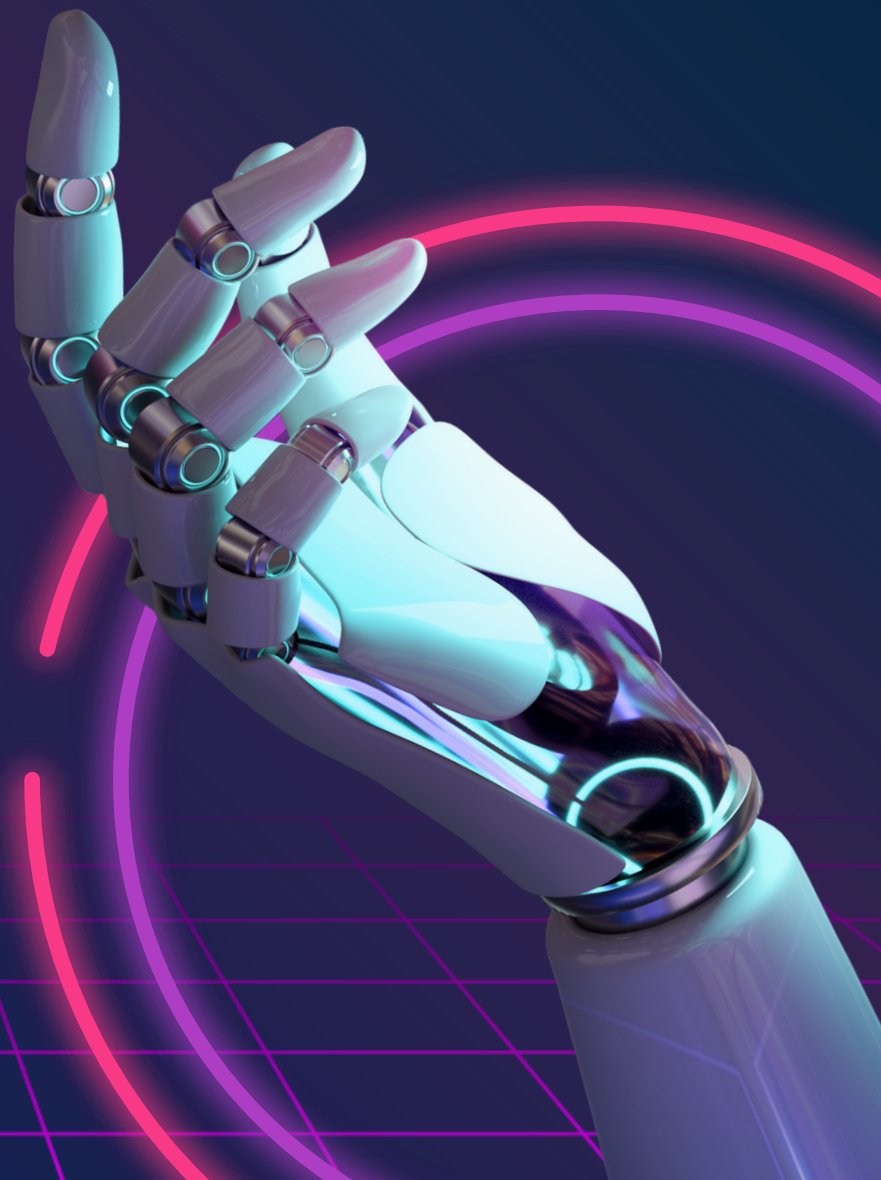
ENSIAS AI CLUB

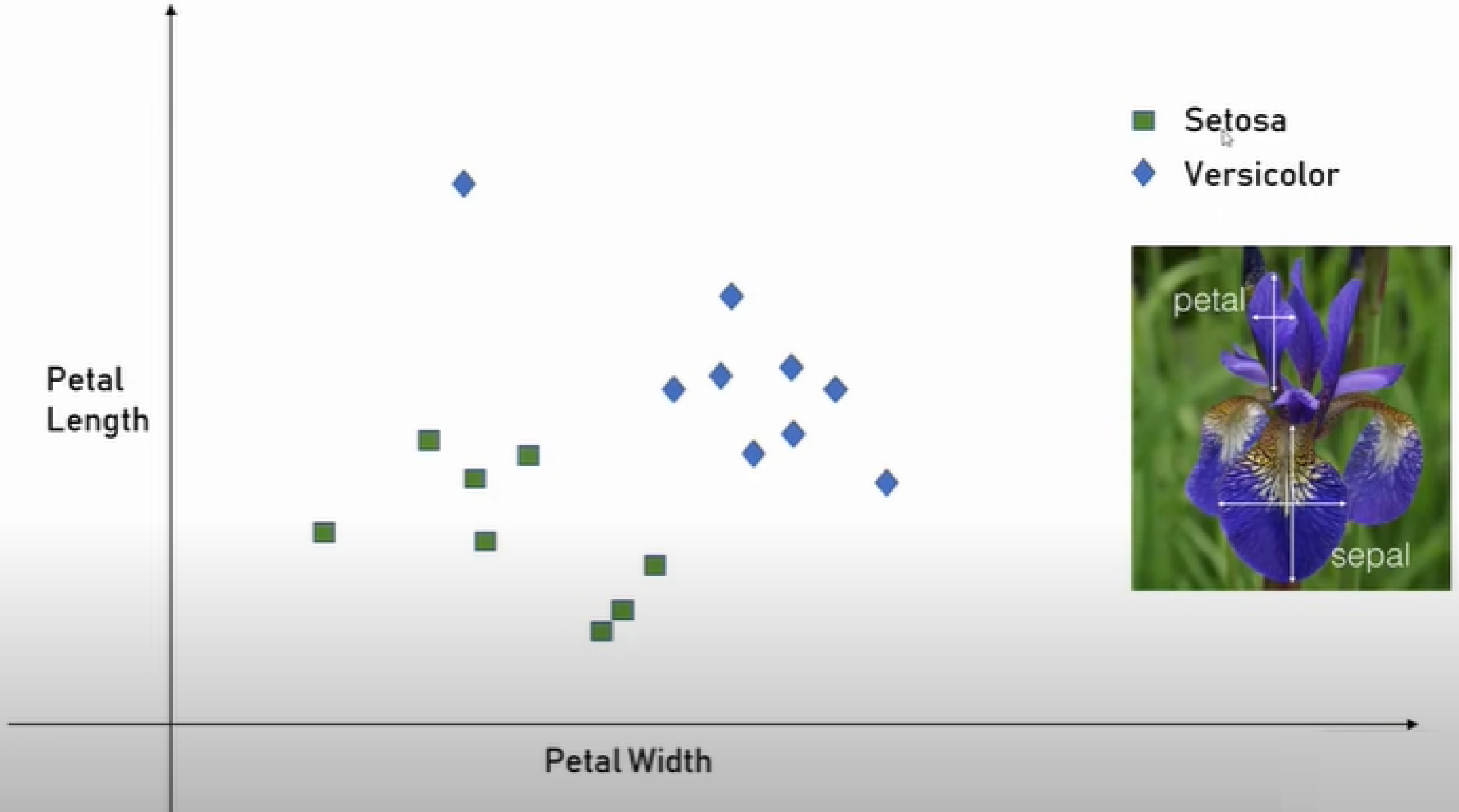
SVM ALGORITHM & ADVICES FOR DC

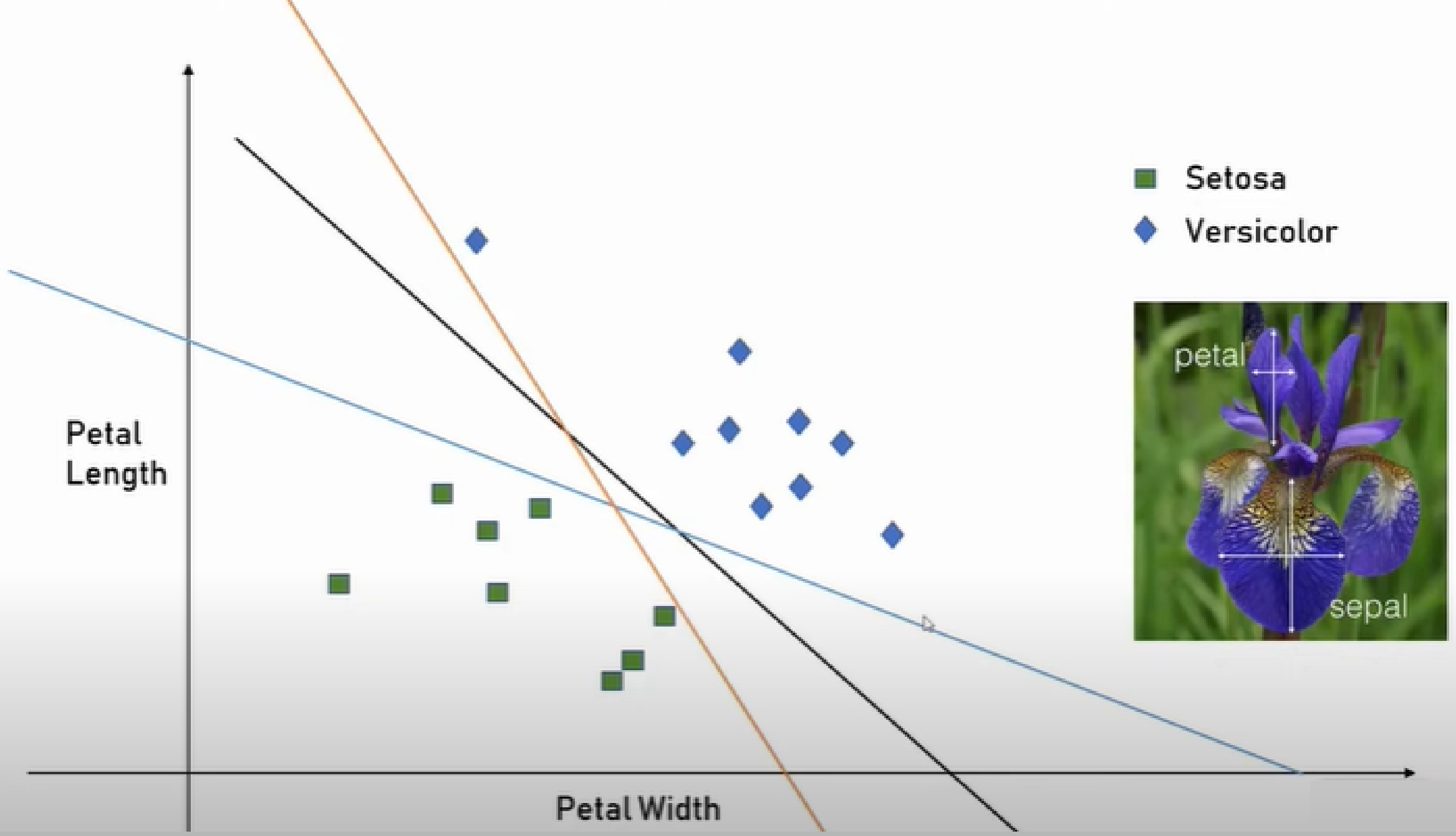
ADIL OUBAIBOU
ADNANE MAJDOUB

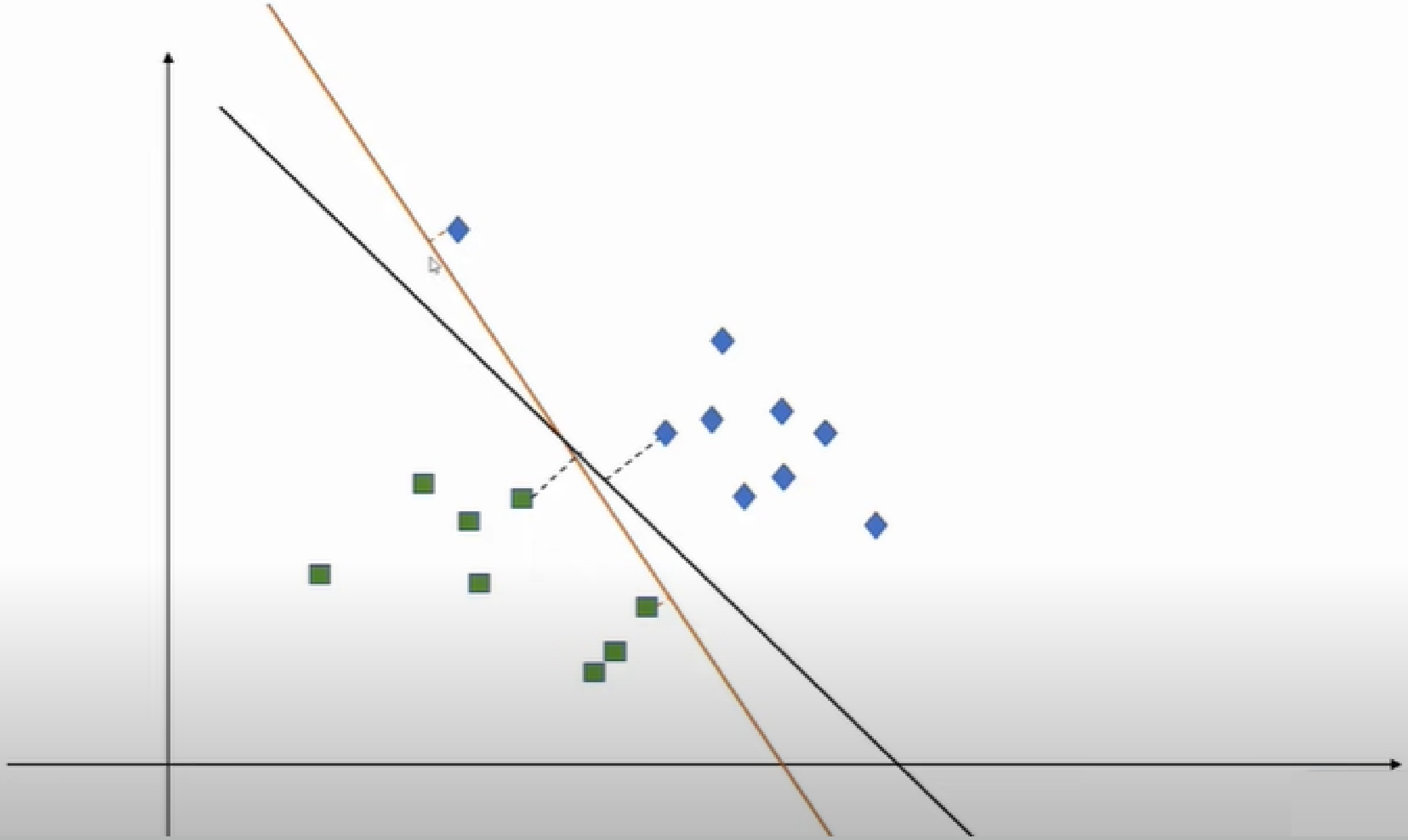
PLAN

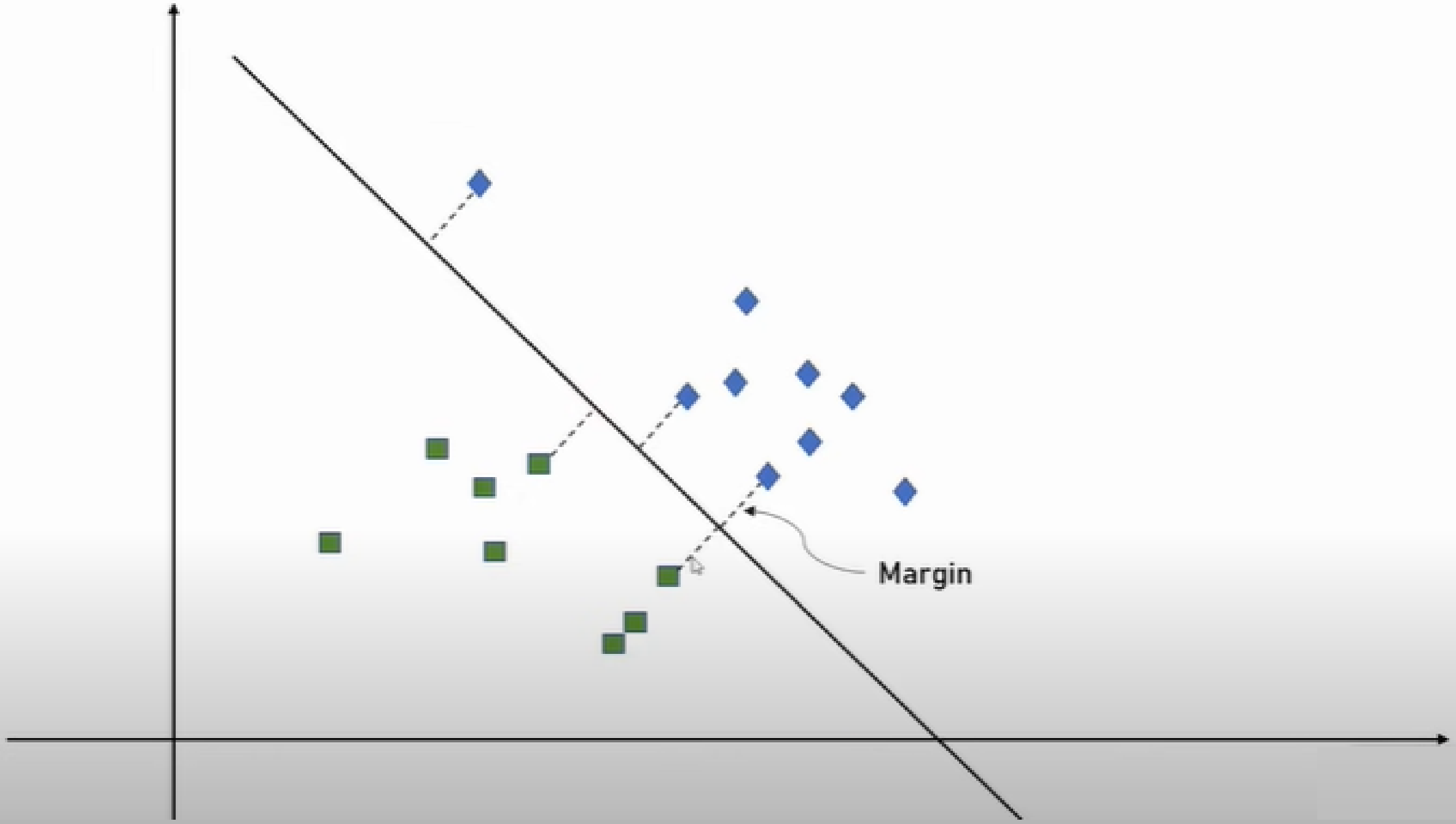
1. SVM algorithm
2. Overfitting & underfitting
3. Practice Lab
4. Metrics
5. Advices to get better results

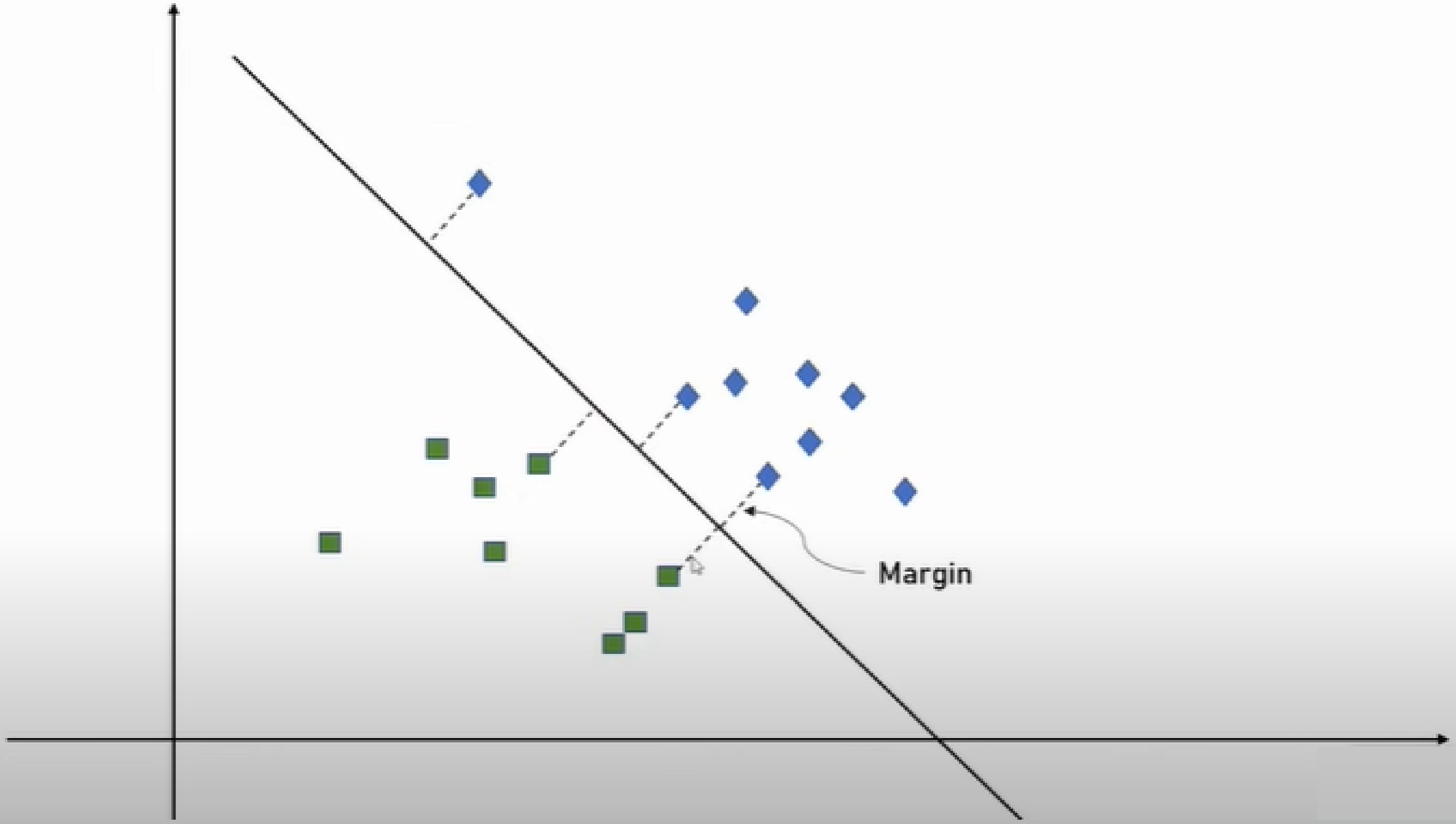


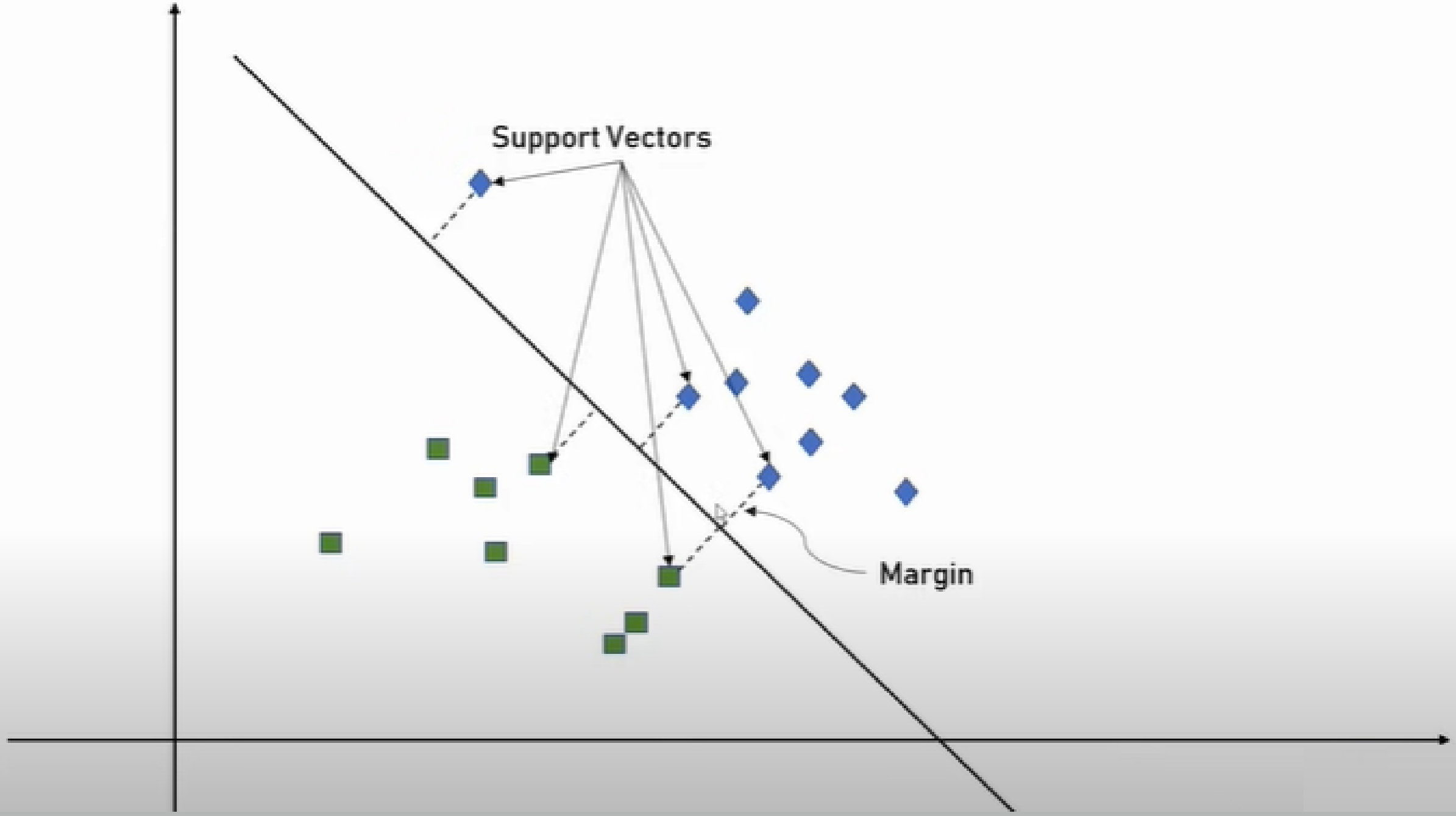

Setosa
Versicolor
Petal Length
Petal Width
petal
sepal


Setosa
Versicolor
Petal Length
Petal Width
petal
sepal

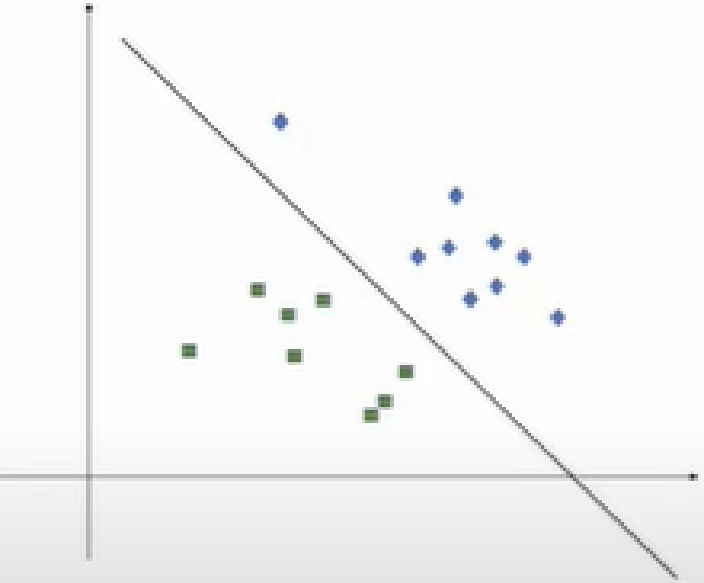



Margin


Margin


Support Vectors
Margin

2D



3D

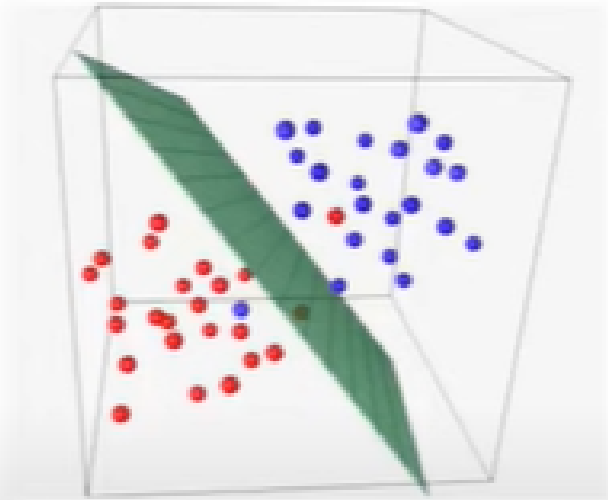
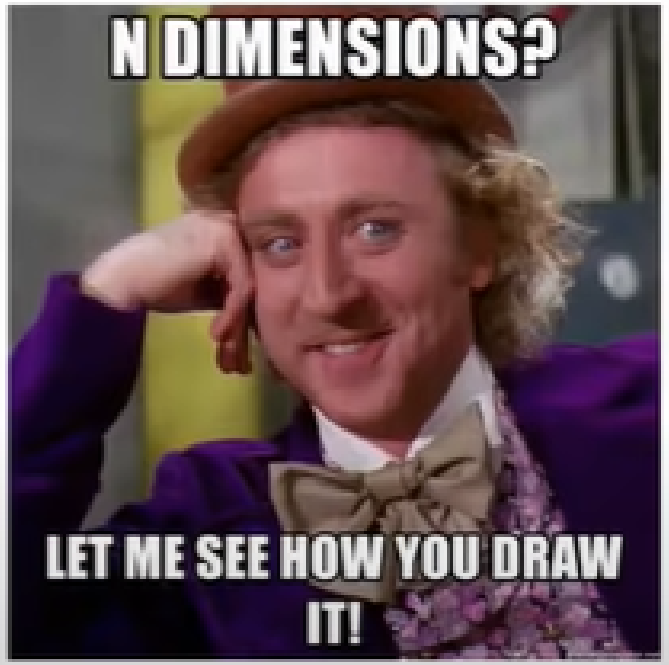
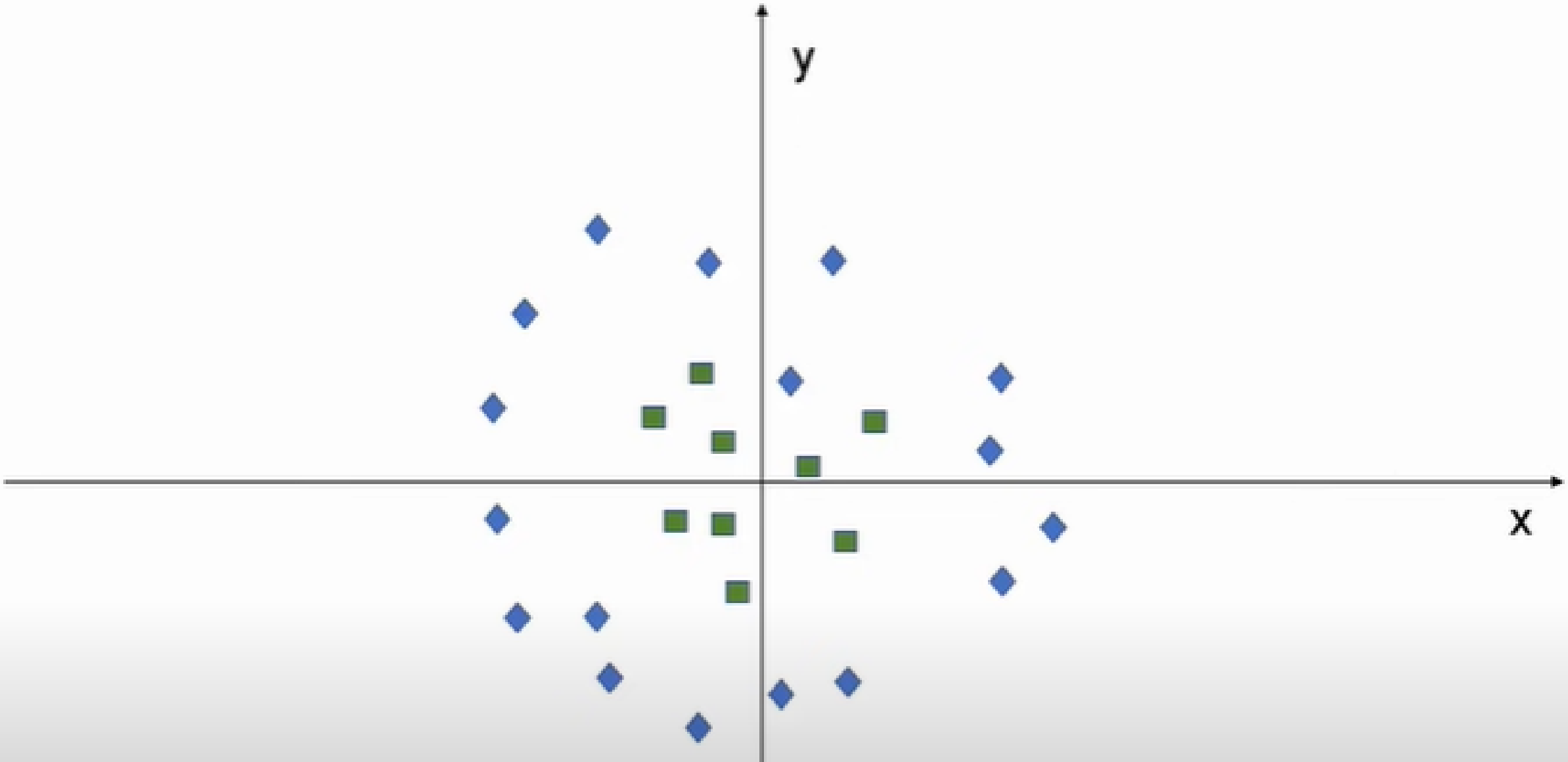


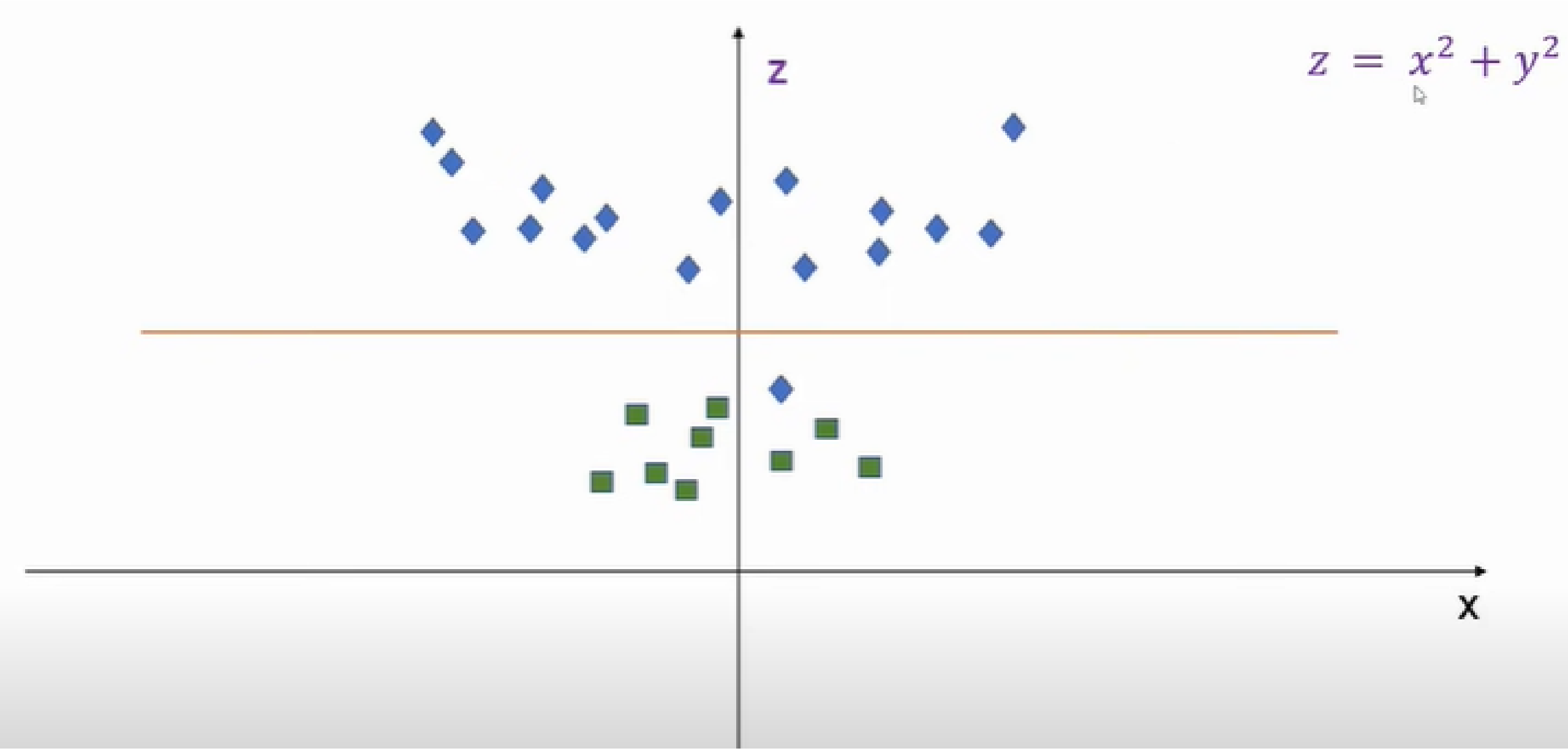
Image Credit: https://appliedmachinelearning.blog

nD



Problem




z
$z = x^2 + y^2$
x

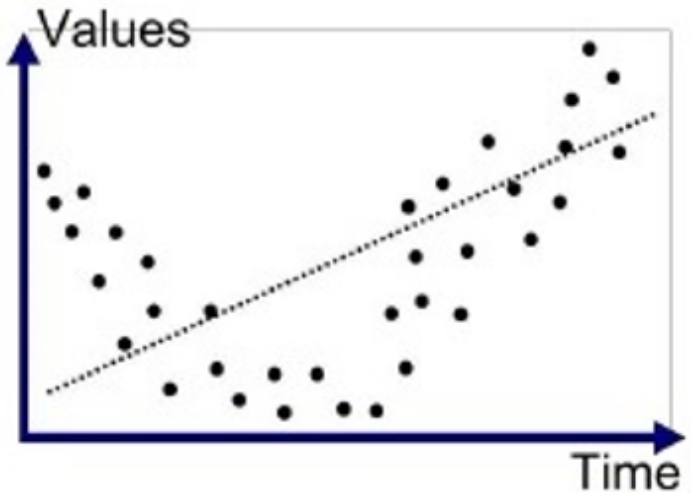
Kernels

- The kernel function transforms the input data into a higher-dimensional space, making it easier to find a hyperplane that separates different classes

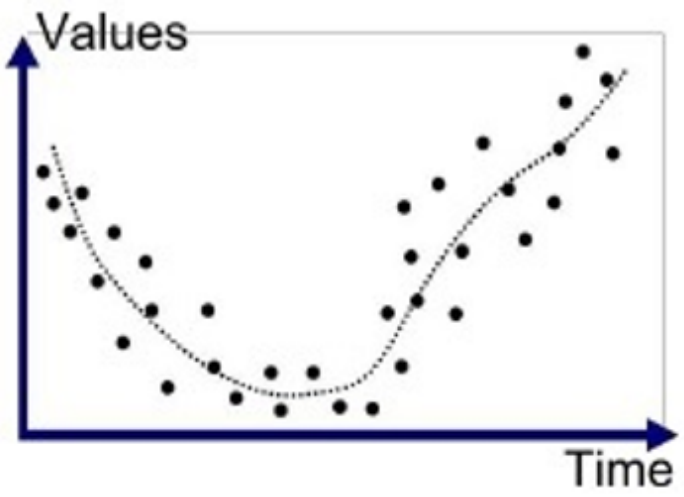
- examples : ‘linear’, ‘poly’, ‘rbf’ … etc

Examples-svm-kernels

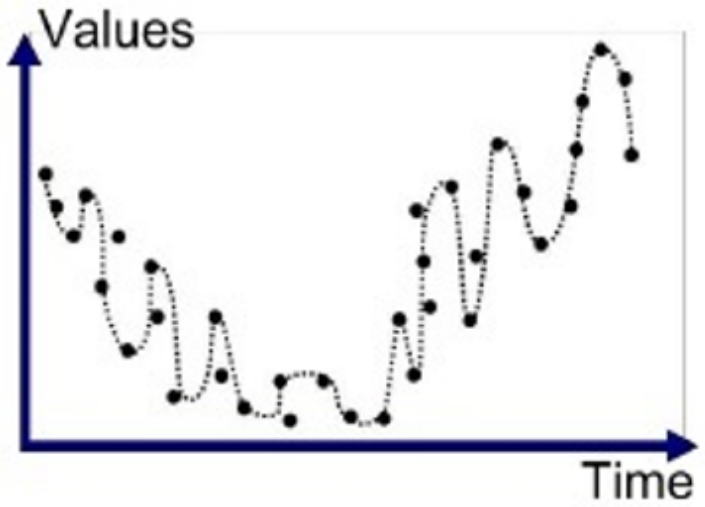
Overfitting/Underfitting



Underfitted



Good Fit/Robust

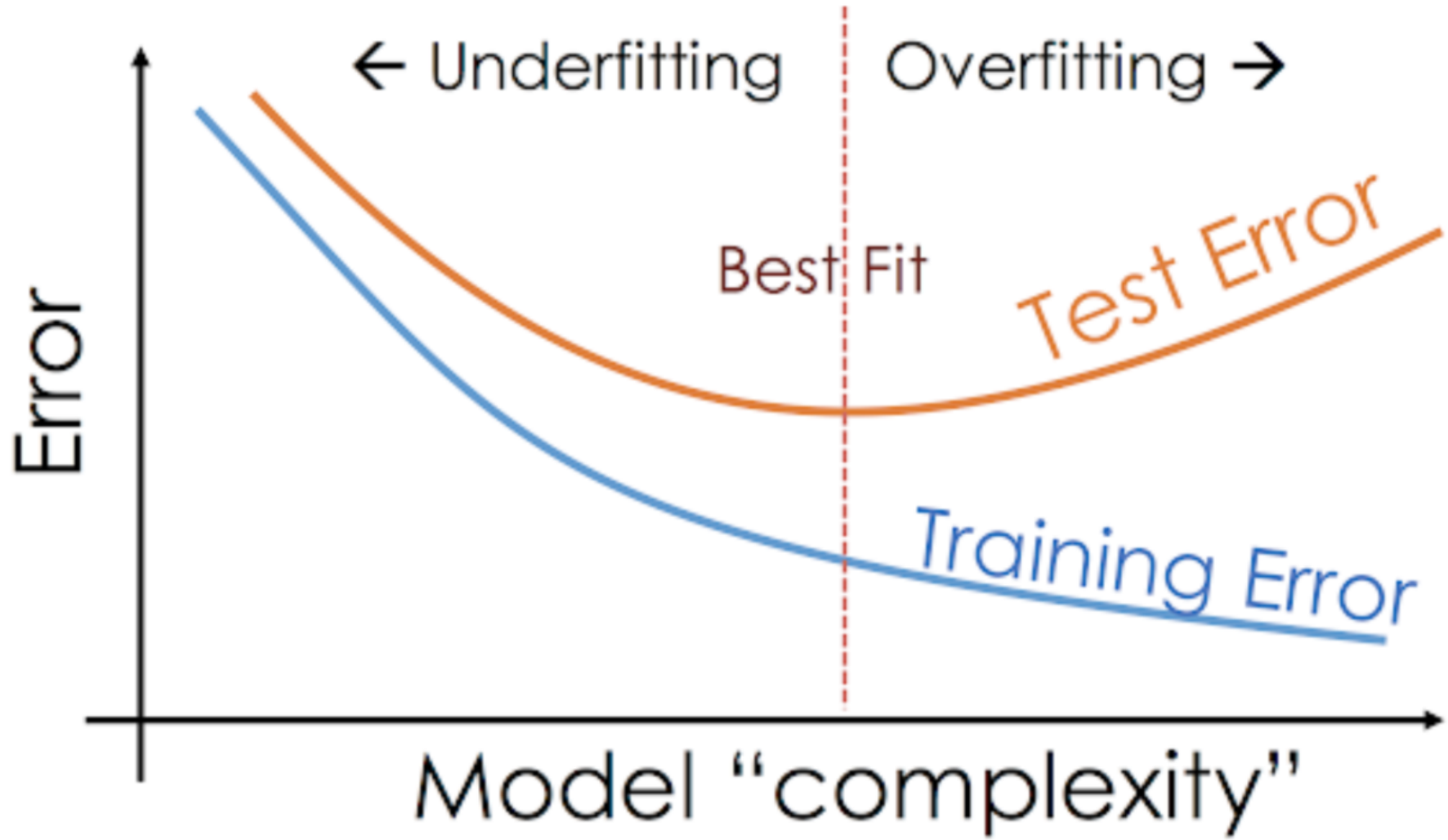


Overfitted

Modele simple (d=1)

Bon Modele (d=3)

Modele Complexe (d>15)

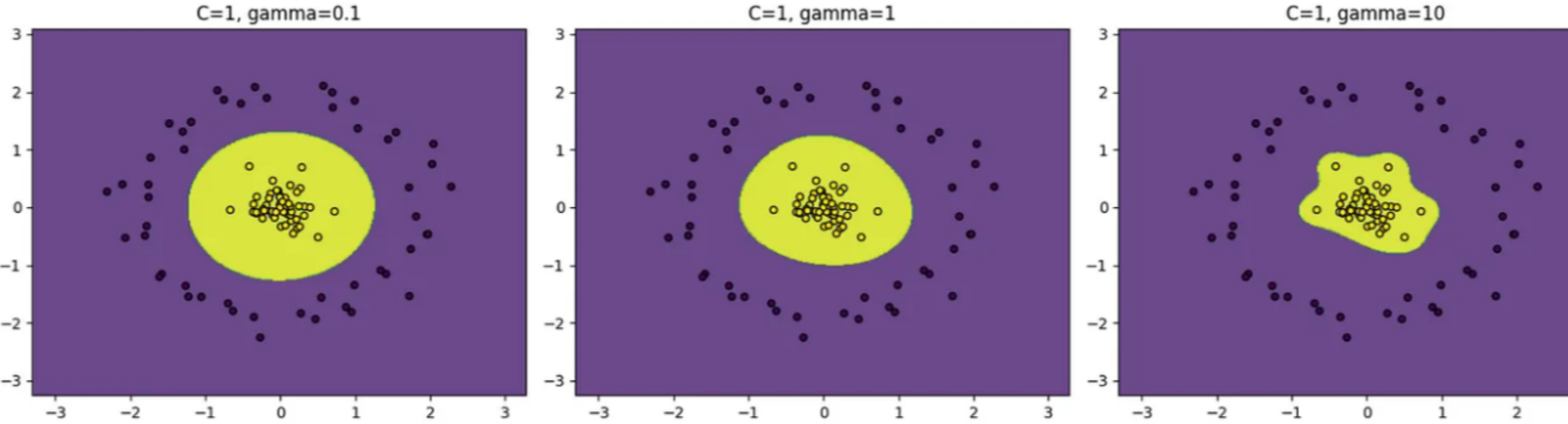

← Underfitting
Overfitting →
Best Fit
Test Error
Training Error
Error
Model "complexity"

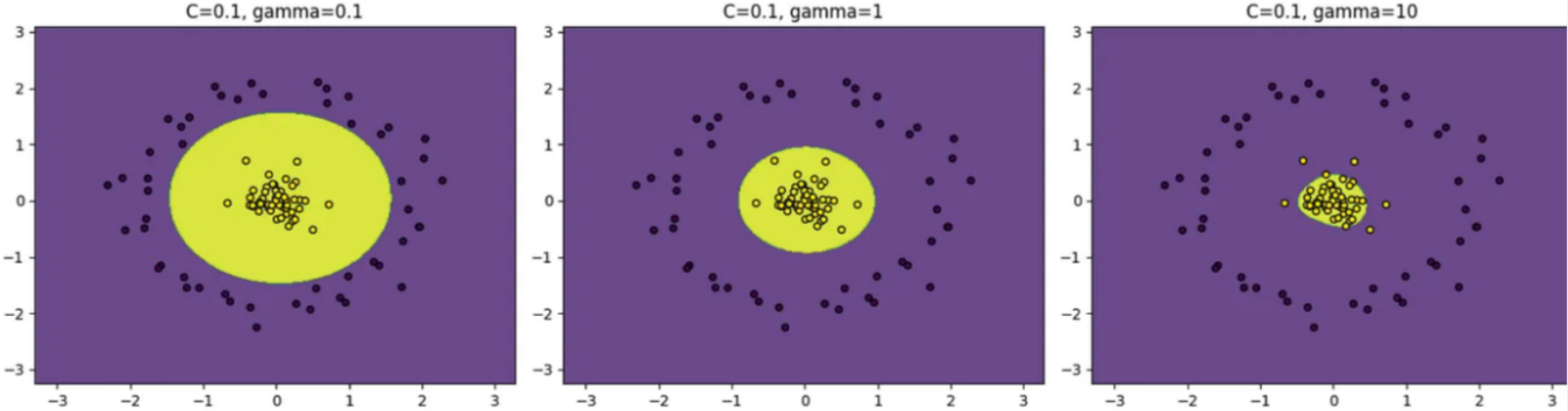
Regularization

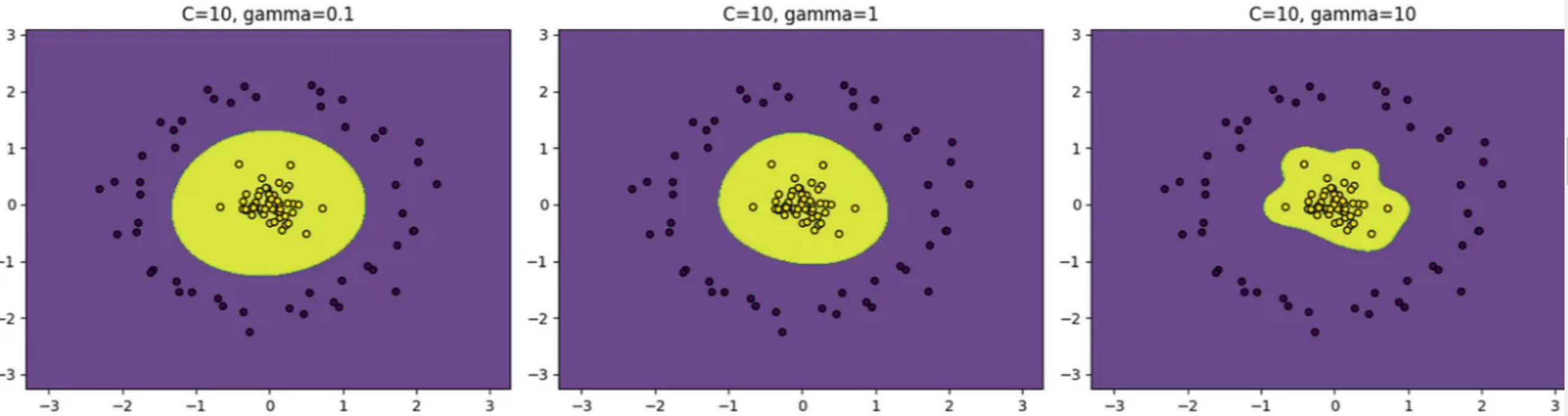
- C is the regularization parameter in SVM
- C tells the SVM optimization how much you want to avoid misclassifying each training example

Gamma

- Gamma determines the influence of individual training examples on the decision boundary
- It's a parameter for the RBF kernel in SVM


C=1, gamma=0.1
C=1, gamma=1
C=1, gamma=10


C=0.1, gamma=0.1
C=0.1, gamma=1
C=0.1, gamma=10
3
2
1
0
−1
−2
−3
−3
−2
−1
0
1
2
3



correctly classify more points.

Metrics (for binary classfication)

		Predicted	
		0	1
Actual	0	TN	FP
	1	FN	TP

$$Precision = \frac{TP}{TP + FP}$$

$$Recall = \frac{TP}{TP + FN}$$

$$\textbf{F1 Score} = \frac{2}{\left(\frac{1}{\text{Precision}} + \frac{1}{\text{Recall}}\right)}$$

$$\textbf{F1 Score} = \frac{2 \times \text{Precision} \times \text{Recall}}{\text{Precision} + \text{Recall}}$$