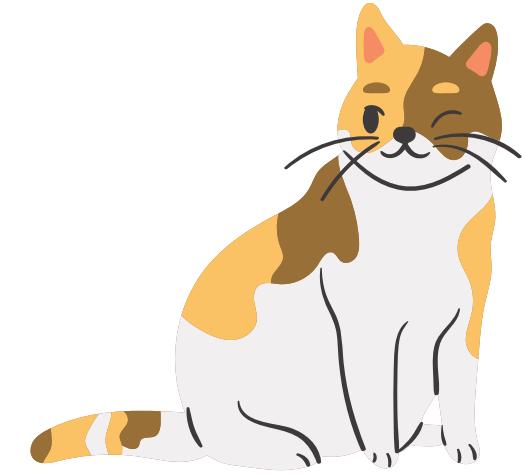
Input:
Sufficient amount of
cat pictures



Representation of an image

Machine Learning Approach

Complex Problems



But this is Deep Learning !!!

Practice Time !

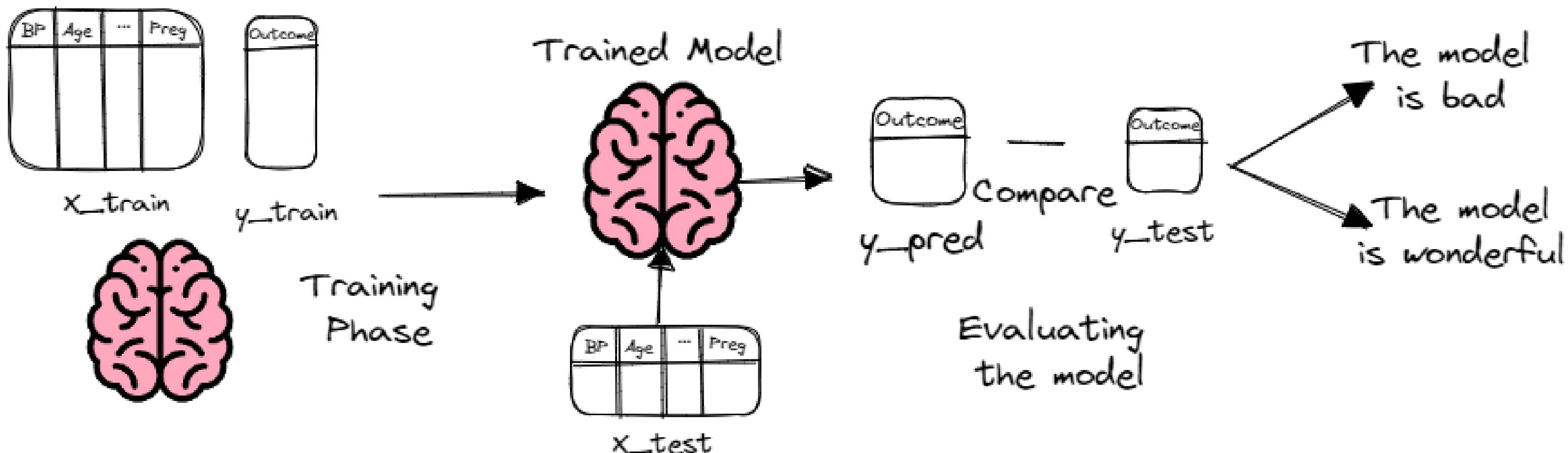
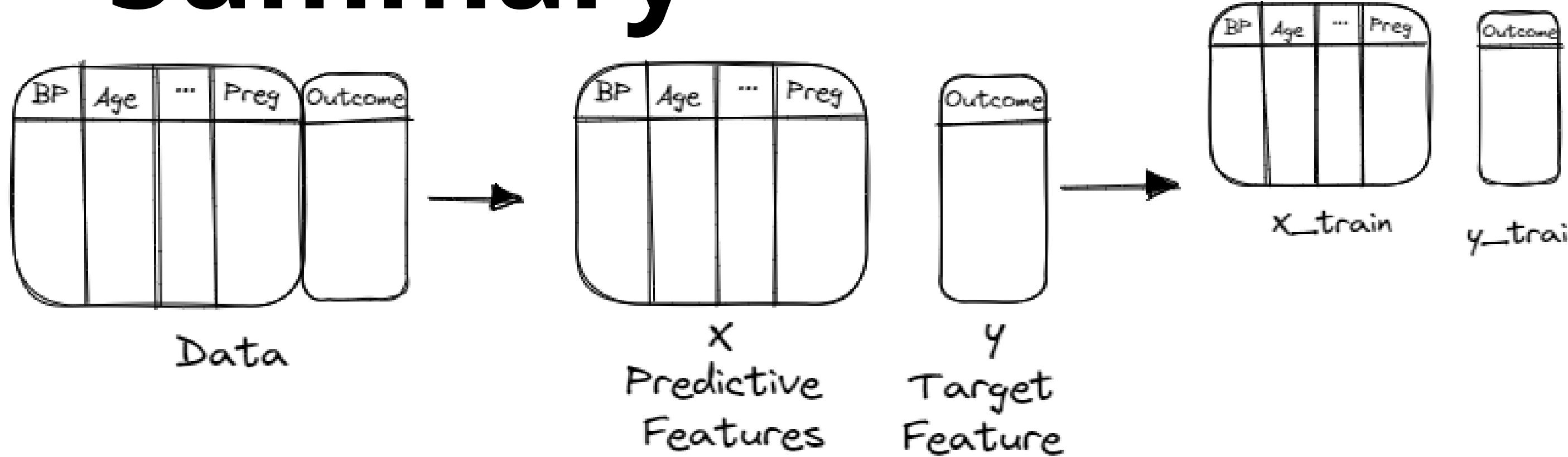
- **Access the Google Colab Notebook**
- **Create a COPY**
- **Read and execute the guided code**
- **Do the tasks**
- **Check the solution**



QR Code of the notebook

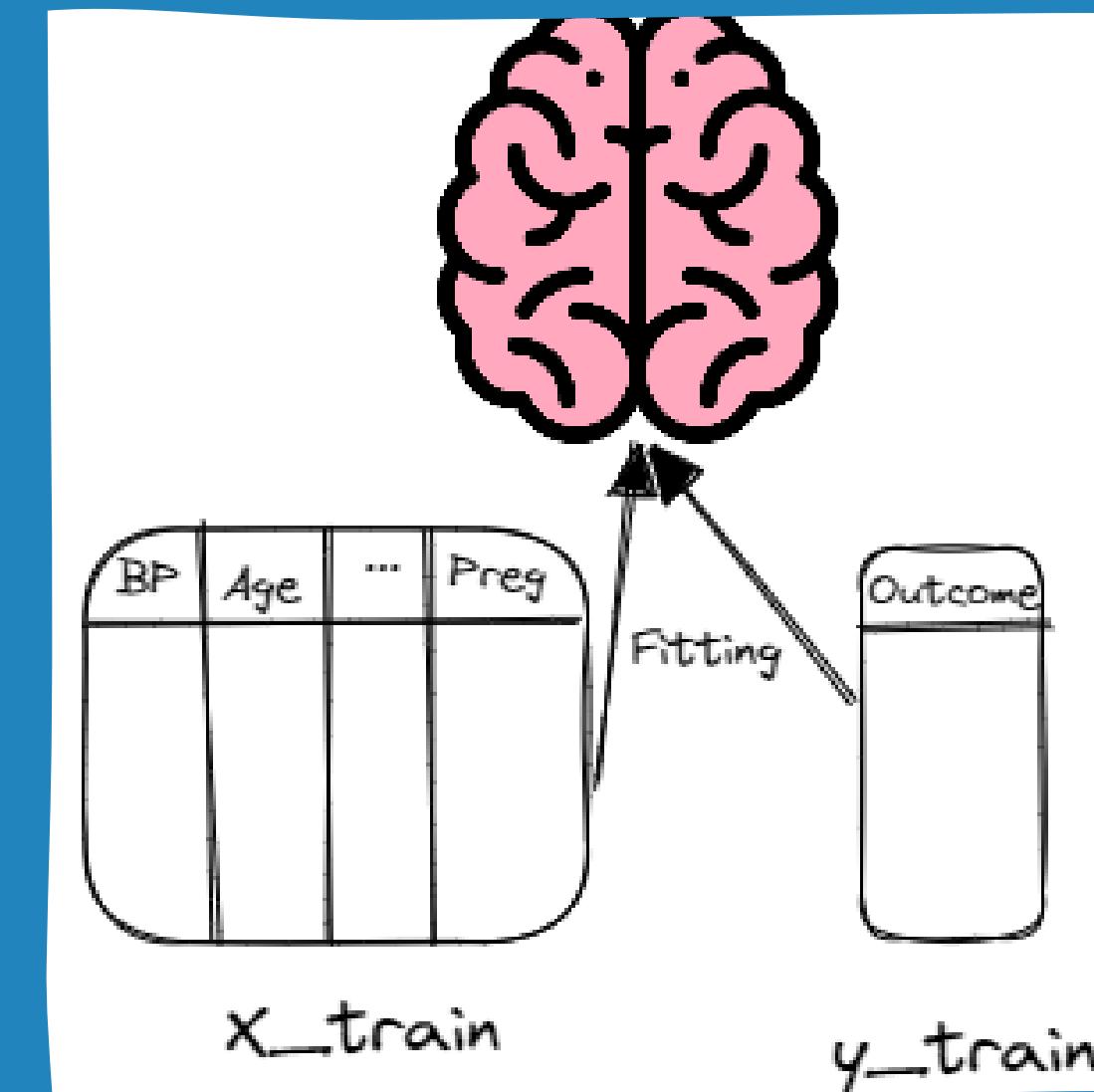


Summary



What happened during the training ?

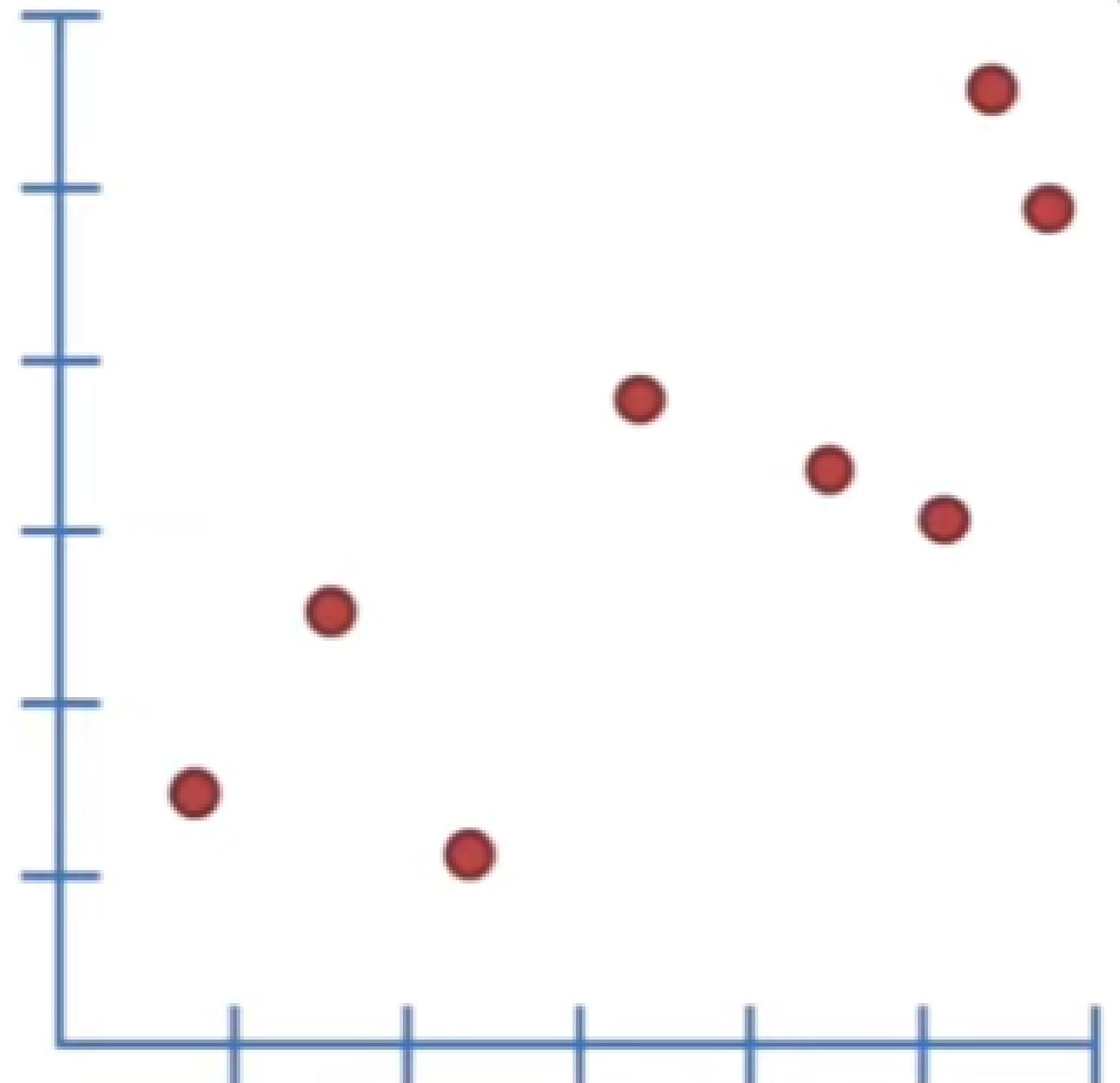
```
model.fit(X_train, y_train)
```



Linear Regression Working !

Mouse size

Mouse weight

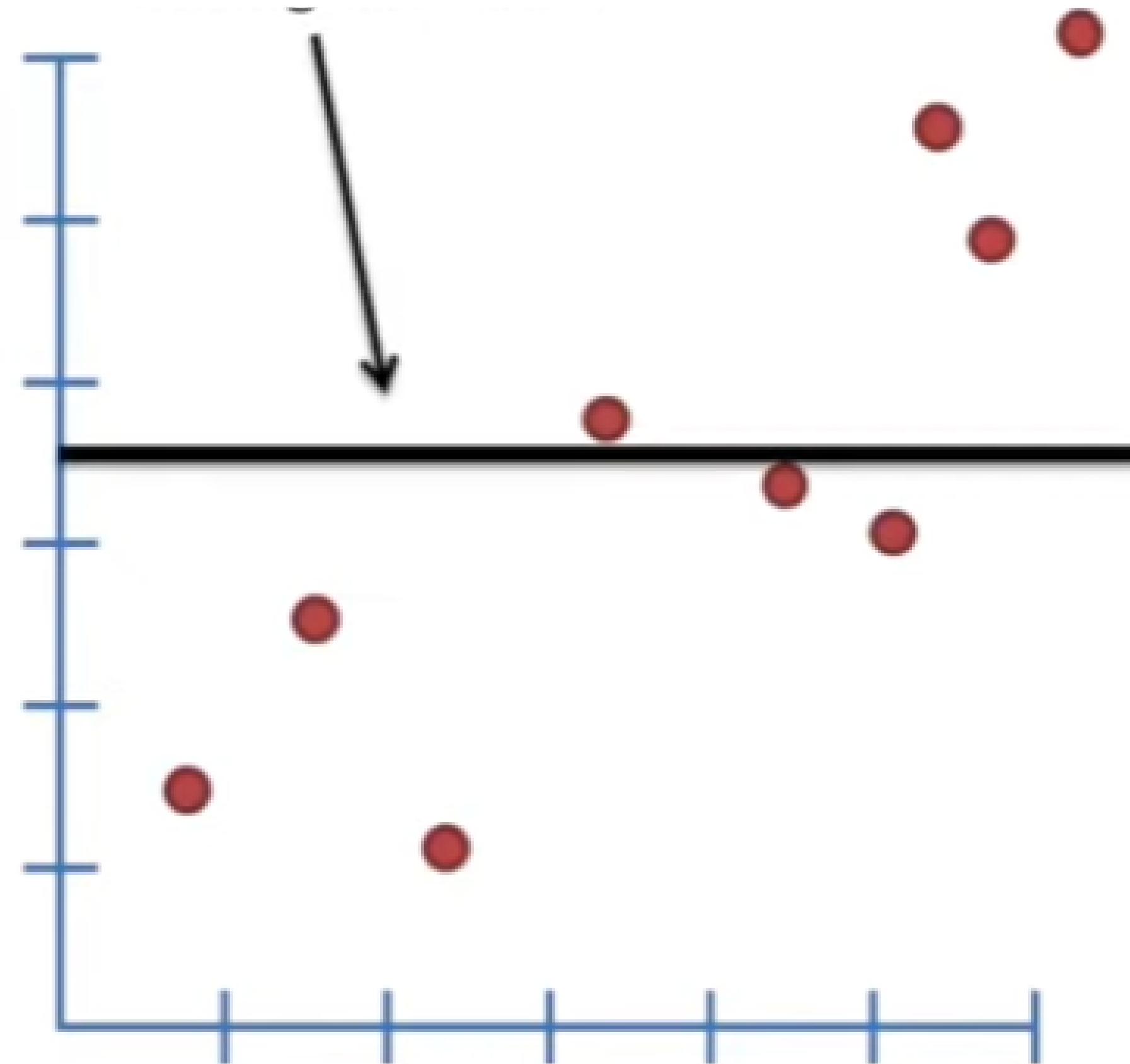


Linear Regression Working !

Line: $y=aX+b$

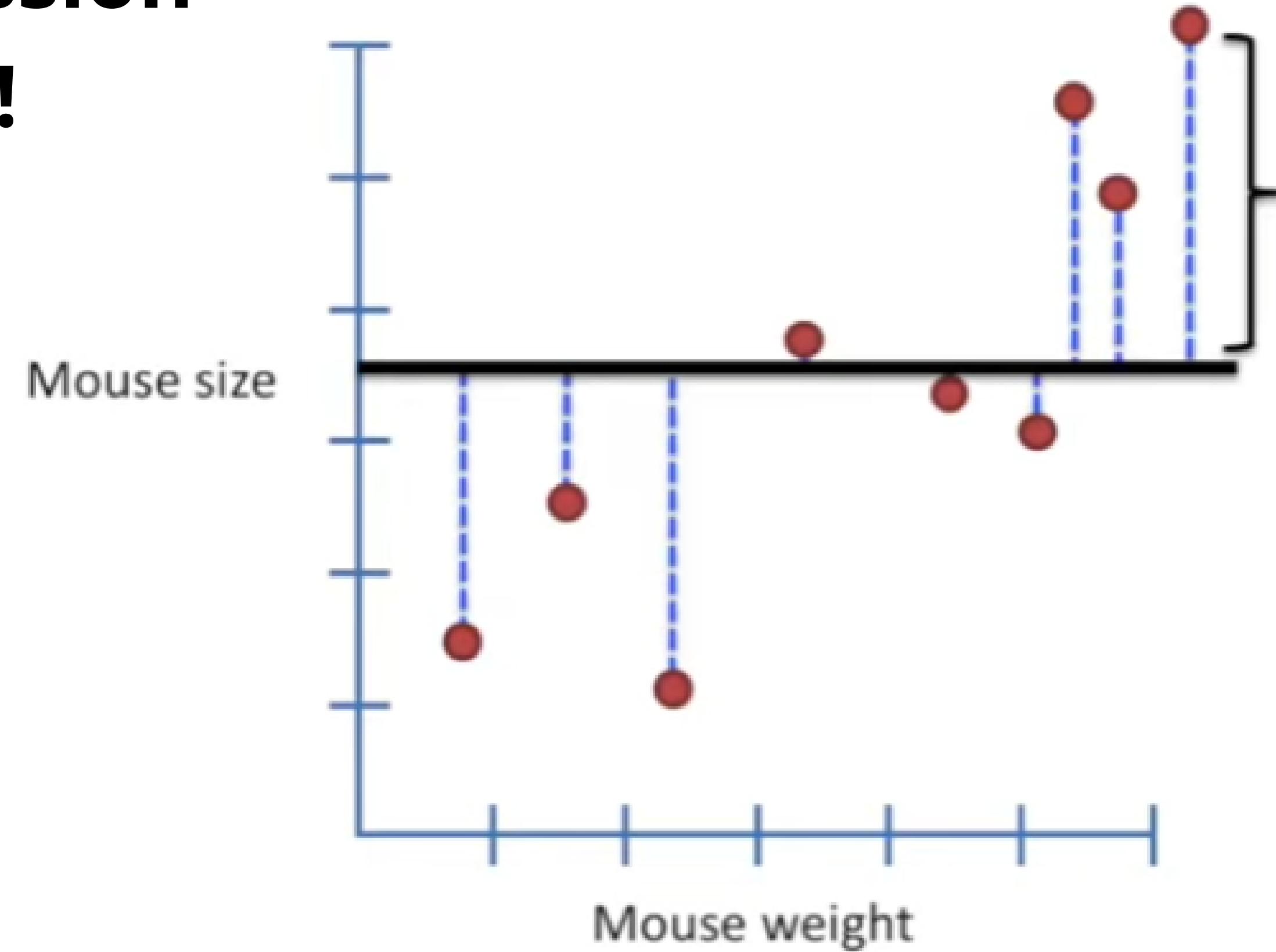
Mouse size

Mouse weight



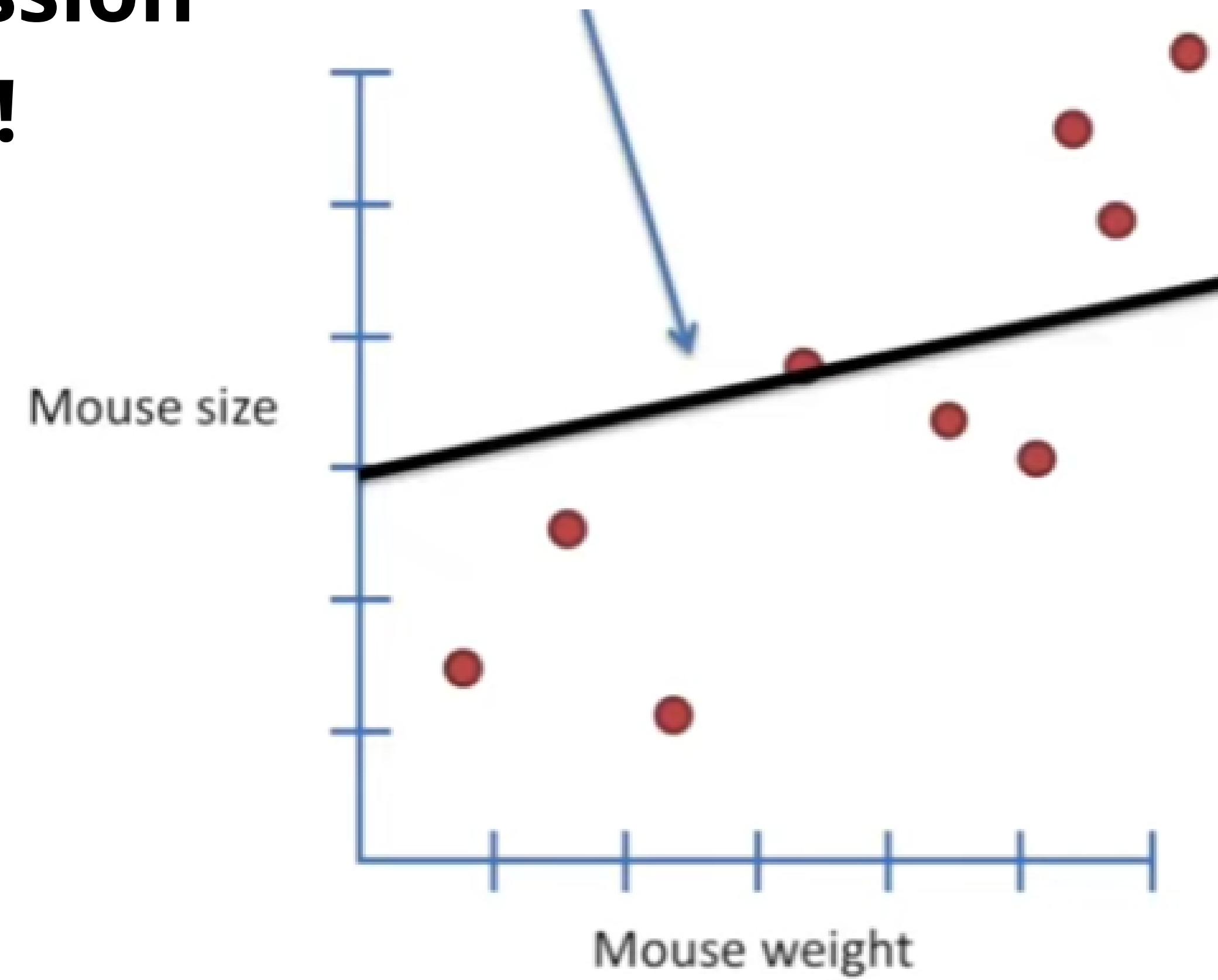
Linear Regression Working !

RMSE: Root
Mean Squared
Error



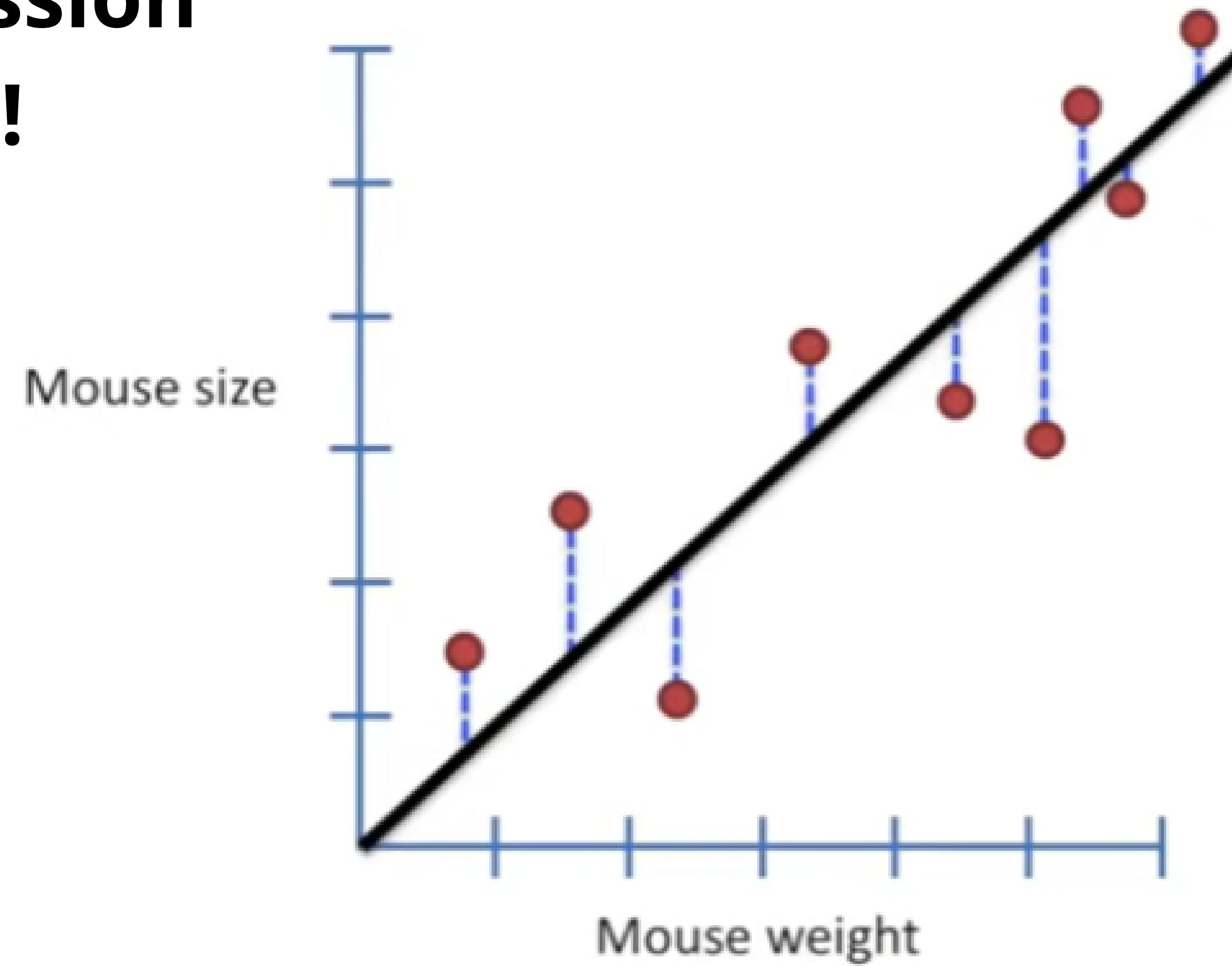
Linear Regression Working !

Line': $y=a'X+b'$



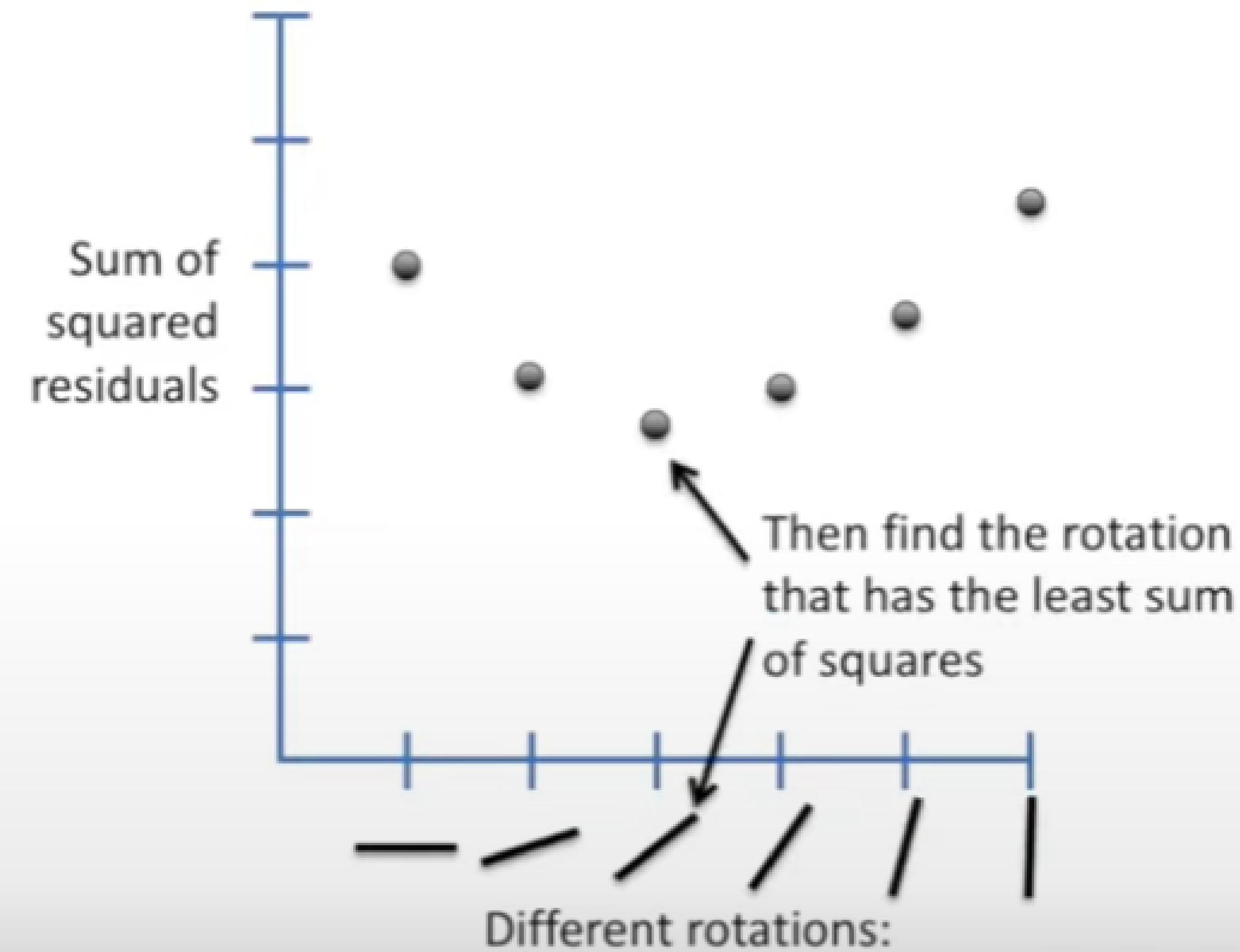
Linear Regression Working !

Keep doing
that



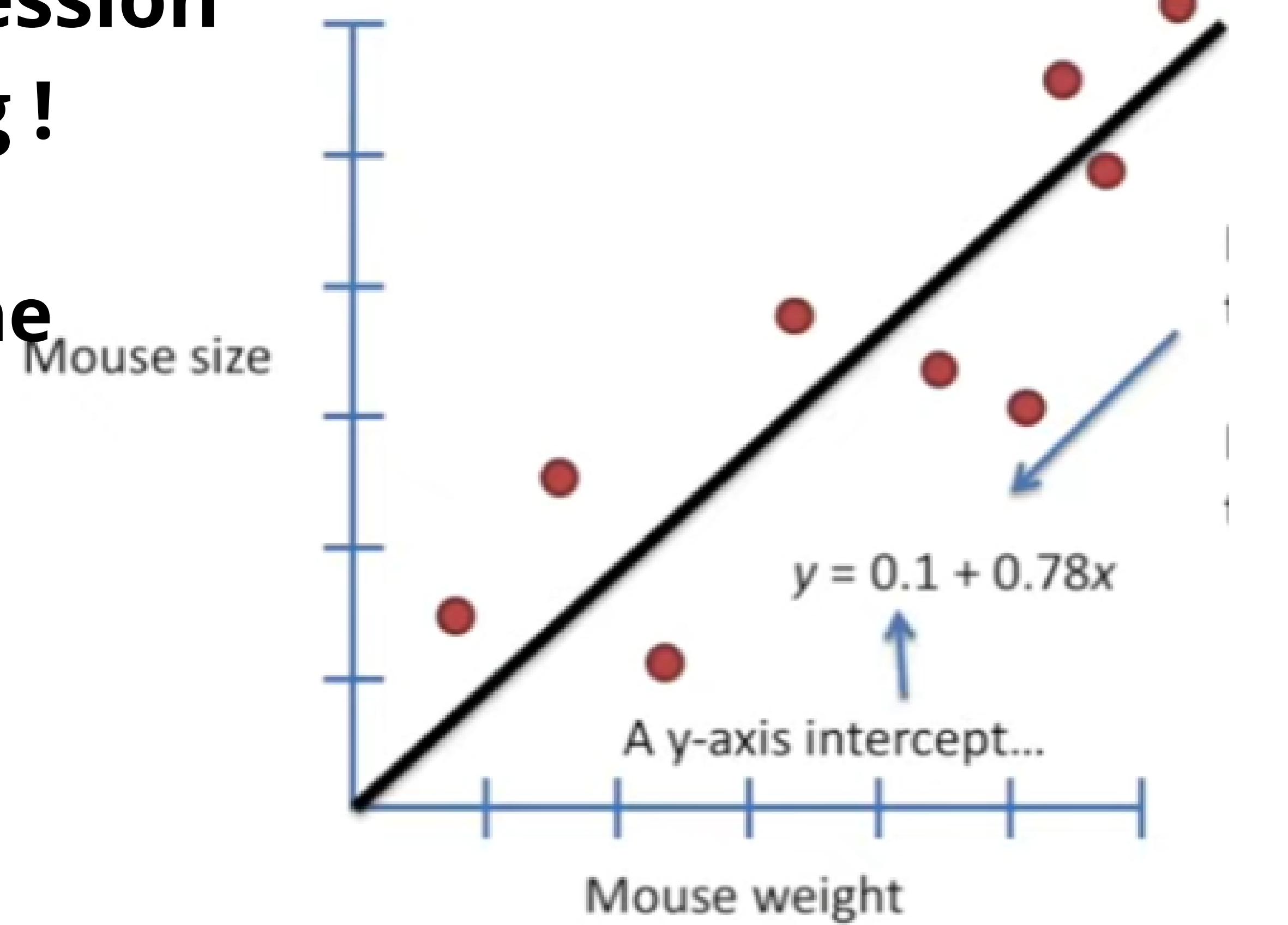
Linear Regression Working !

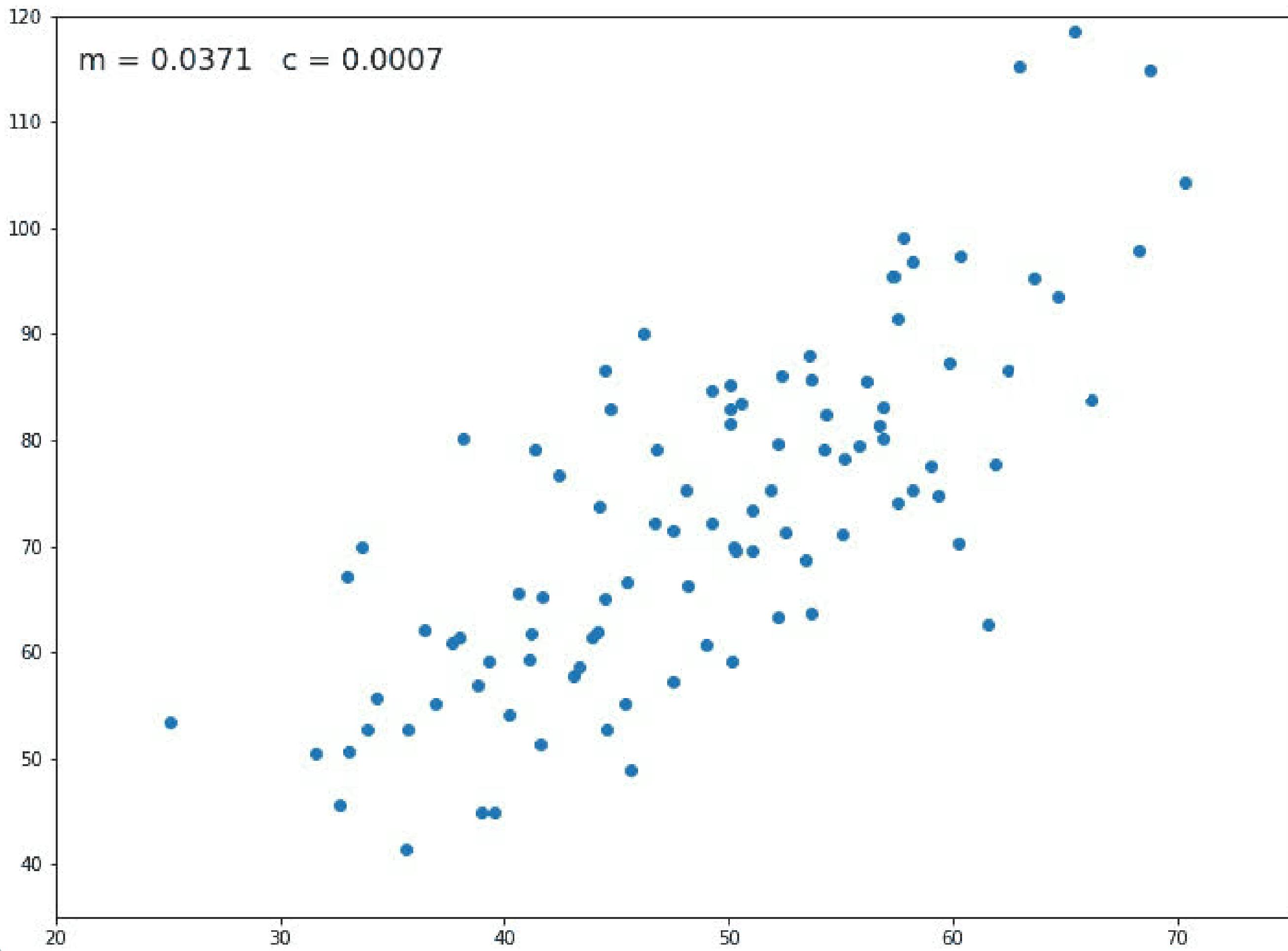
Study and plot
rotations and
RMSE



Linear Regression Working !

And here is the
last model:

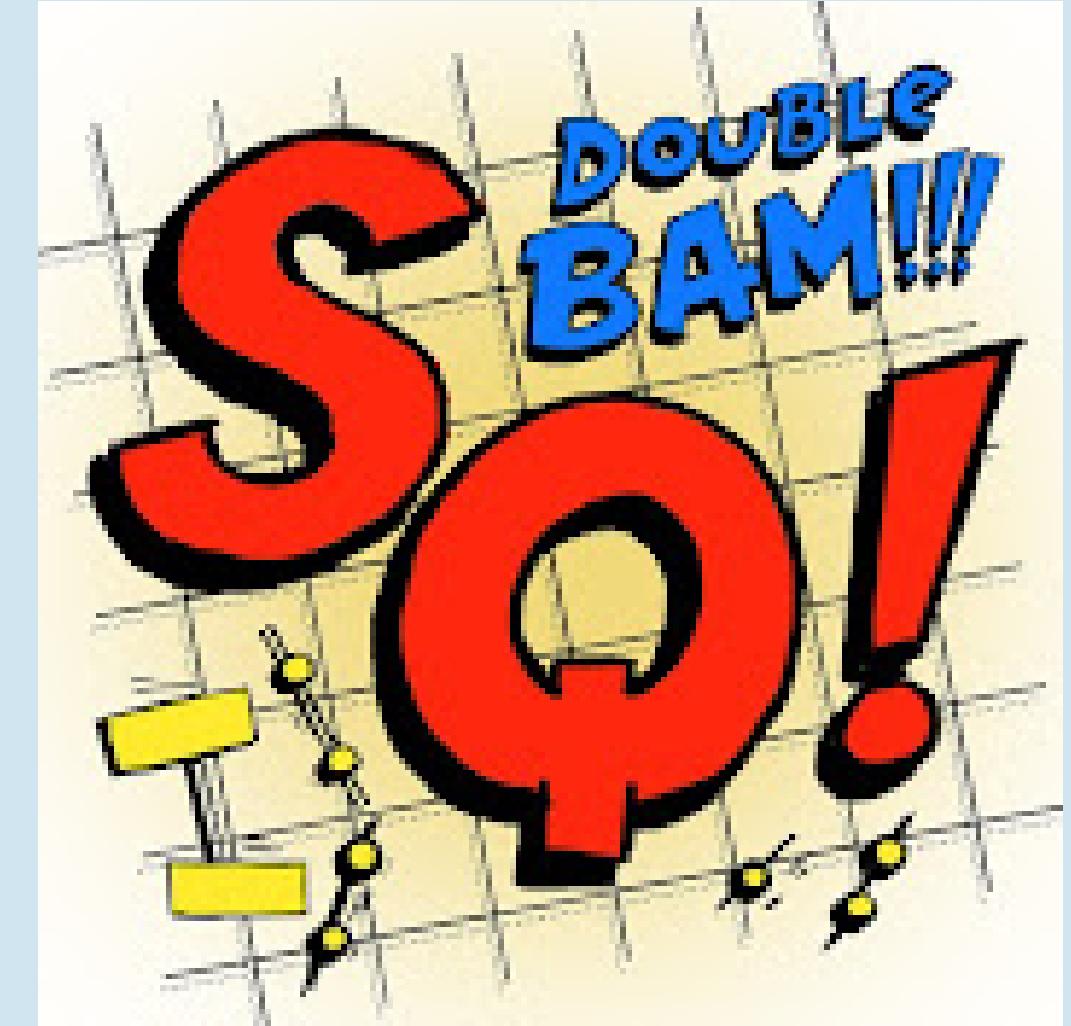




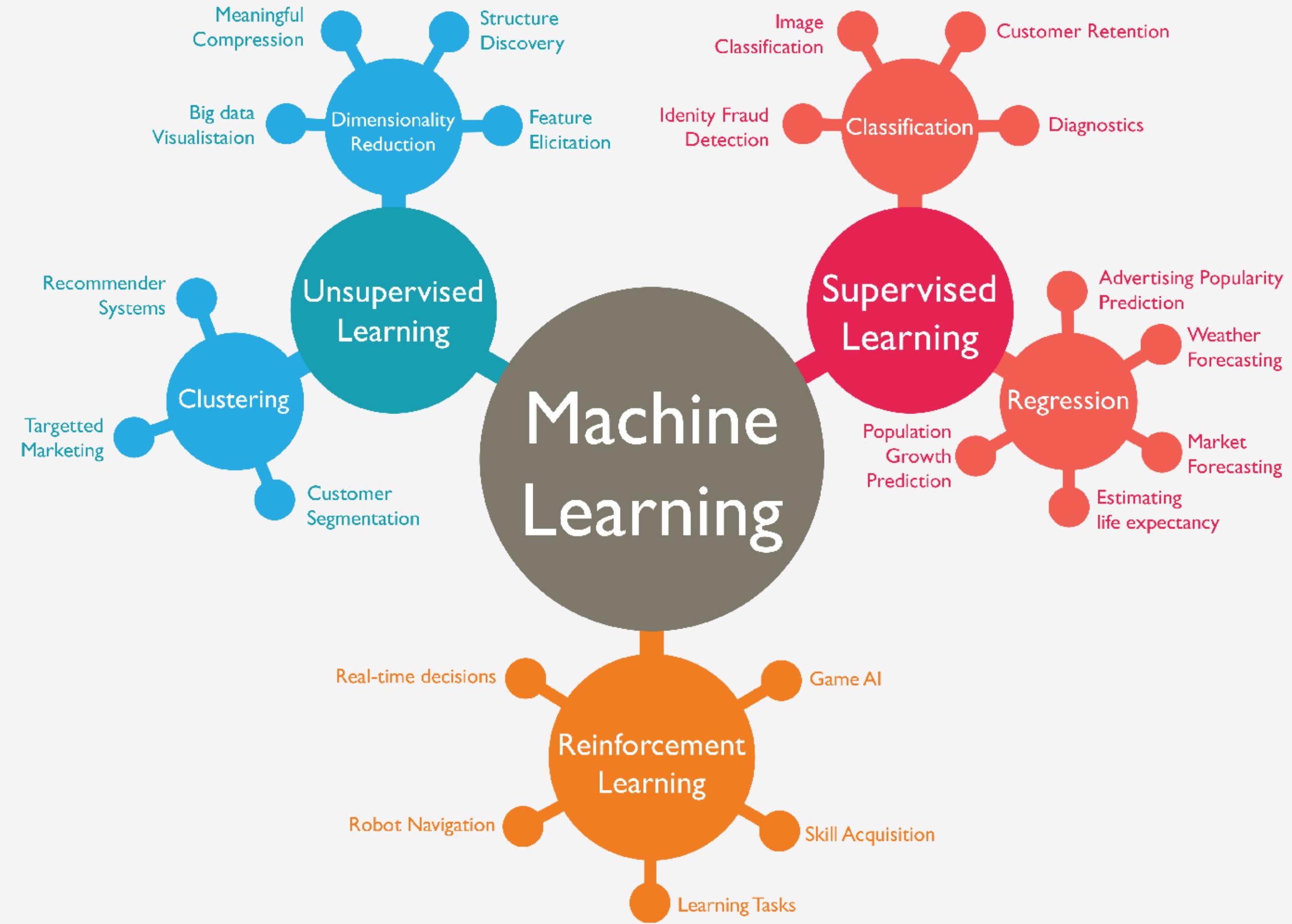
Youtube Channel:

StatQuest with Josh Starmer

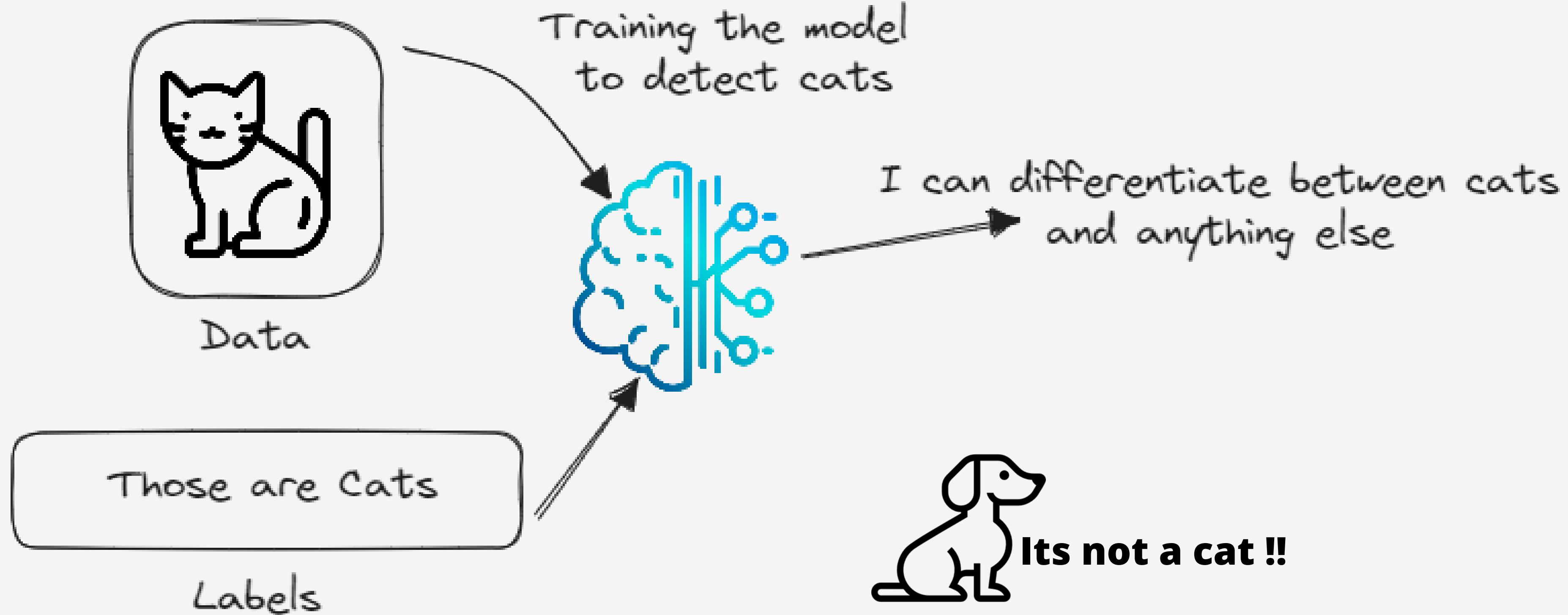
Learn in depth about all ML concepts
easily !



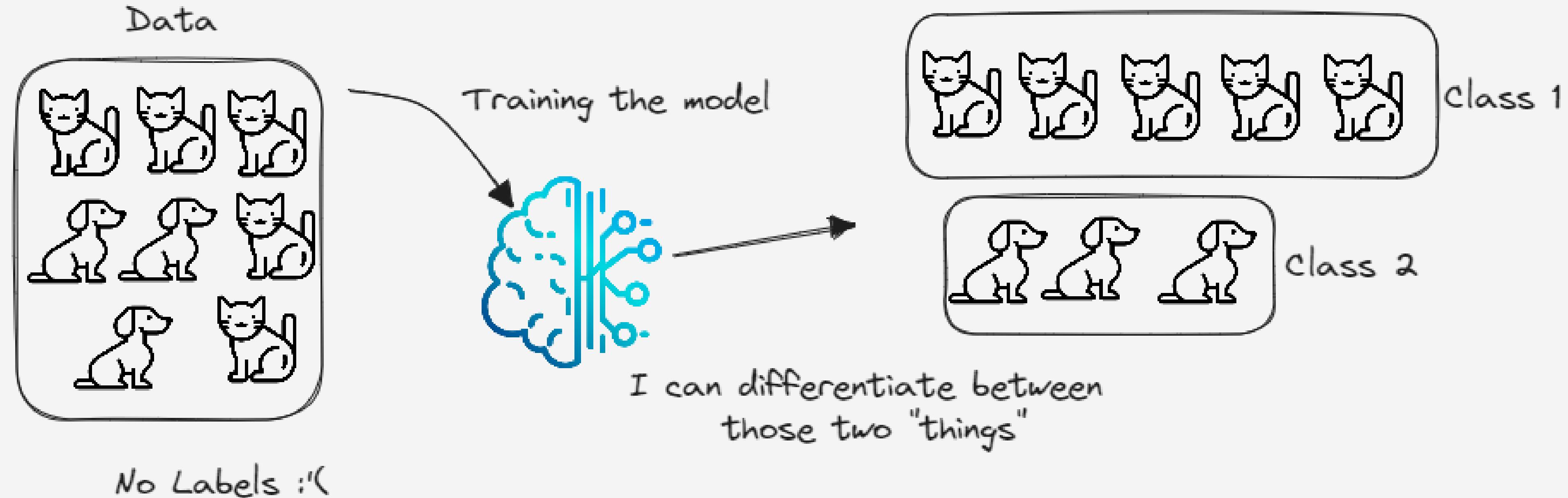
Types of Machine Learning



Supervised Learning

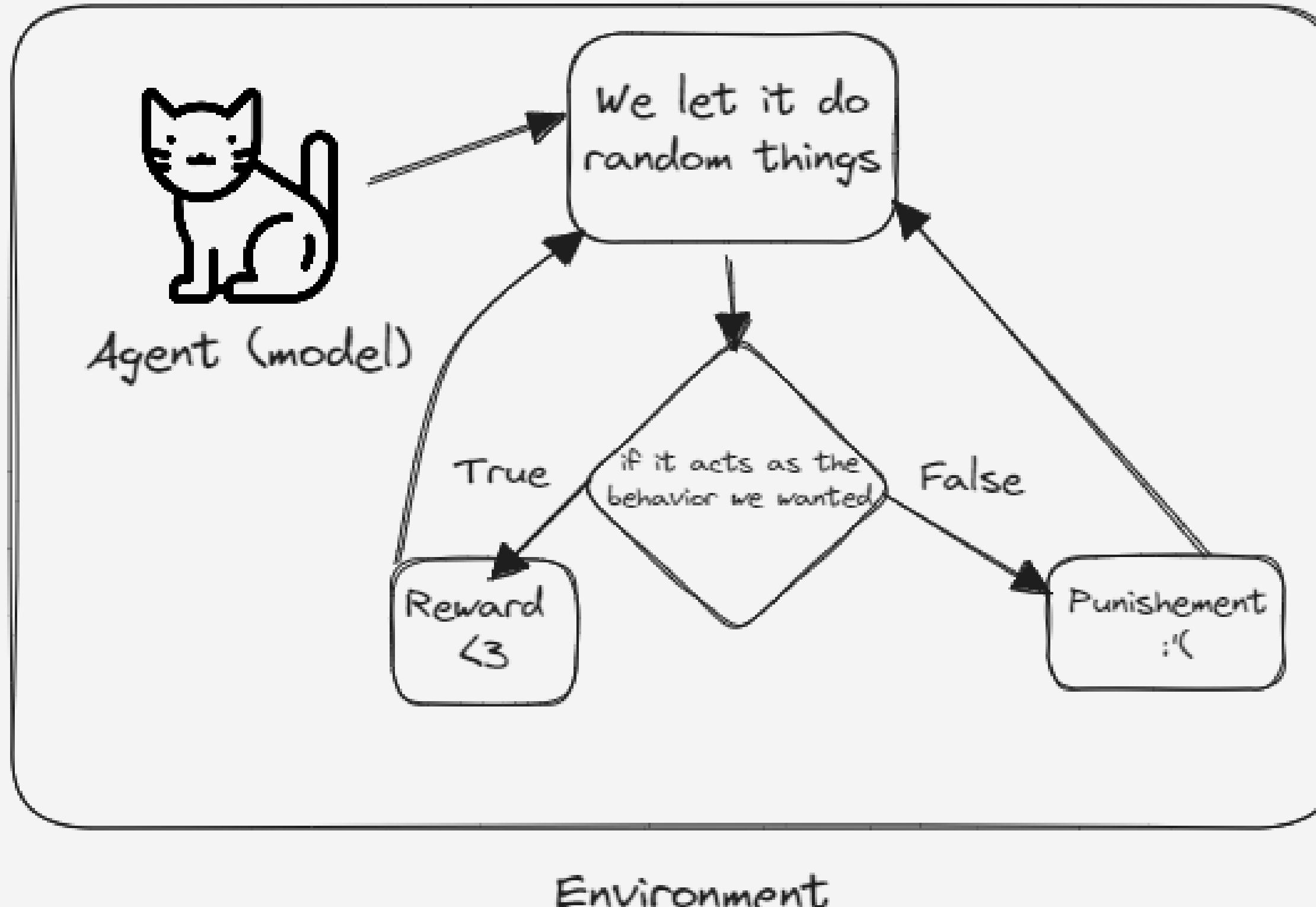


Unsupervised Learning



Reinforcement Learning

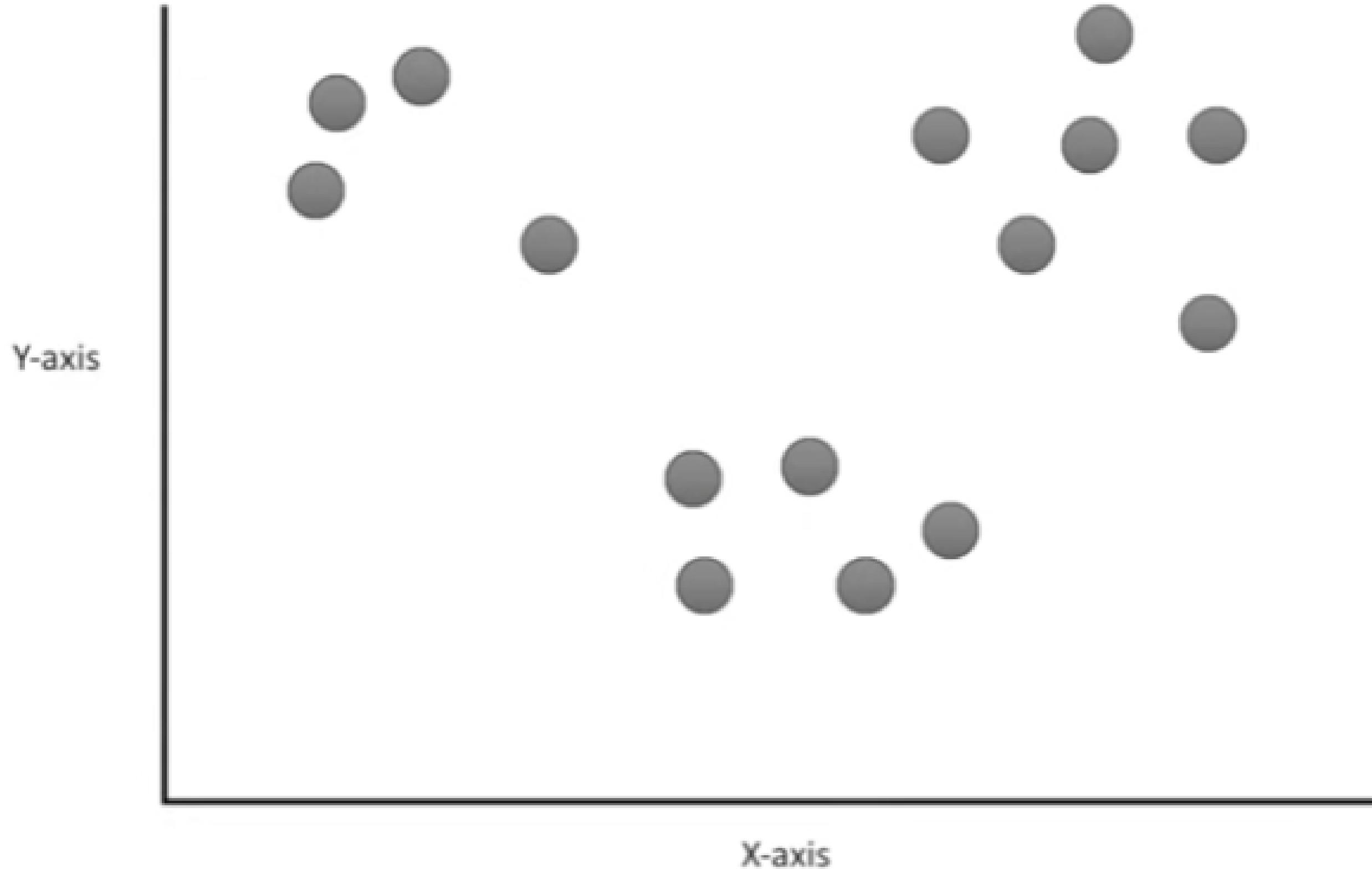
Objective: We want the cat to do a certain behavior



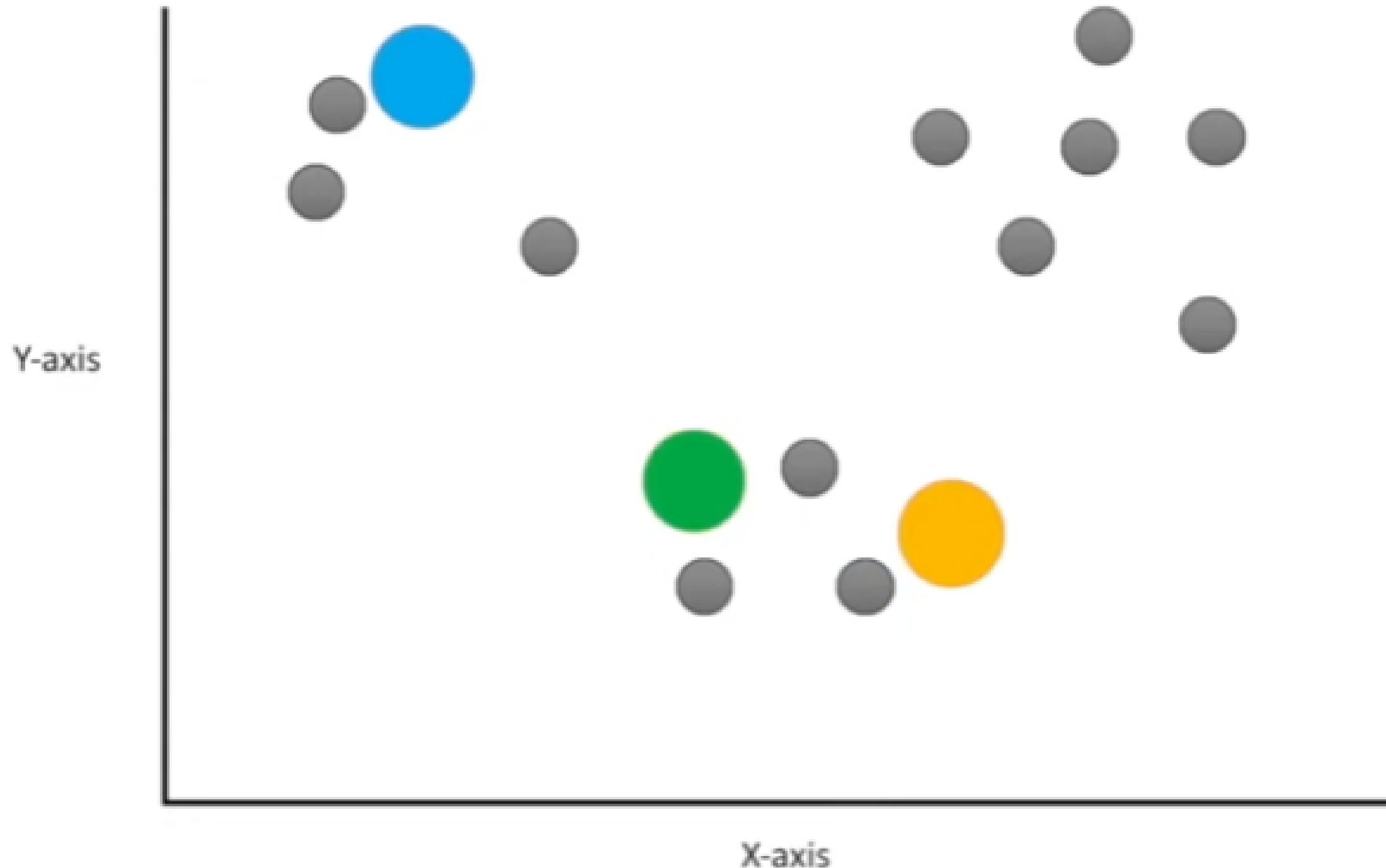
Practice Time !



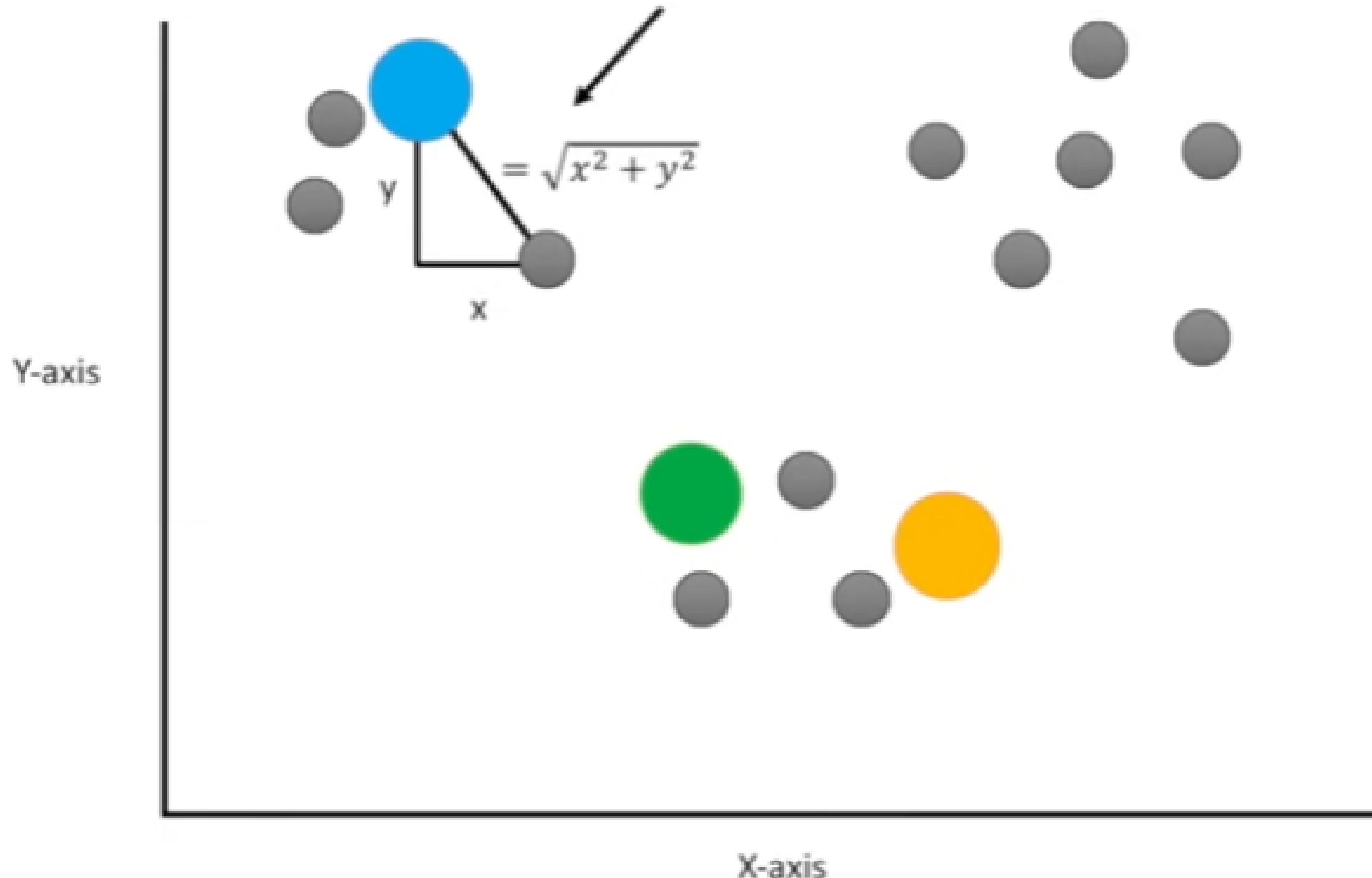
How does K-Means work ?



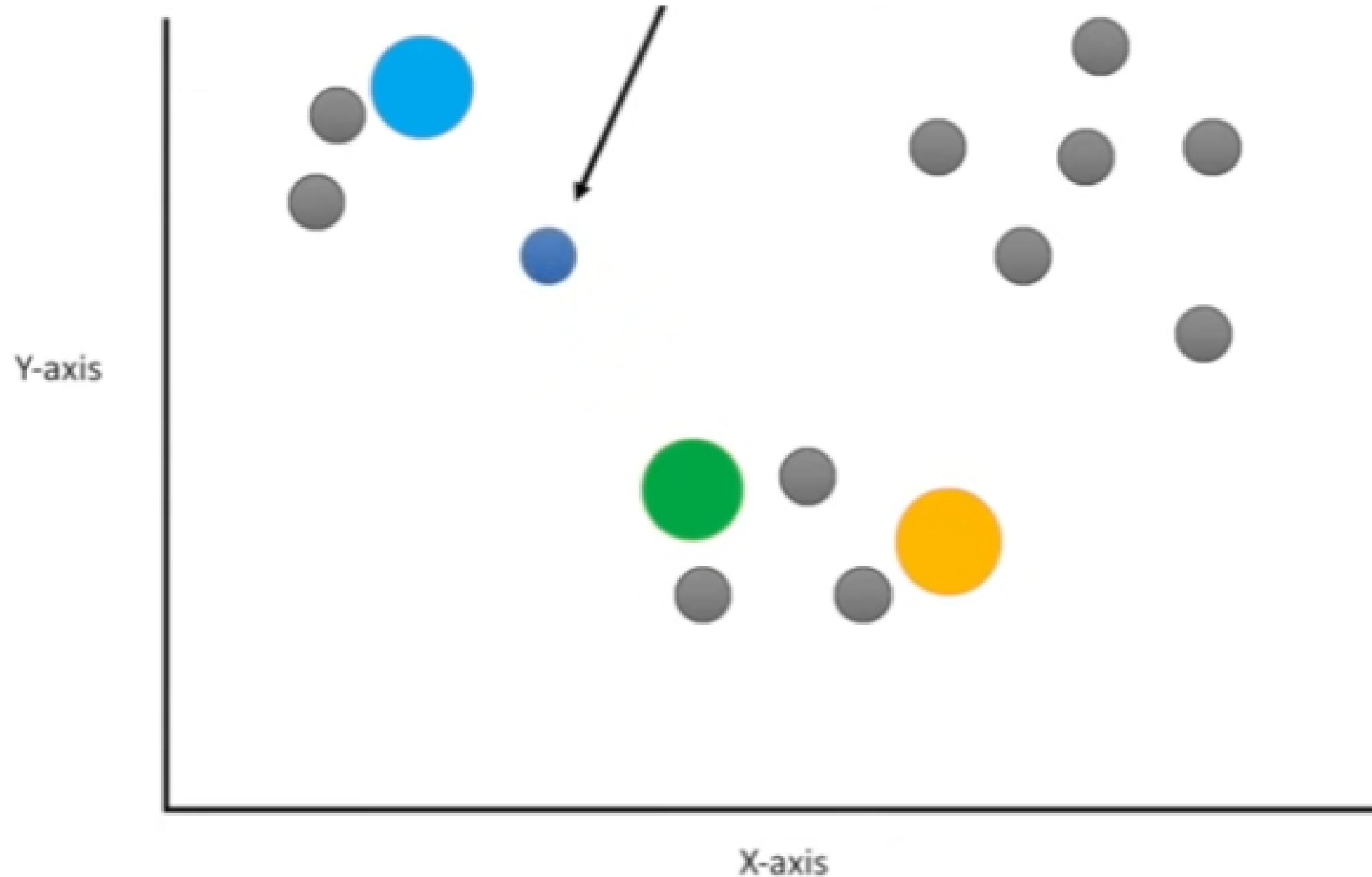
How does K-Means work ?



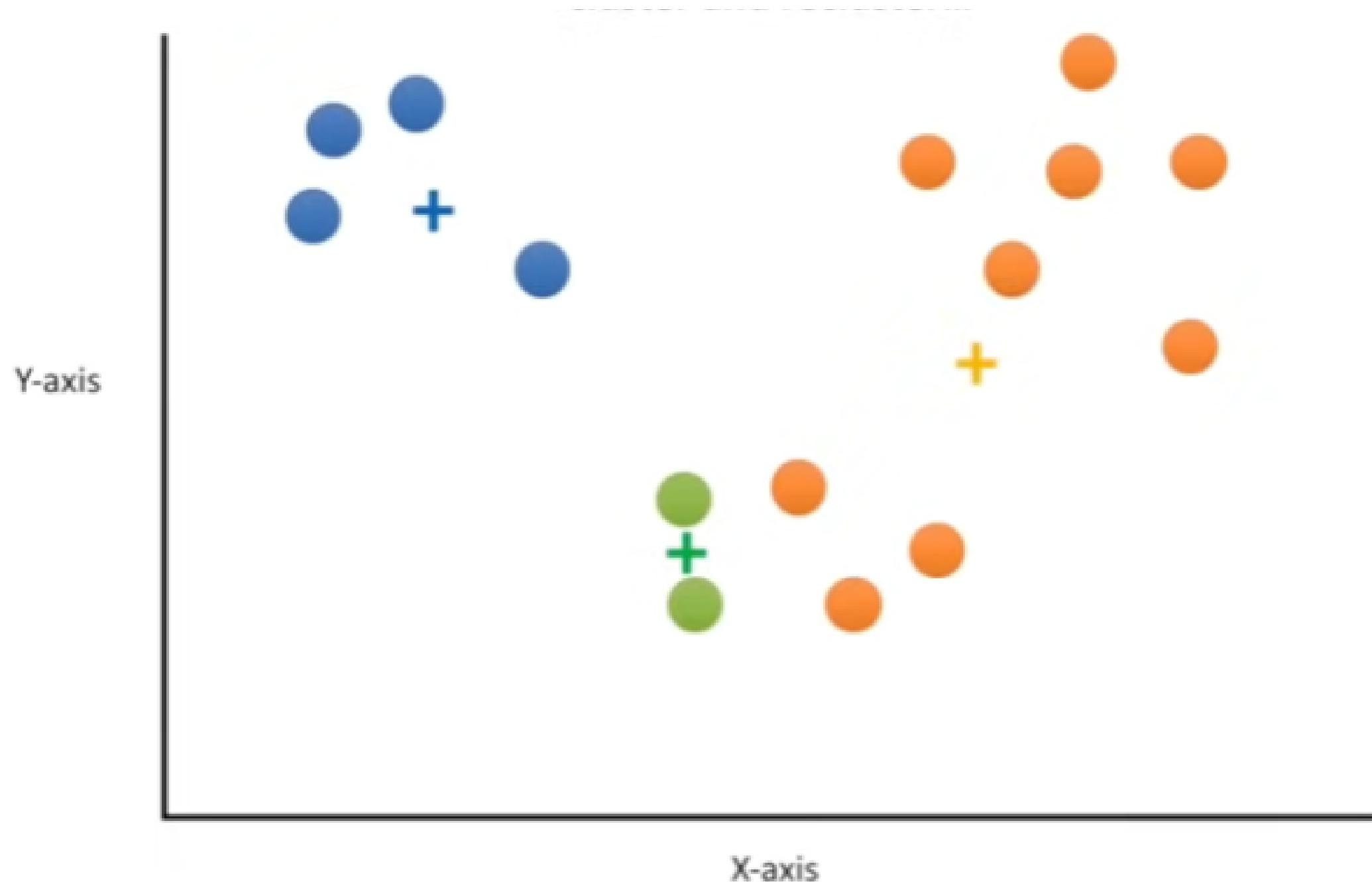
How does K-Means work ?



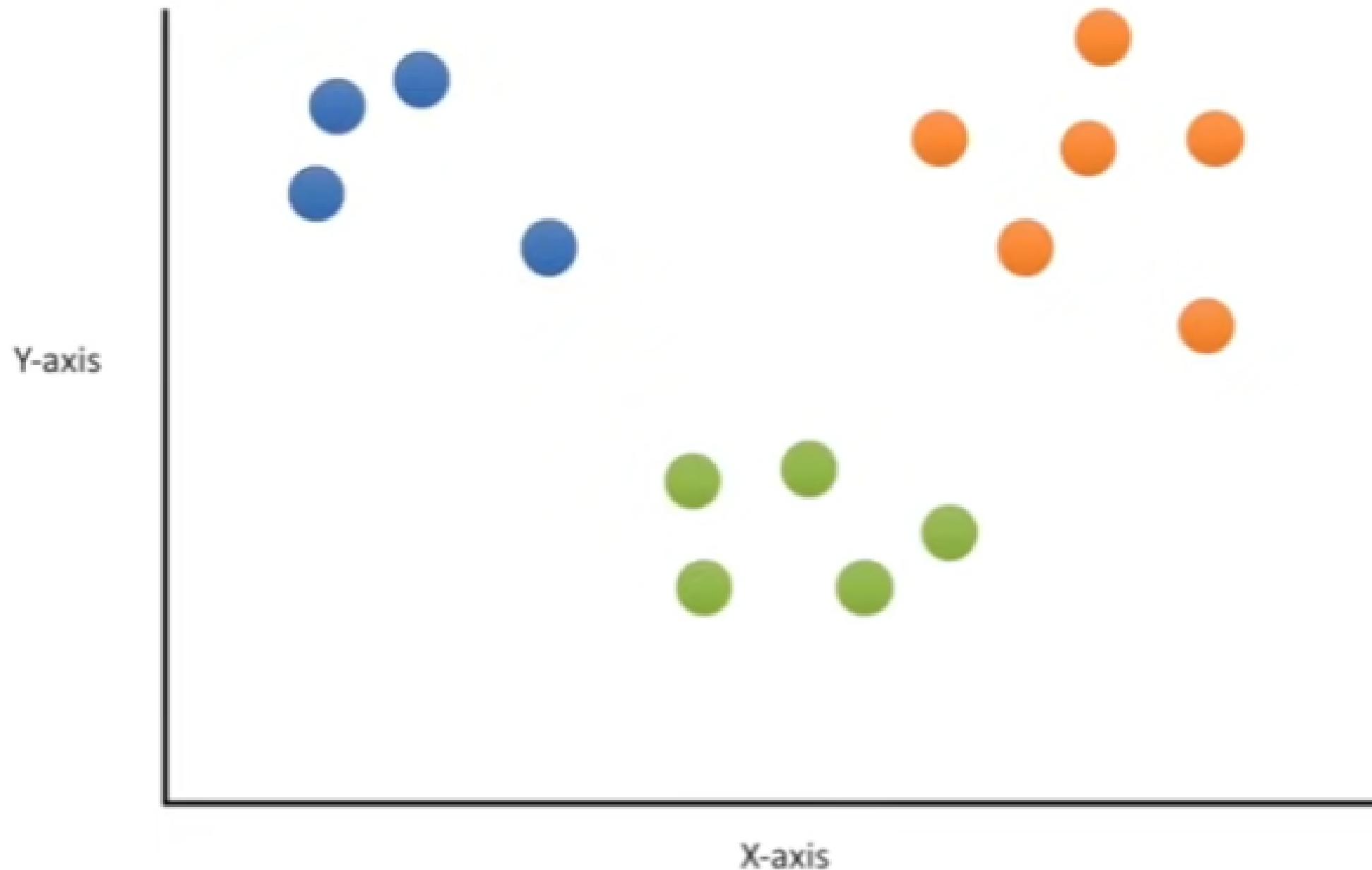
How does K-Means work ?



How does K-Means work ?

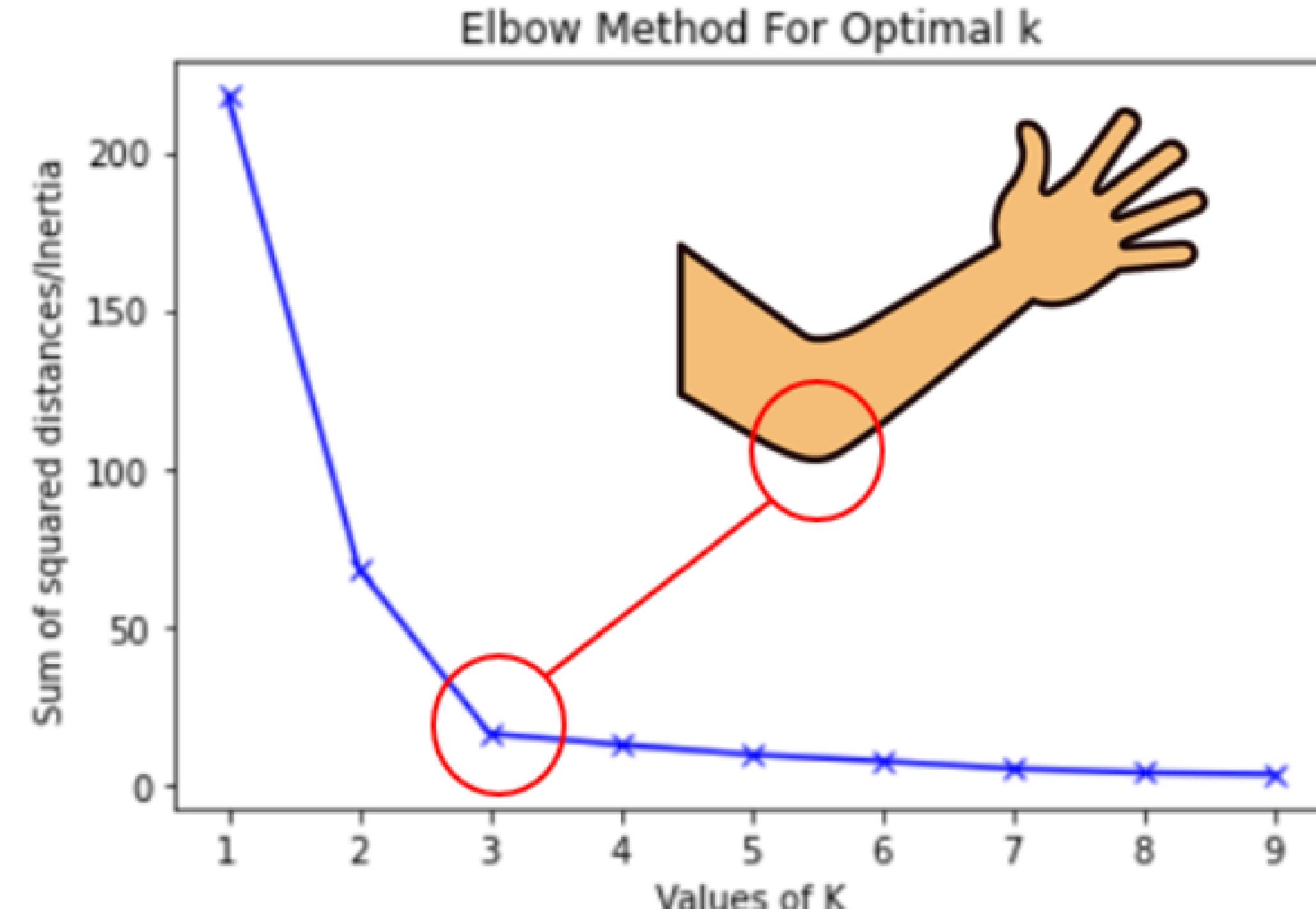


How does K-Means work ?



The Result

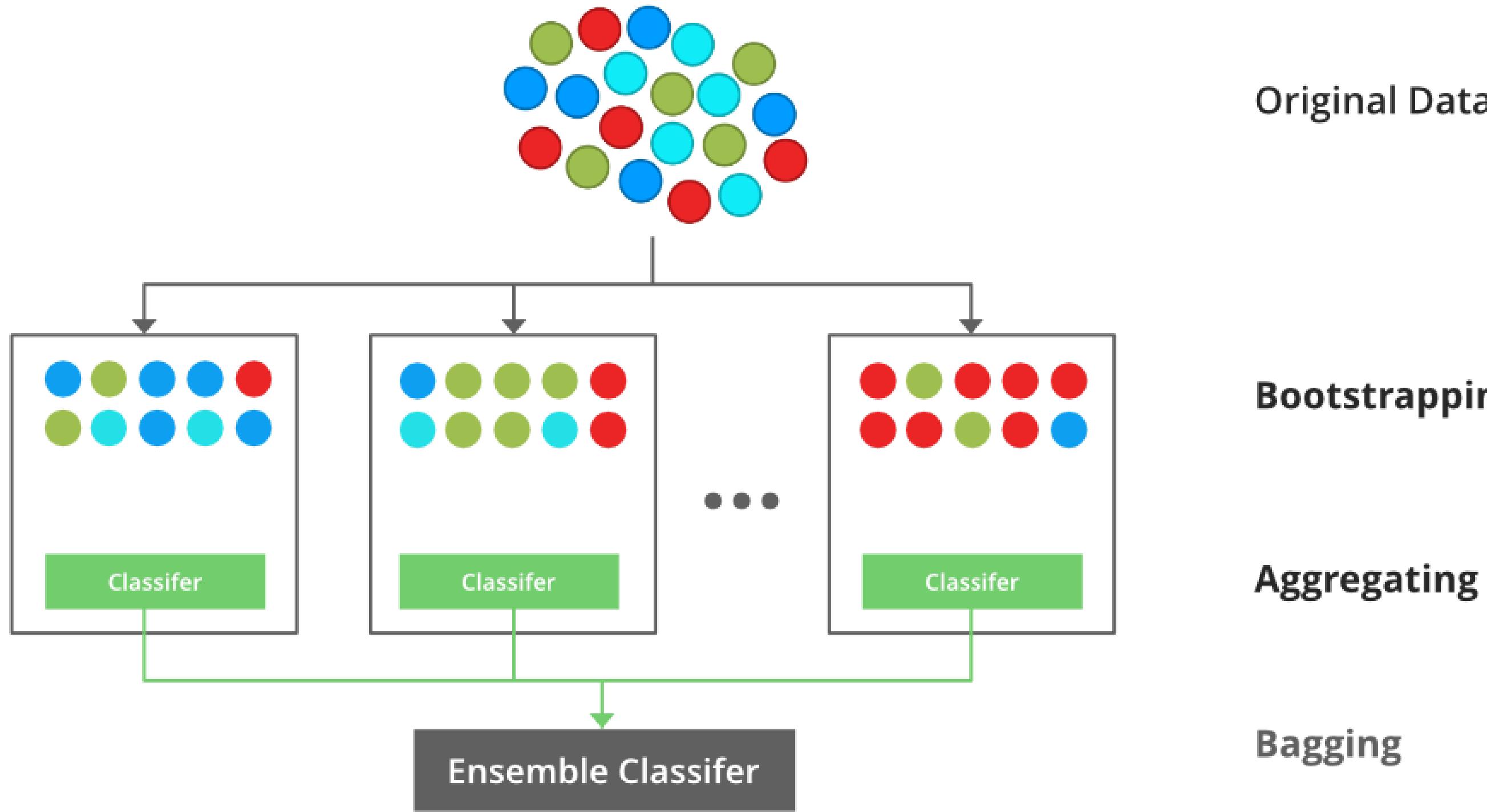
How to choose the K parameter ?



Experimentation !

Line plot between K and inertia

Build Powerful Models:



Bagging and Boosting

Original Data

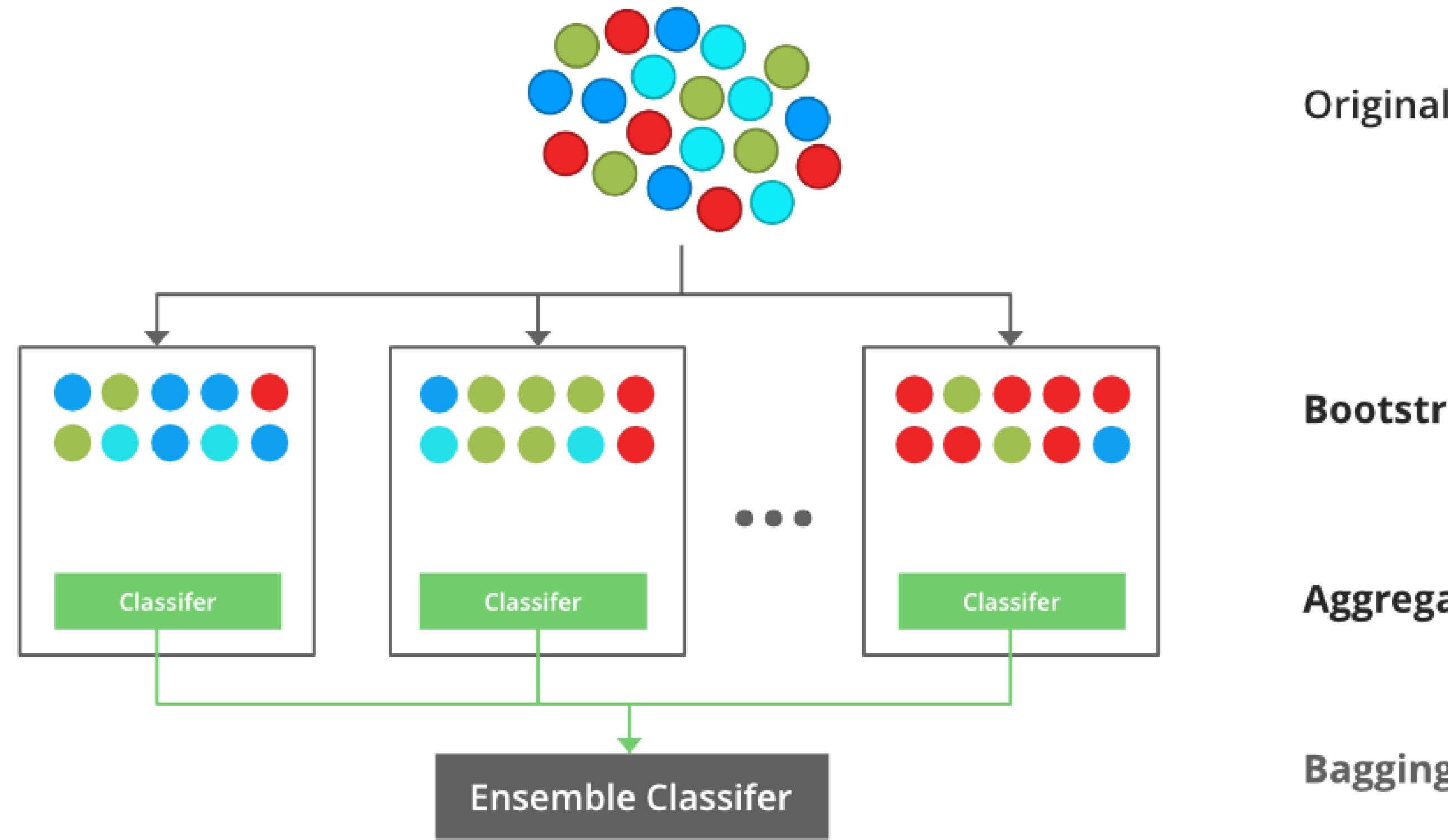
Bootstrapping

Aggregating

Bagging

**RandomForest is
a bag of Decision
Trees**

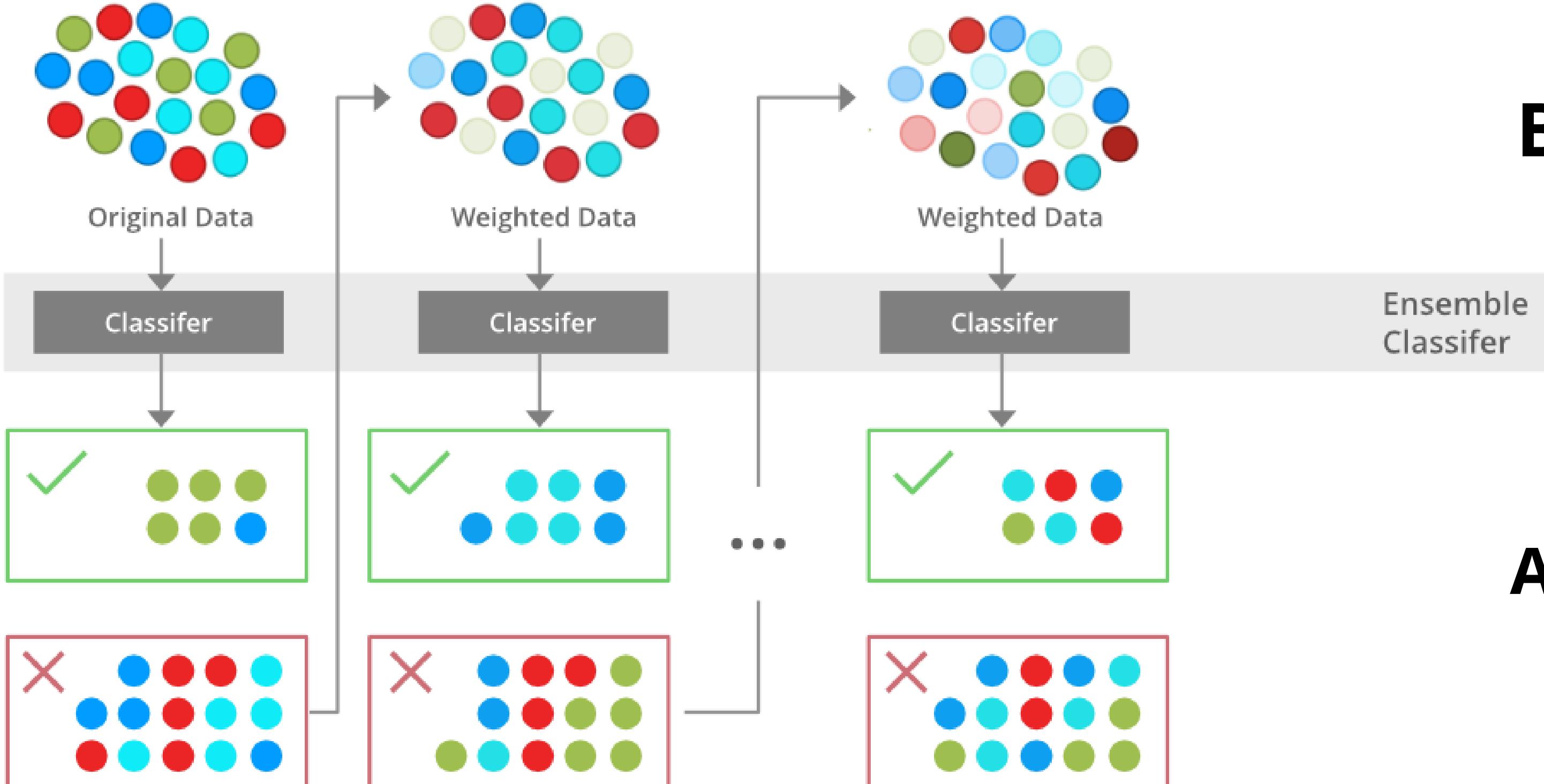
Build Powerful Models:



Bagging and Boosting

RandomForest is a bag of Decision Trees

Build Powerful Models:



Problems and Troubles with data



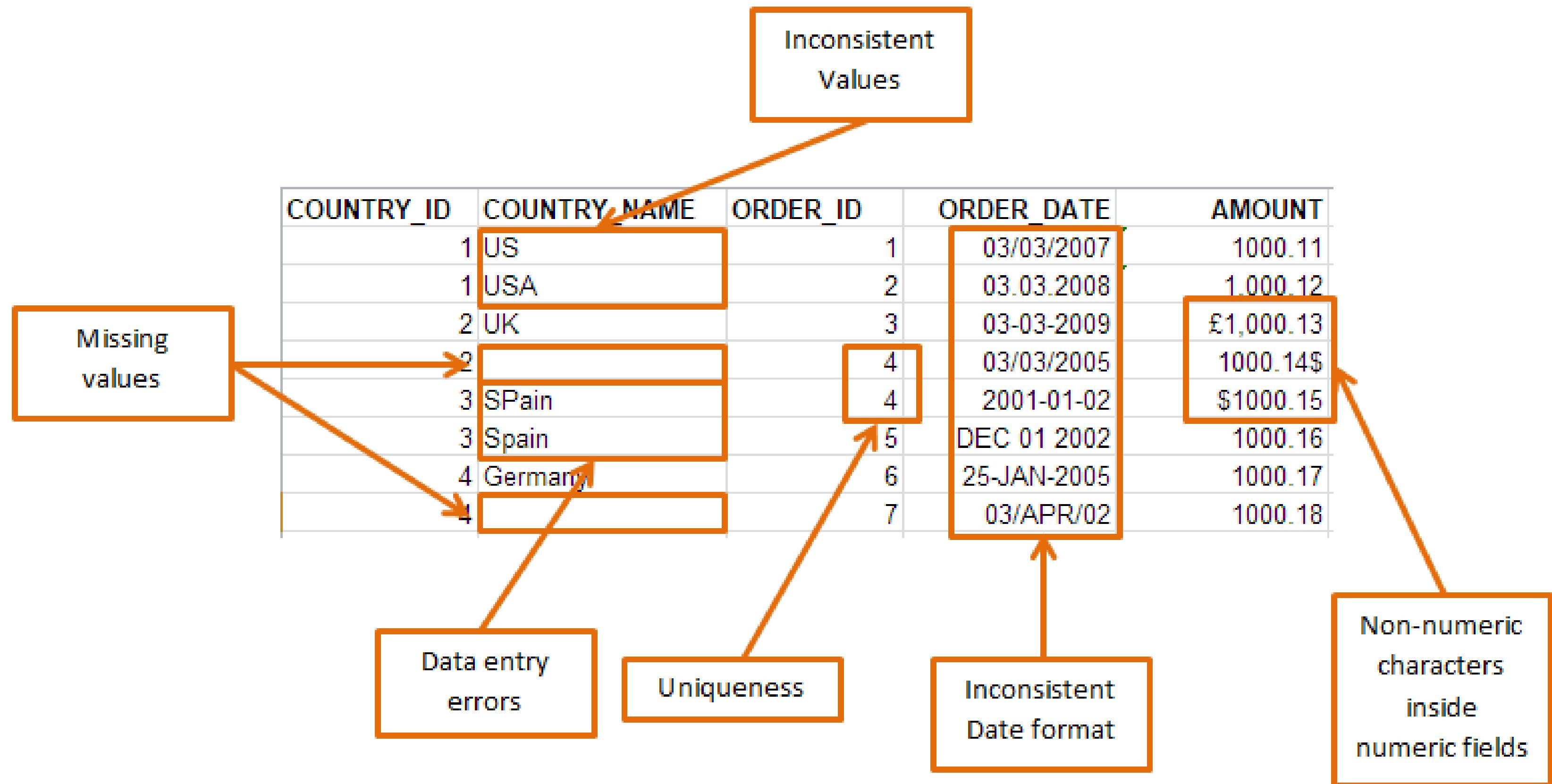
Missing Values



**92% of the used
data is unclean**

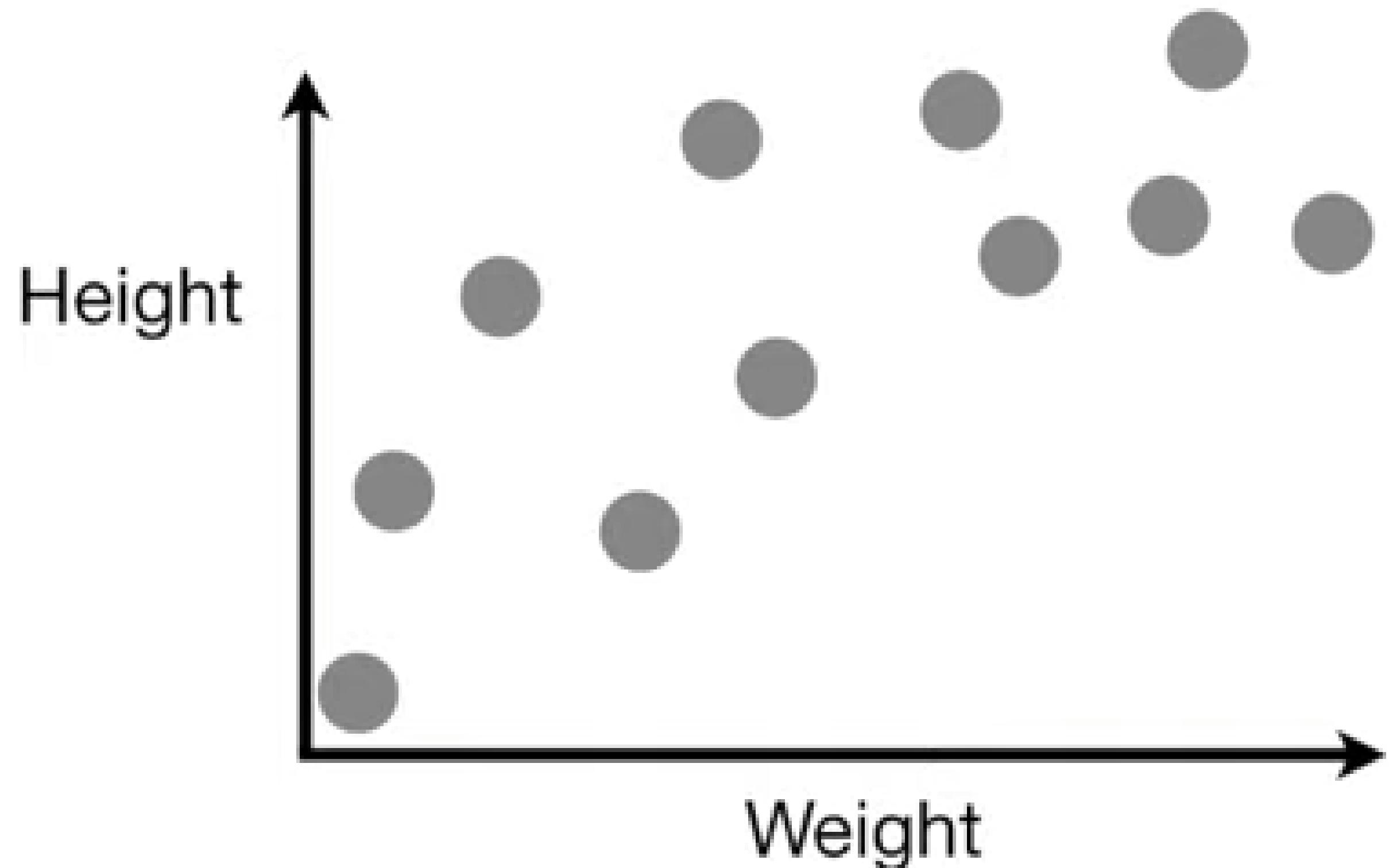
**Bad
Format** **Imbalanced
Data**

Problems and Troubles with data



Problems and Troubles with models

Bias and Variance

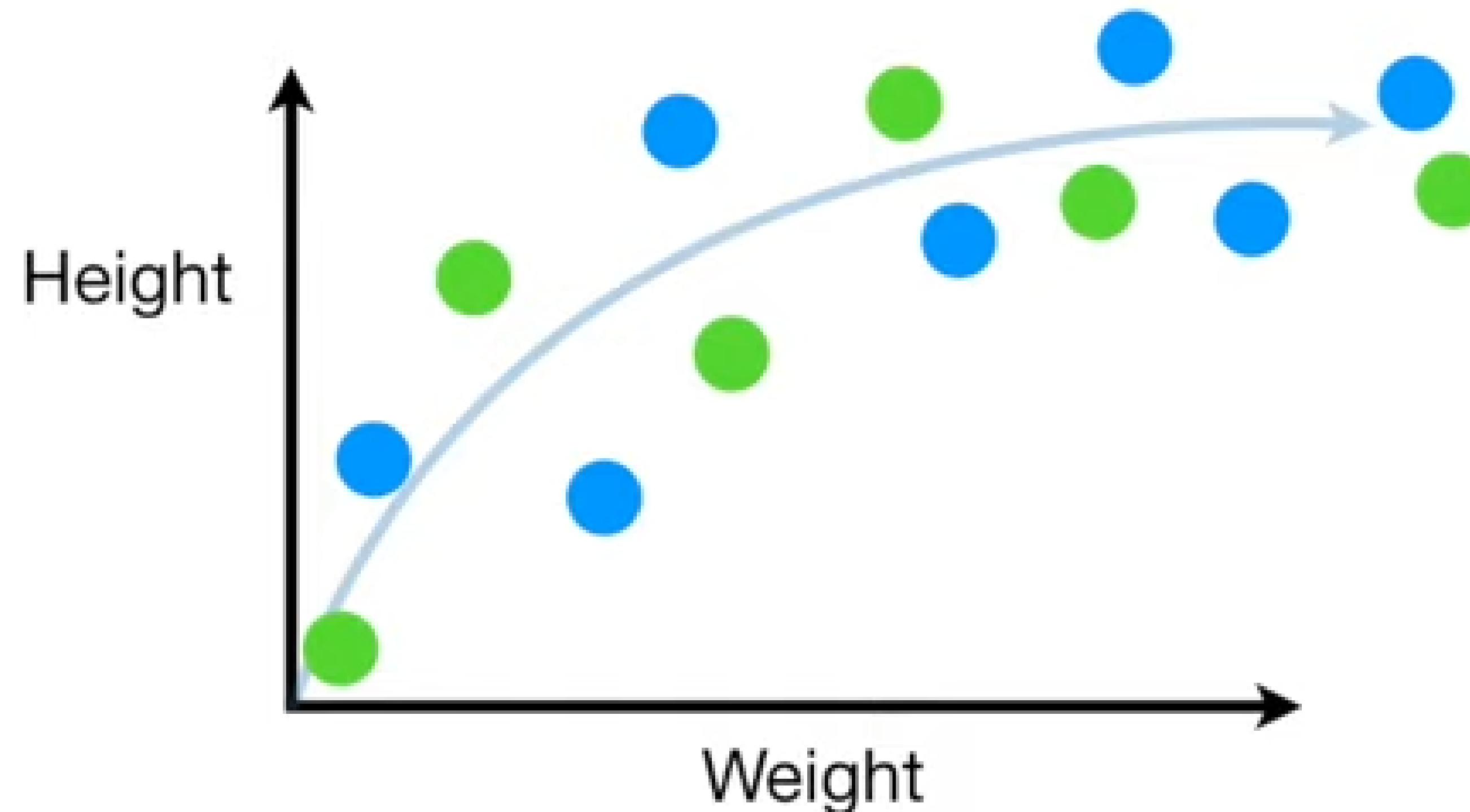


Problems and Troubles with models

Bias and Variance

TEST

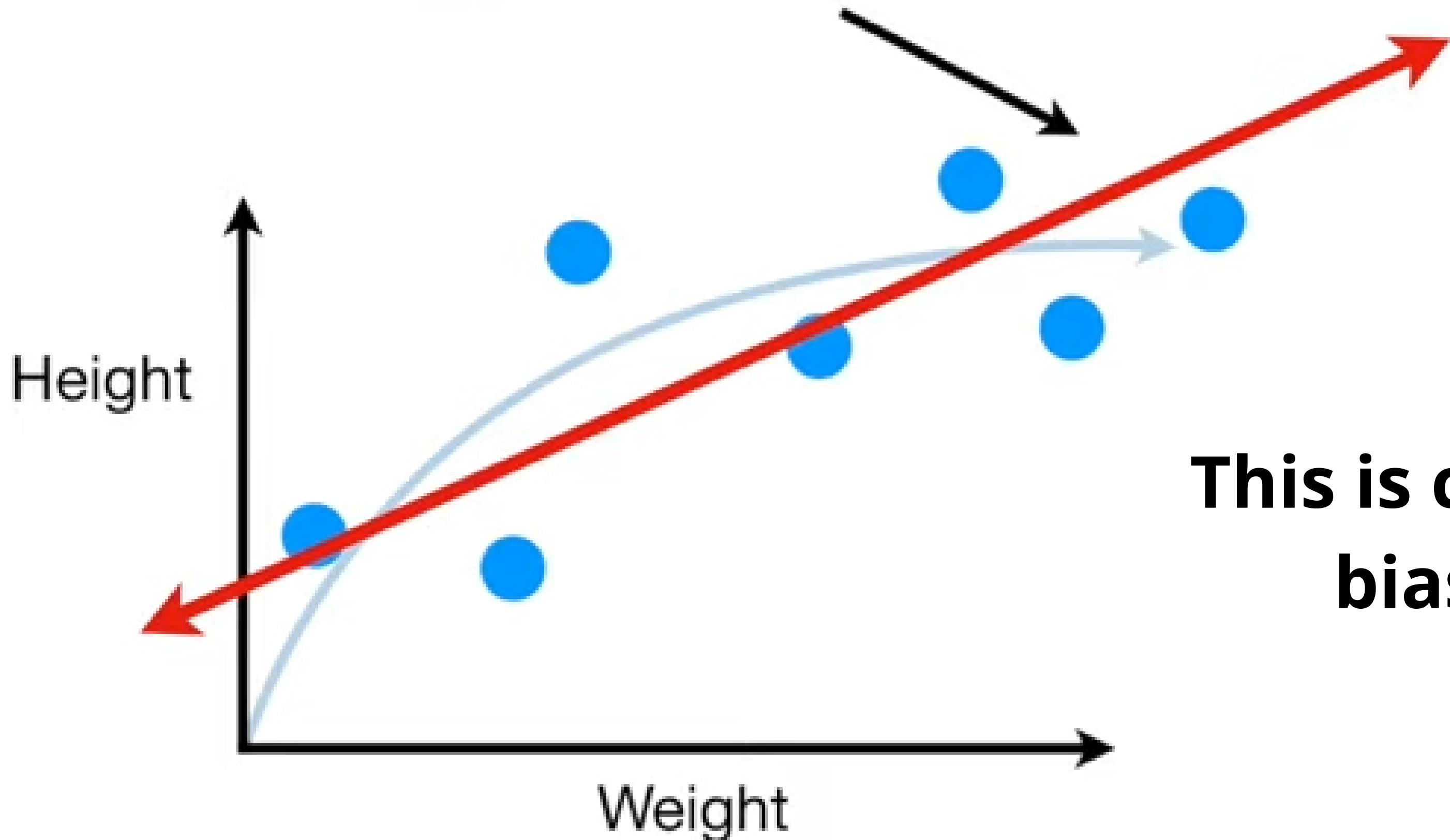
TRAIN



Problems and Troubles with models

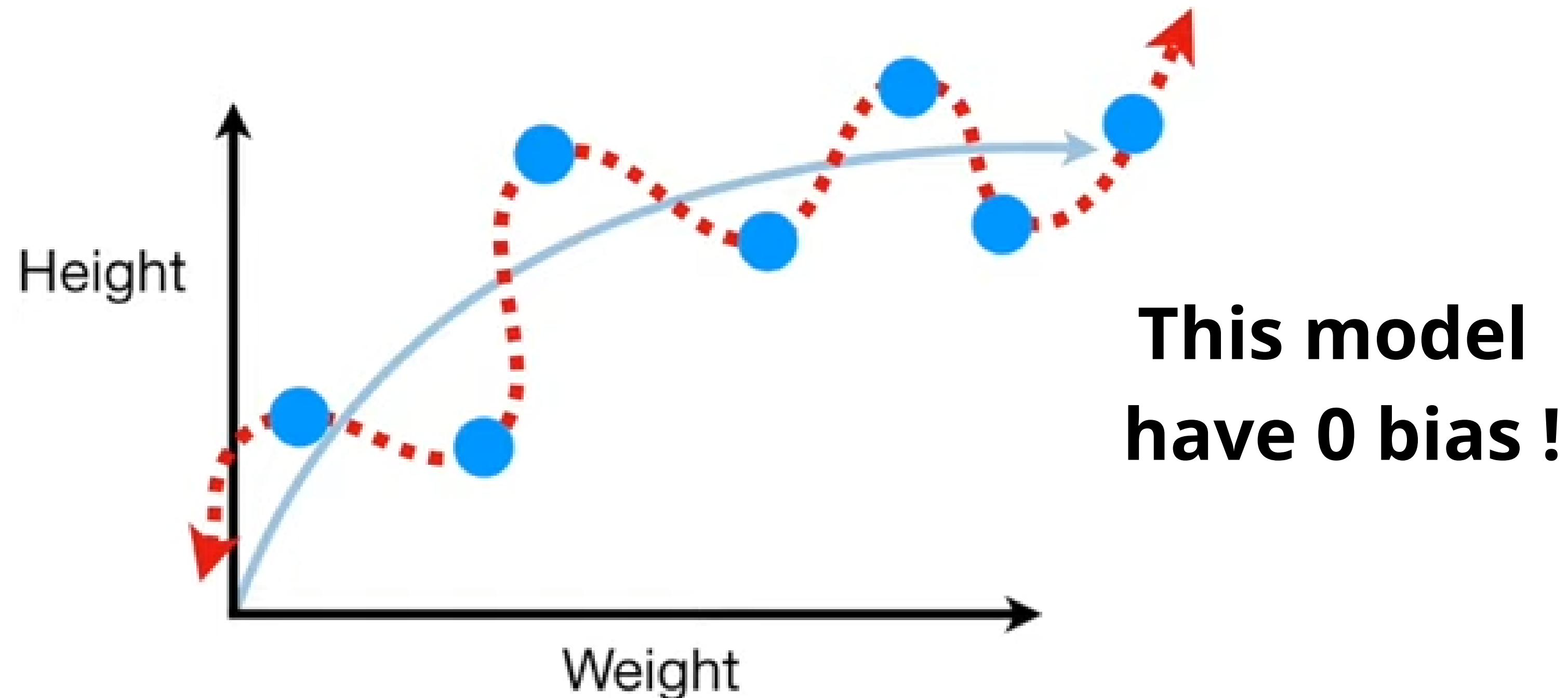
Bias and Variance

The linear model will never capture the true relation between height and weight



Problems and Troubles with models

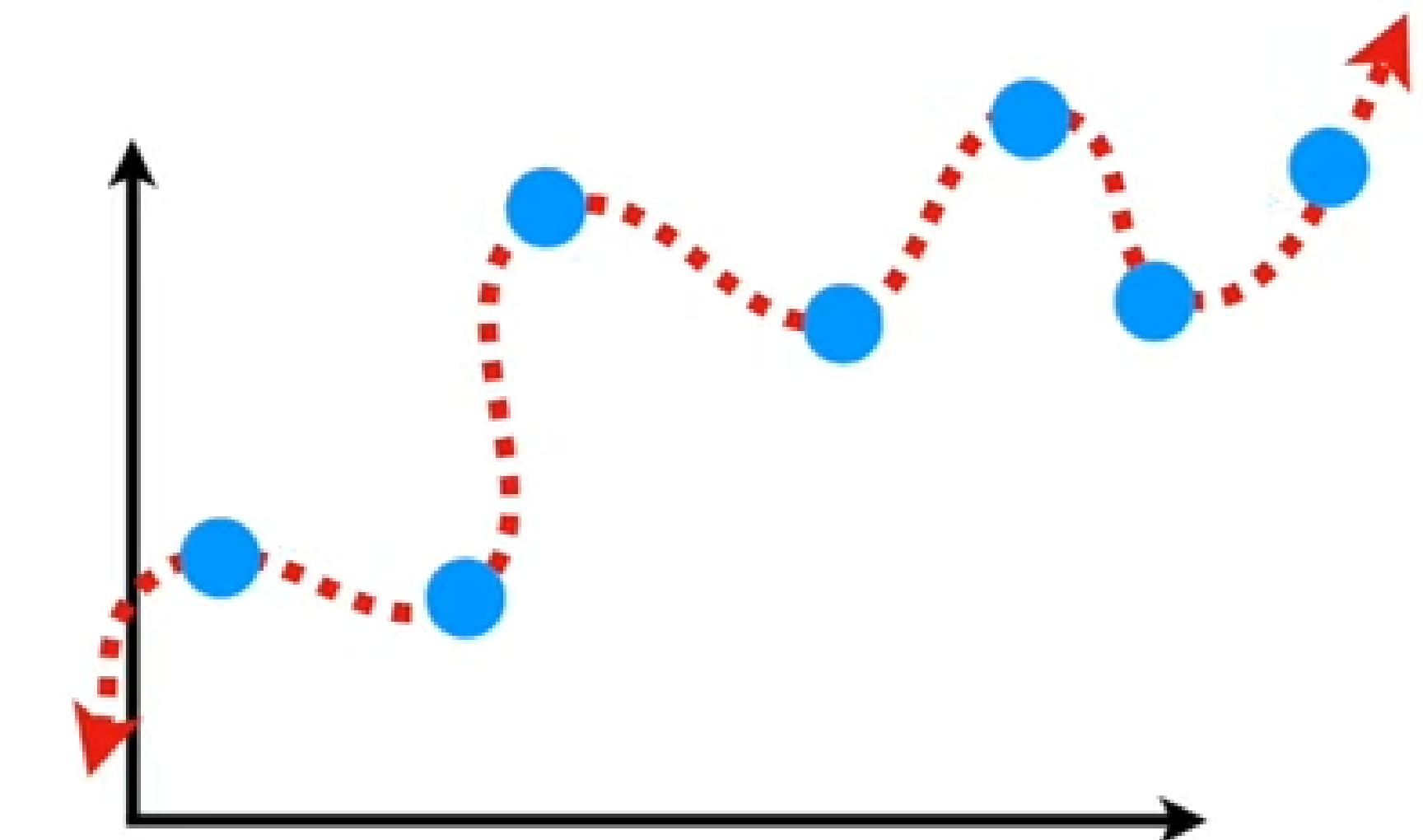
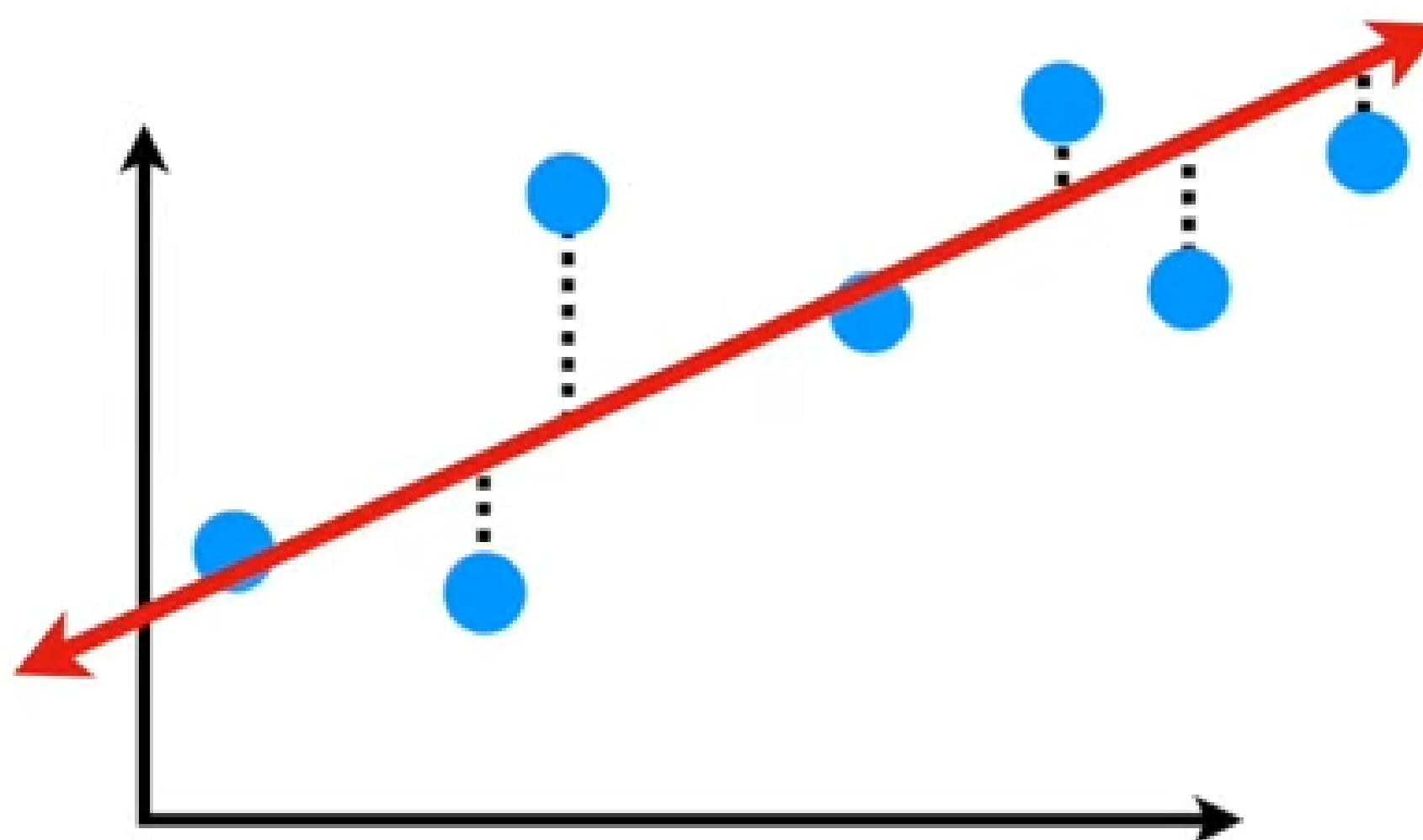
Bias and Variance



Problems and Troubles with models

Bias and Variance

Calculate their RMSE

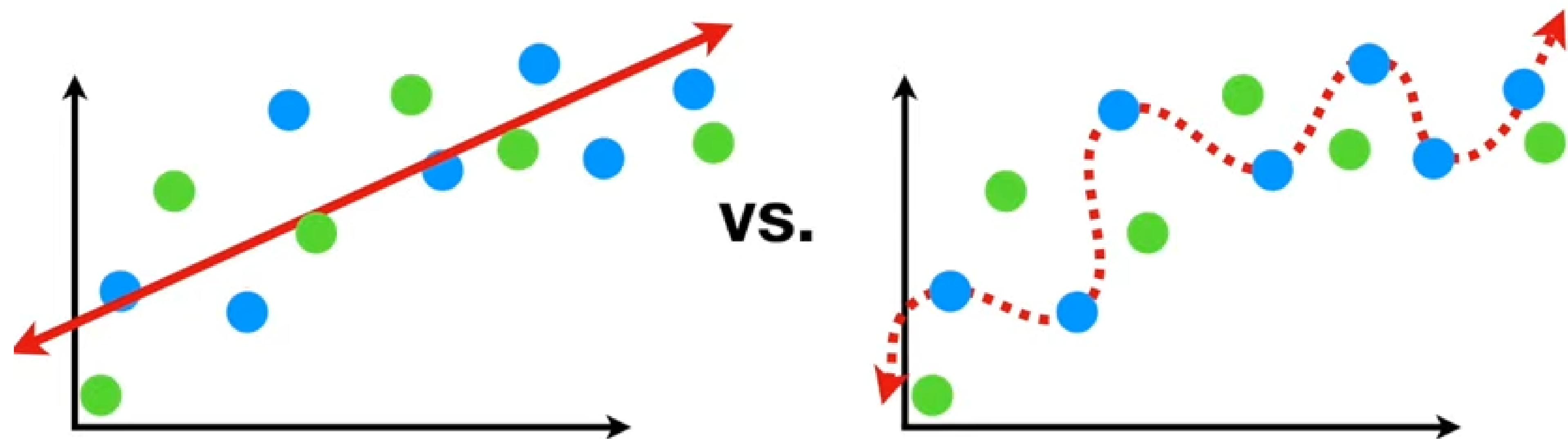


The Polynomial Model is clearly better !

Problems and Troubles with models

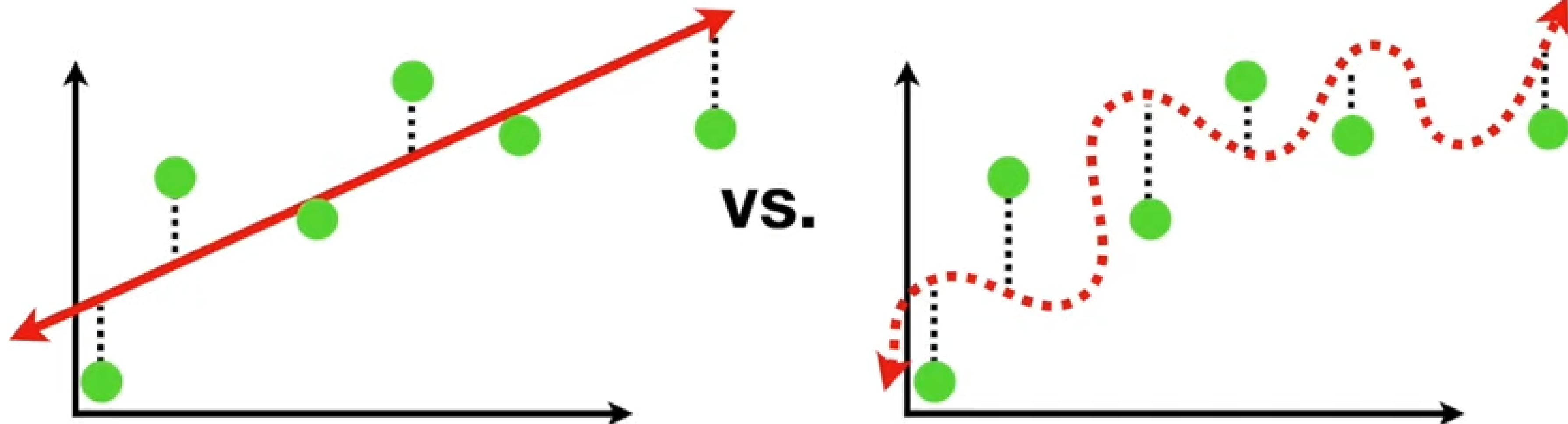
Bias and Variance

**But we have a testing set
too**



Problems and Troubles with models

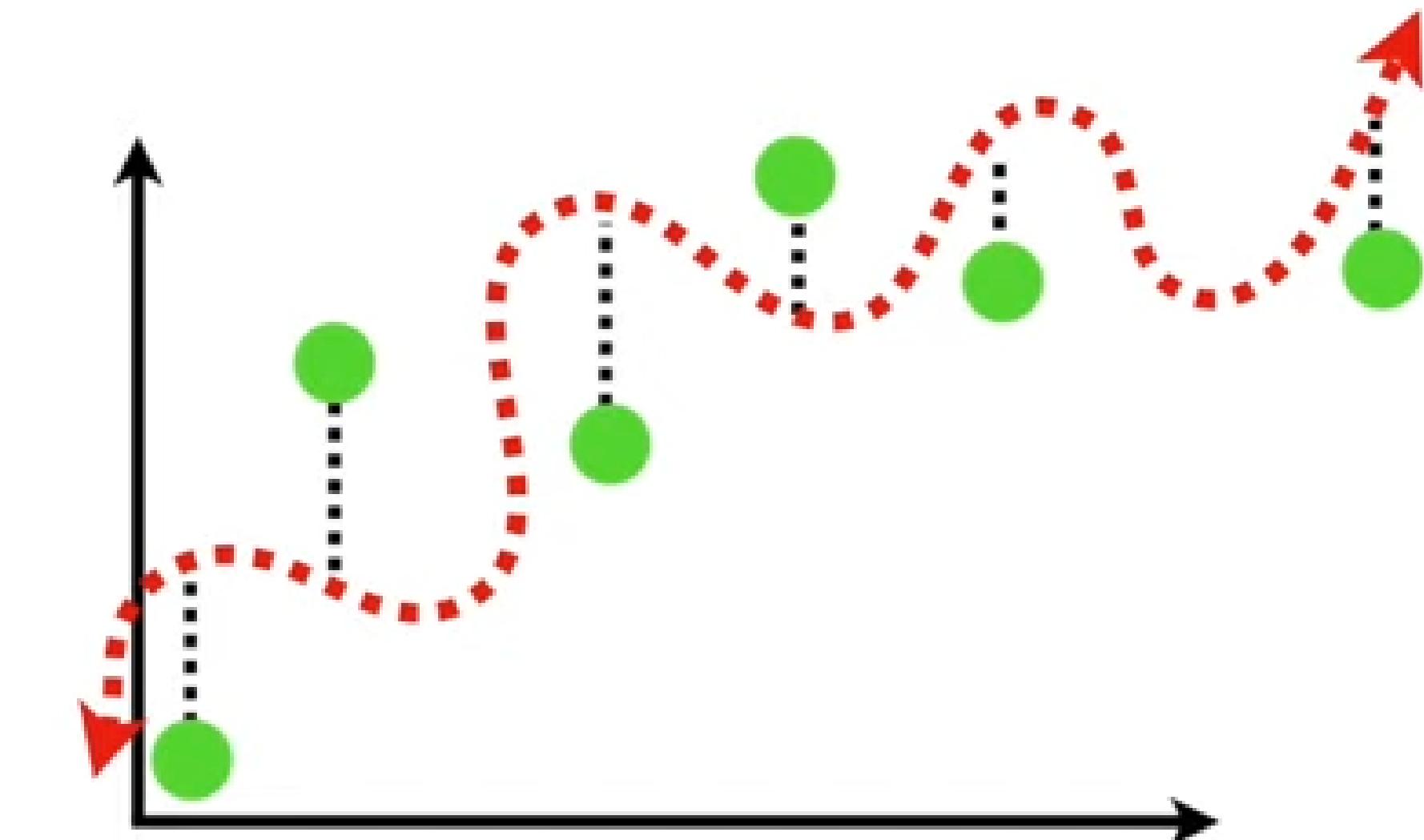
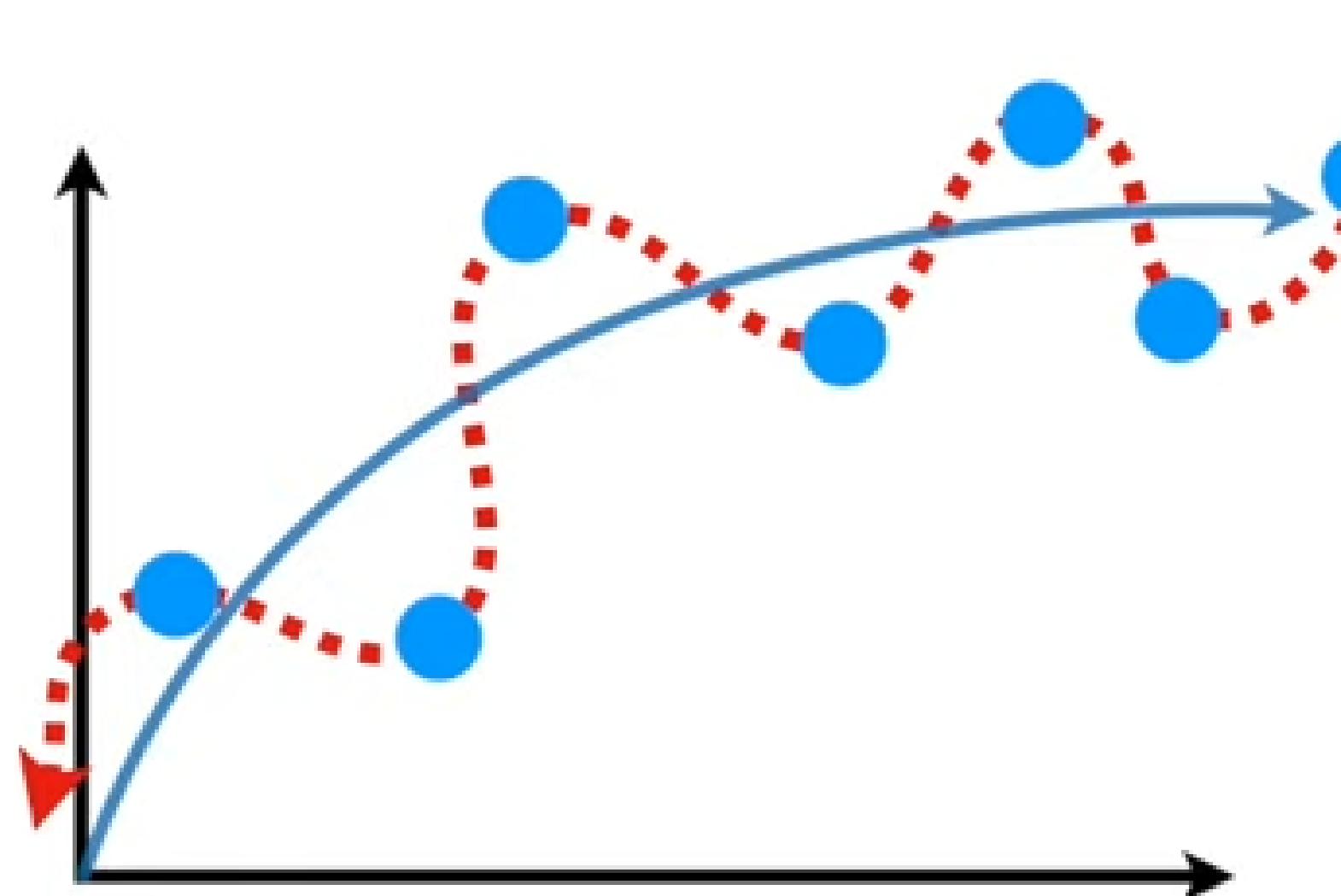
Bias and Variance



Here the linear model is better !

Problems and Troubles with models

Bias and Variance

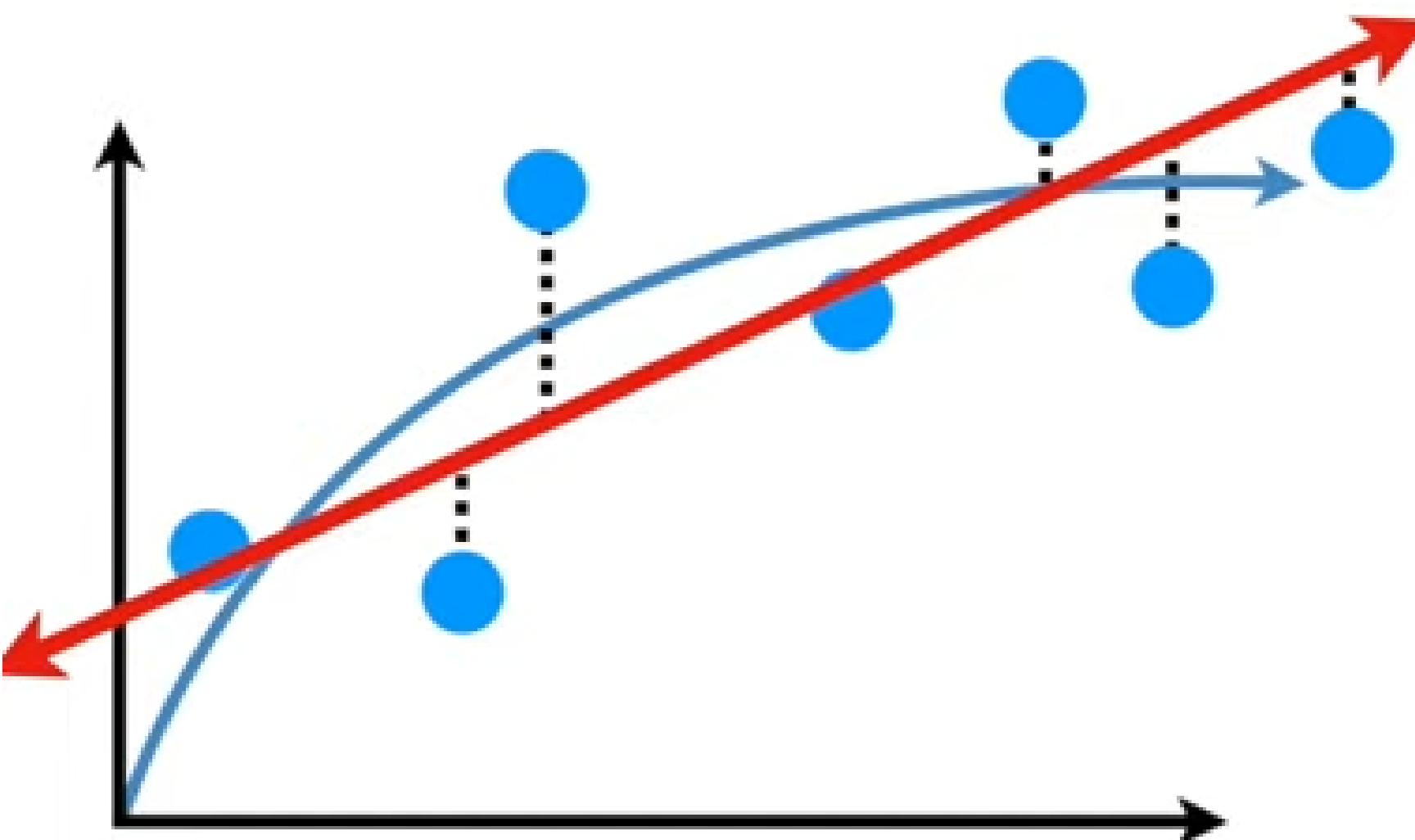


This is variance !

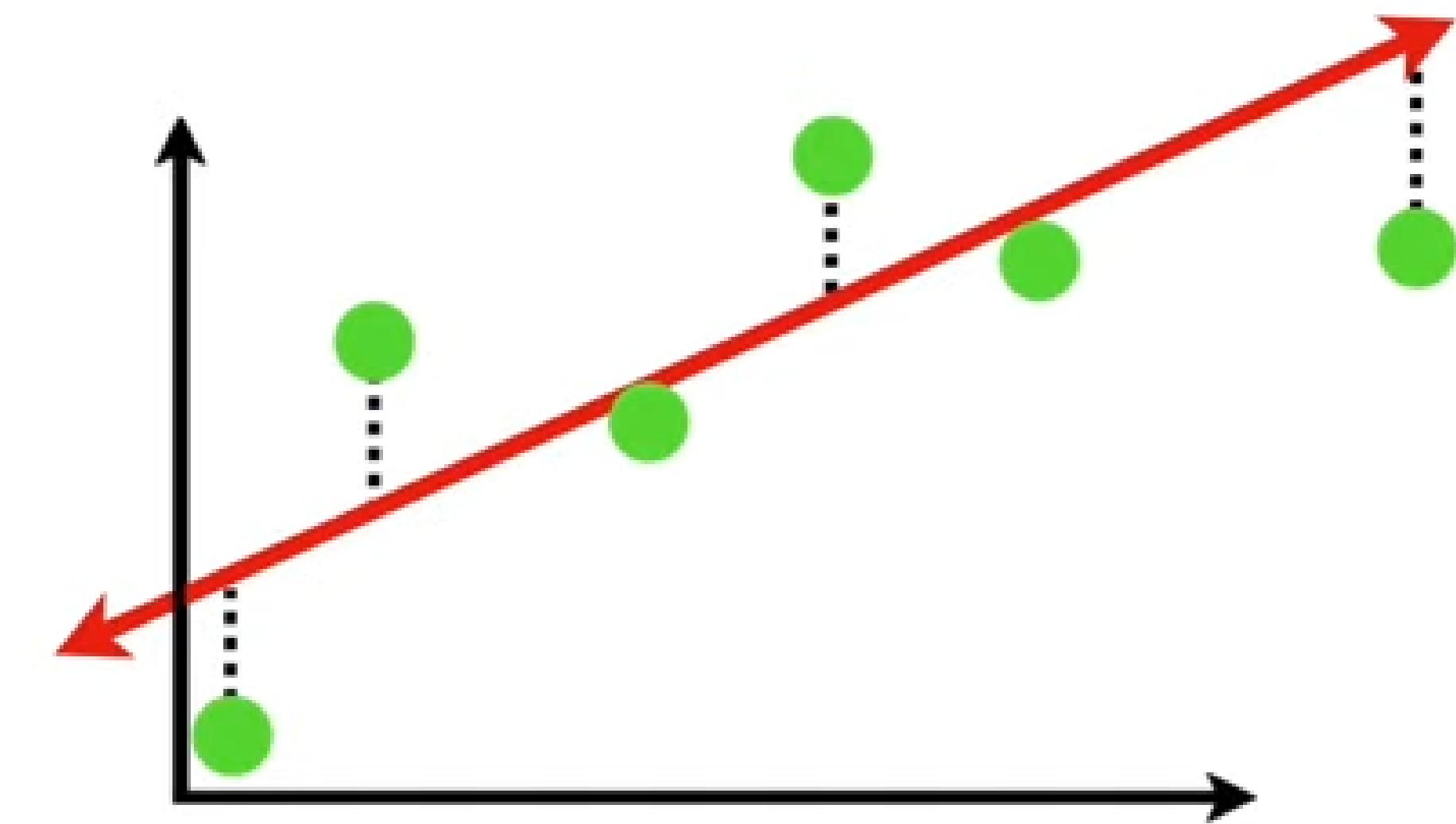
The polynomial model have high variability between different datasets

Problems and Troubles with models

Bias and Variance



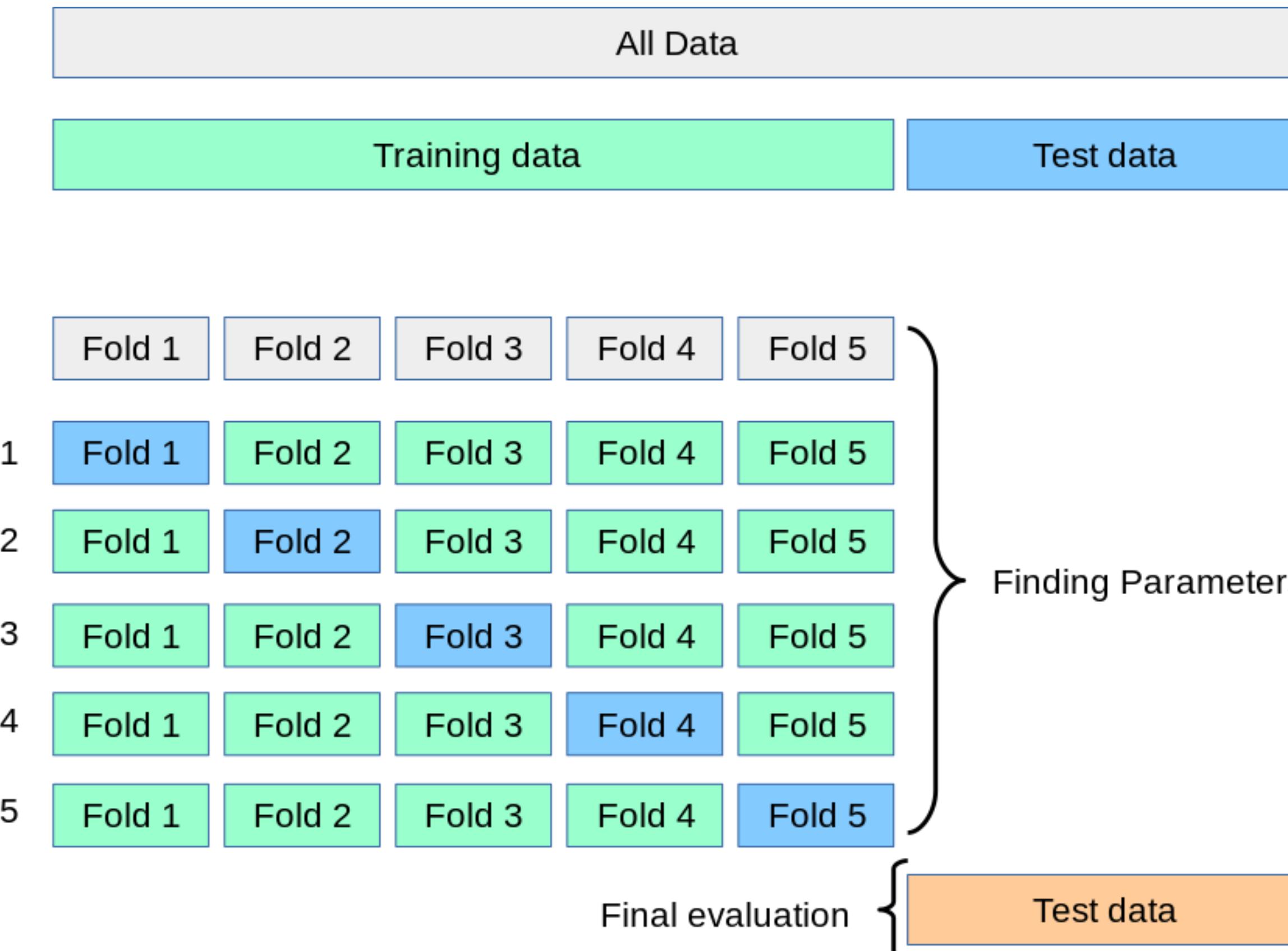
This model is
consistent



It gives good predictions (not excellent ones) but do it more often

Problems and Troubles with models

Cross Validation



Problems and Troubles with models

Cross Validation



Where to go now ?



**Kaggle, Learn and
Compete**



**Datacamp, Learn and get
Certified**

Where to go now ?



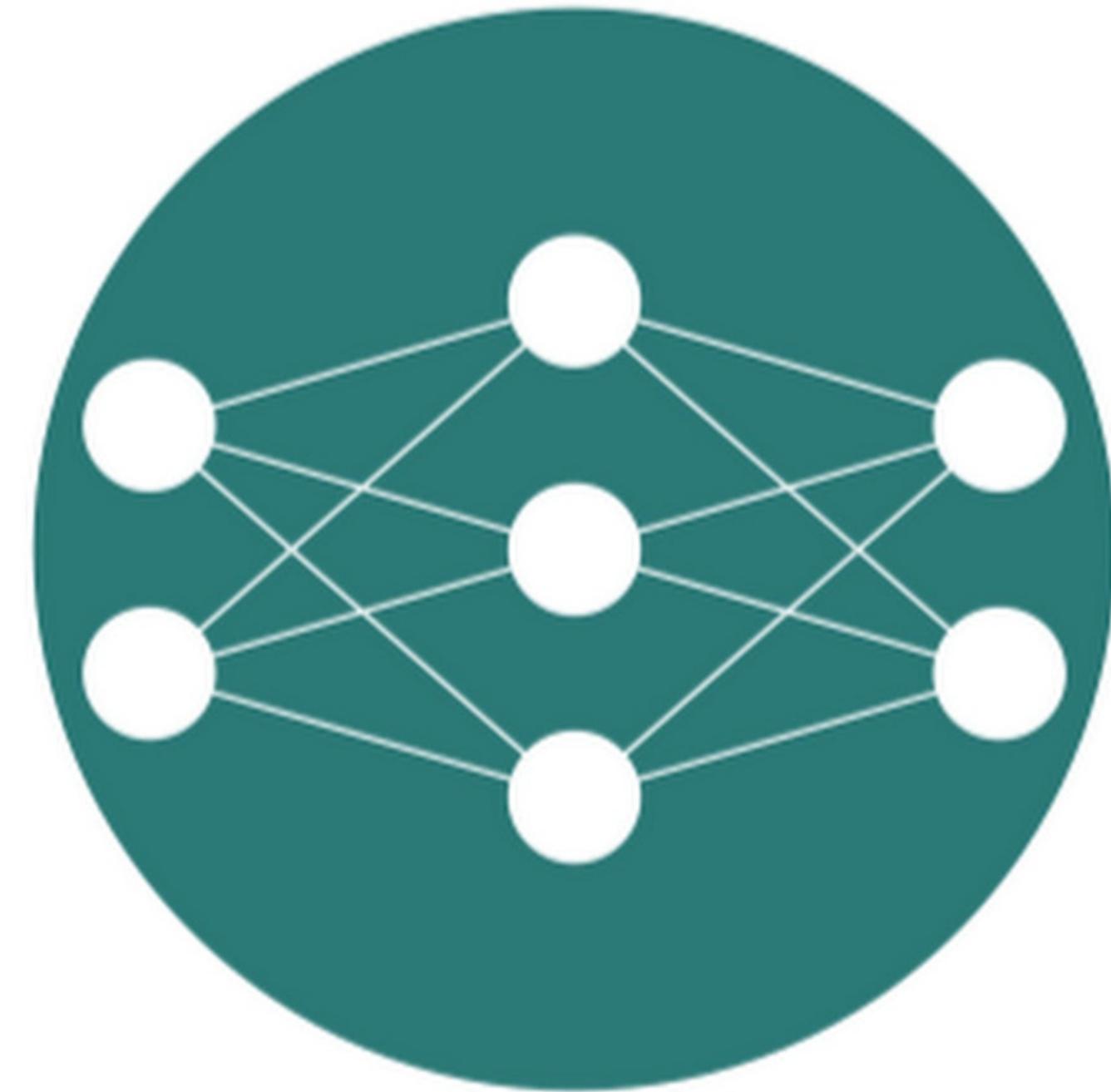
Machine Learning

Machine Learning

by Andrew Ng

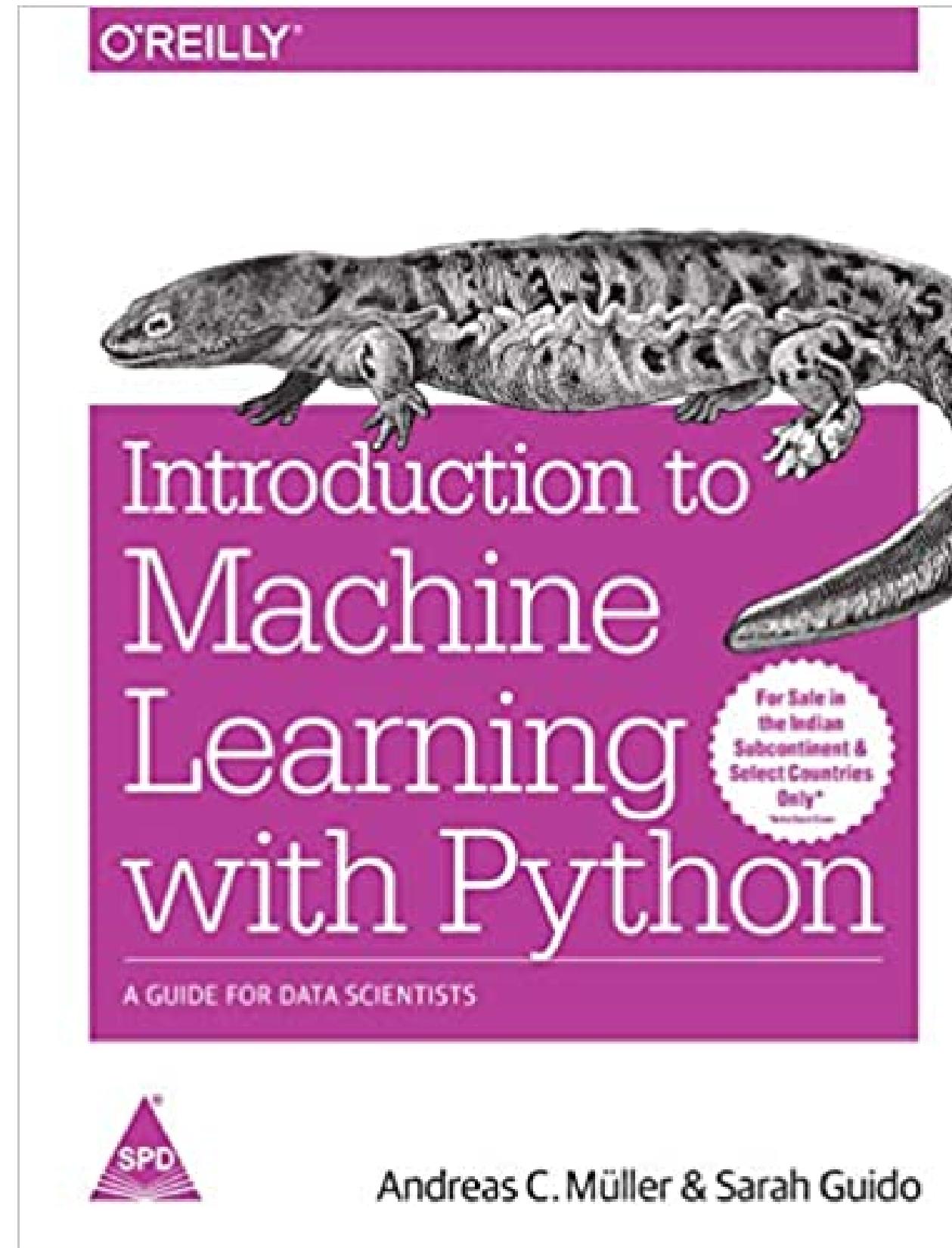


Andrew Ng Courses



Machine Learnia

Where to go now ?



O'REILLY®

Deep Learning from Scratch

Building with Python from First Principles



Seth Weidman

Contact me



email: ja_aitsaid@esi.dz

Linkedin: Azzedine Idir Aitsaid



Thank you !