

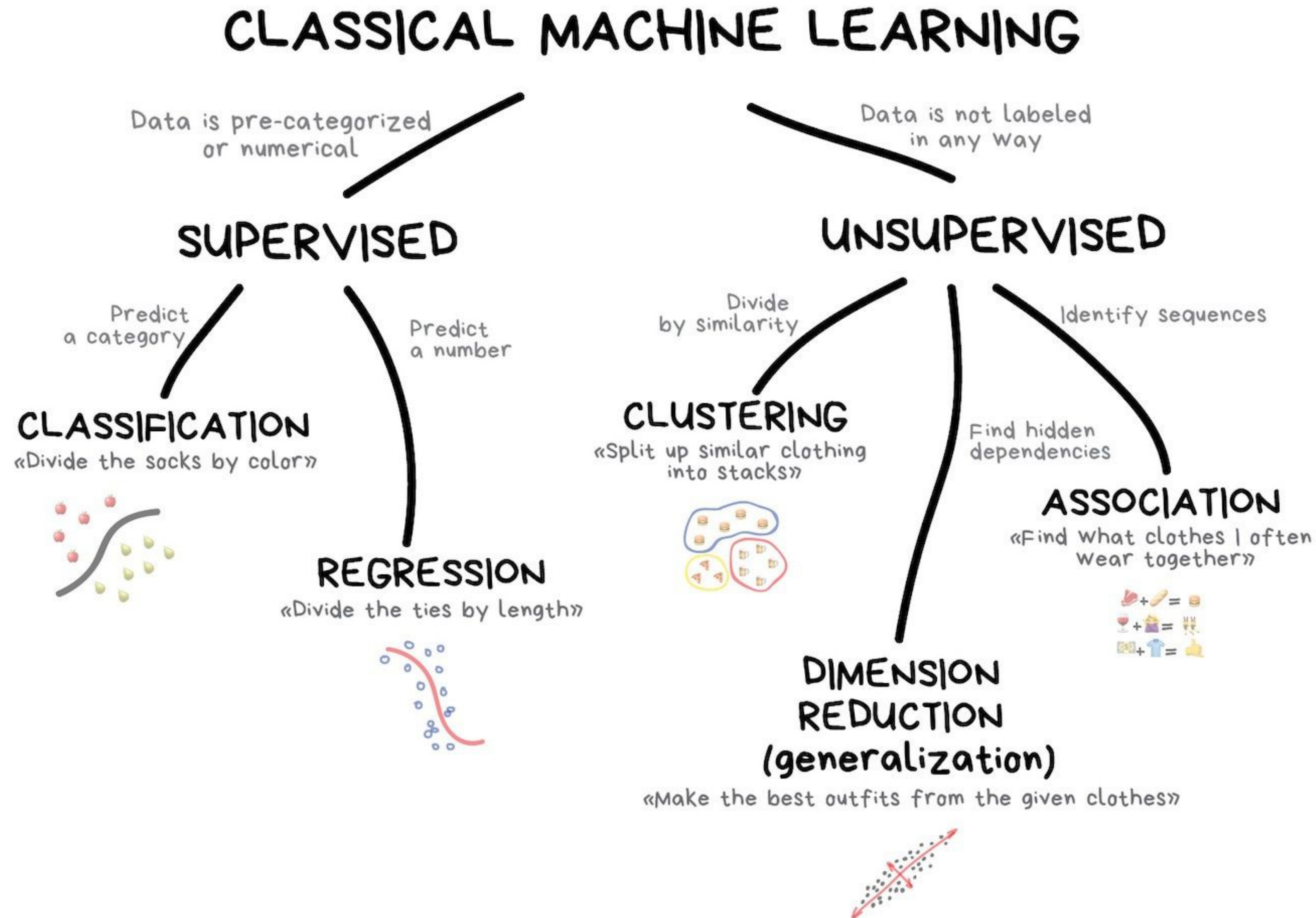
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Support Vector Machines K Nearest Neighbors

by Saturdays AI

Get ready for the future AI!

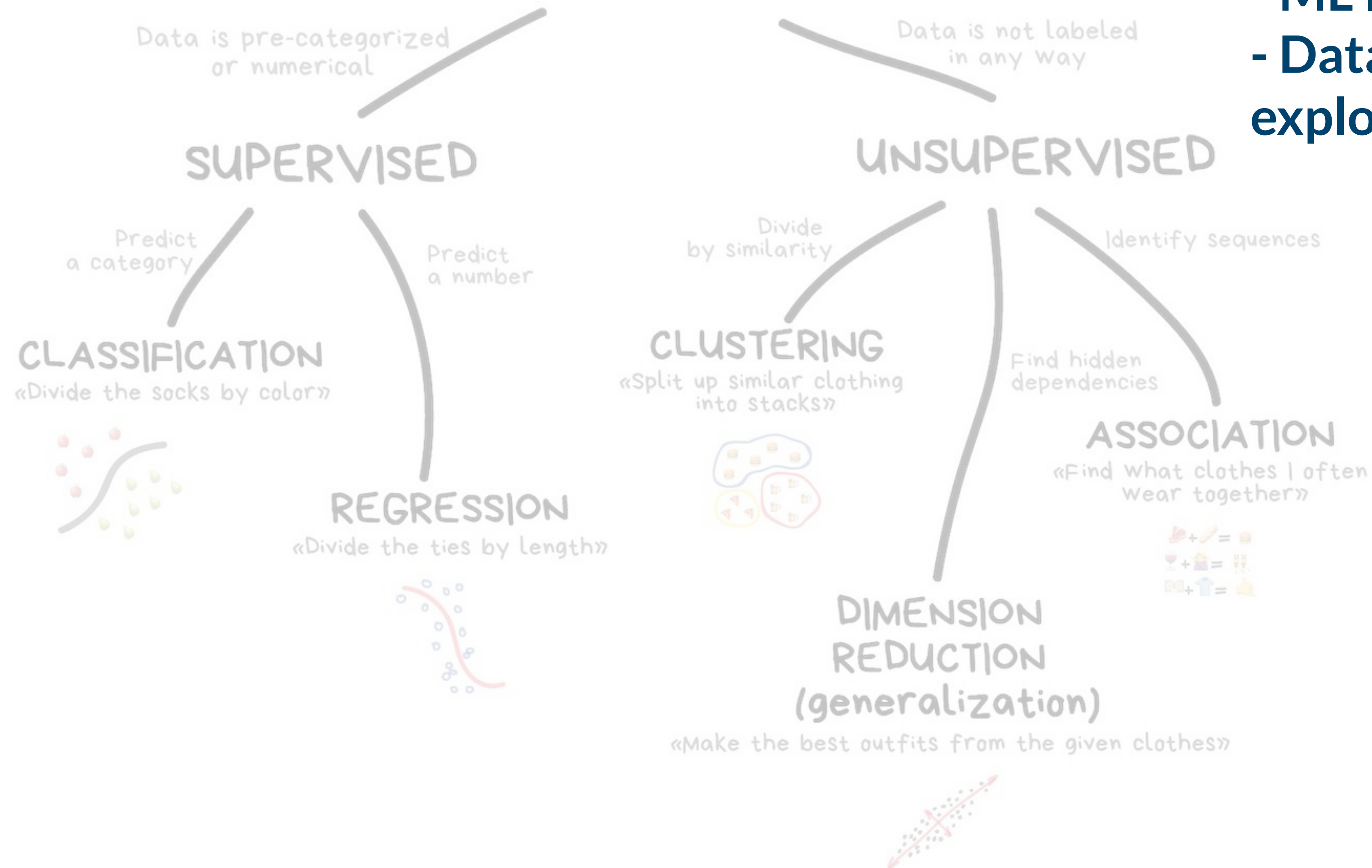
Machine Learning Overview



Machine Learning recap

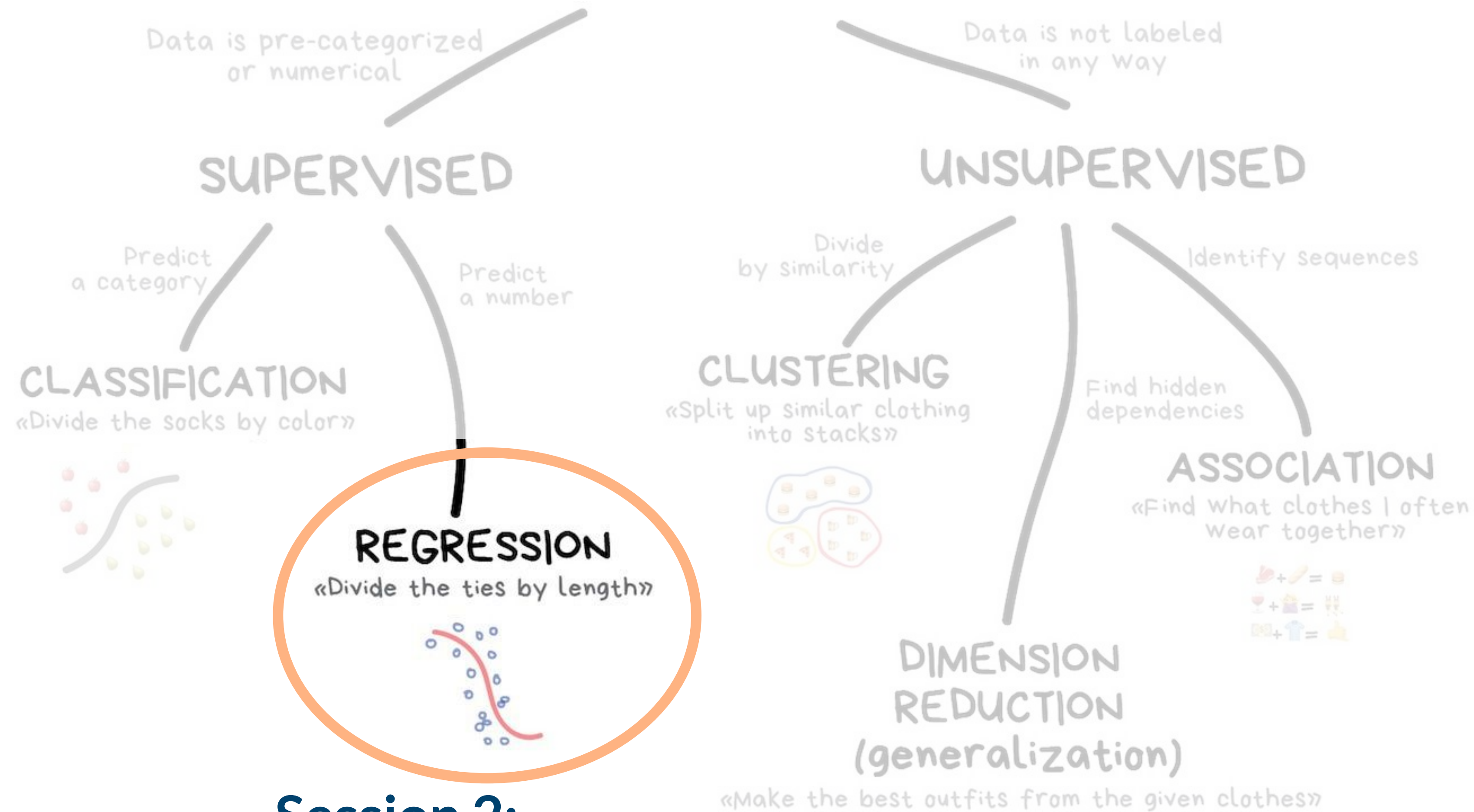
CLASSICAL MACHINE LEARNING

Session 1:
- ML Intro
- Data cleaning & exploratory



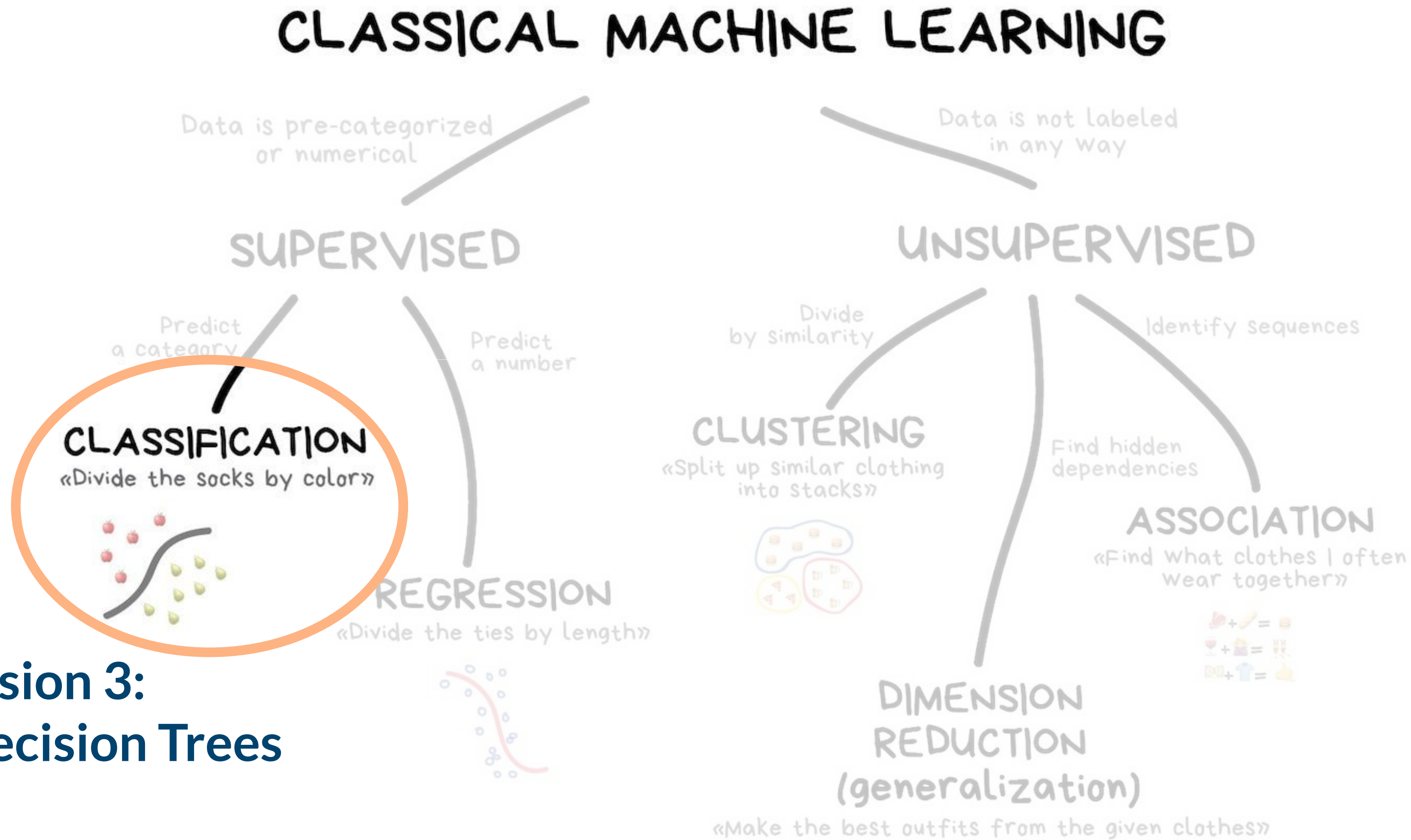
Machine Learning recap

CLASSICAL MACHINE LEARNING



Session 2:
-Logistic regression

Machine Learning recap

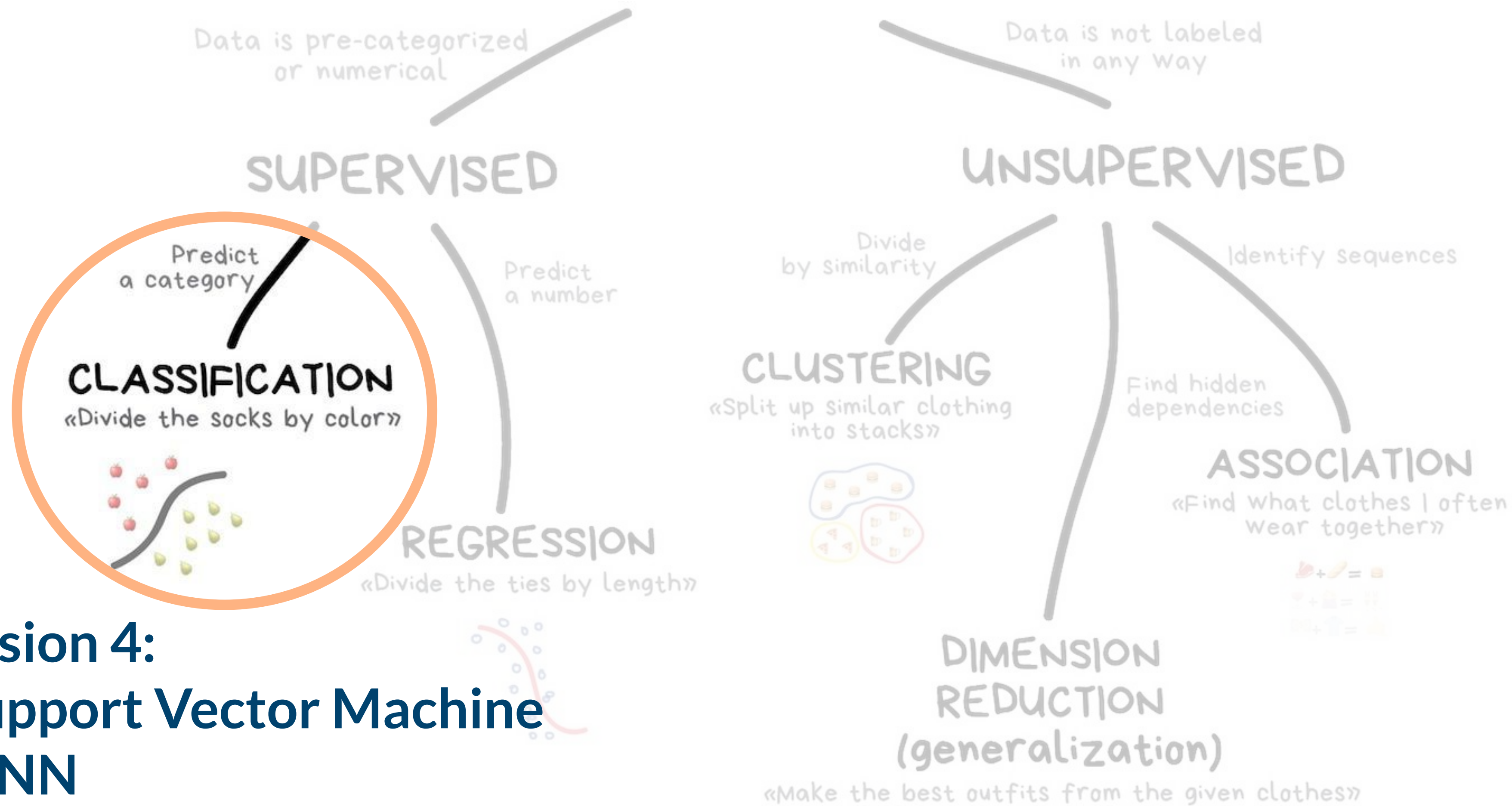


Session 3:
- Decision Trees

- Random Forest (Ensemble methods)
- Boosting (Ensemble methods)

Machine Learning recap

CLASSICAL MACHINE LEARNING



Session 4:

- Support Vector Machine
- k-NN

AI Saturdays

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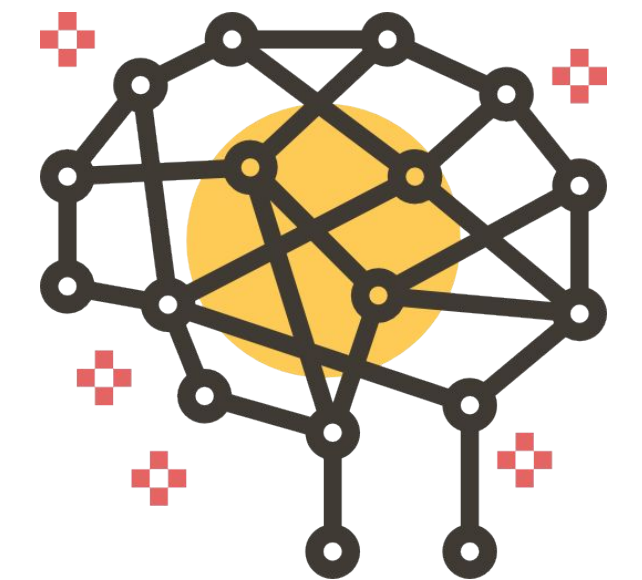
Aimed at getting you to kick ass in AI

Structured study groups going through materials actually used at top universities like Stanford and Berkeley. Bring some python skills, your laptop and lots of passion to start learning.

Food and snacks will be provided thanks to our sponsors!

Not too familiar with coding? Do not worry.
Come on **March 3rd** for an intro to python for data science and linear algebra.

EXPERIENCE
PERSONAL
/TUTORIAL



Today

9:30h

Support Vector Machines

10:30h

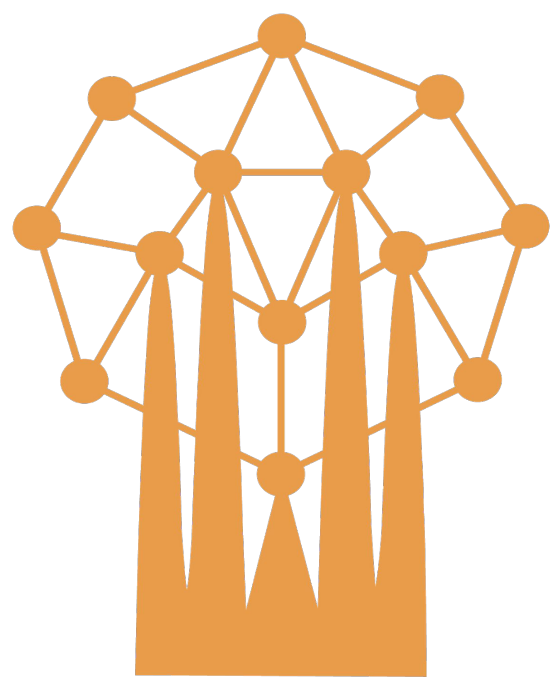
k Nearest Neighbors

11:30h

Coffee break

12:30h

Classification Challenge



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Classification: Support Vector Machines

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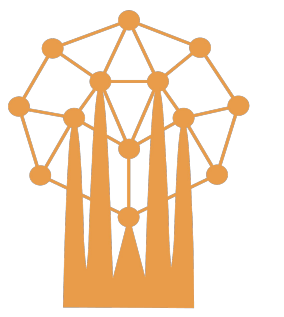
Get ready for the future AI!

What is Support Vector Machines ?

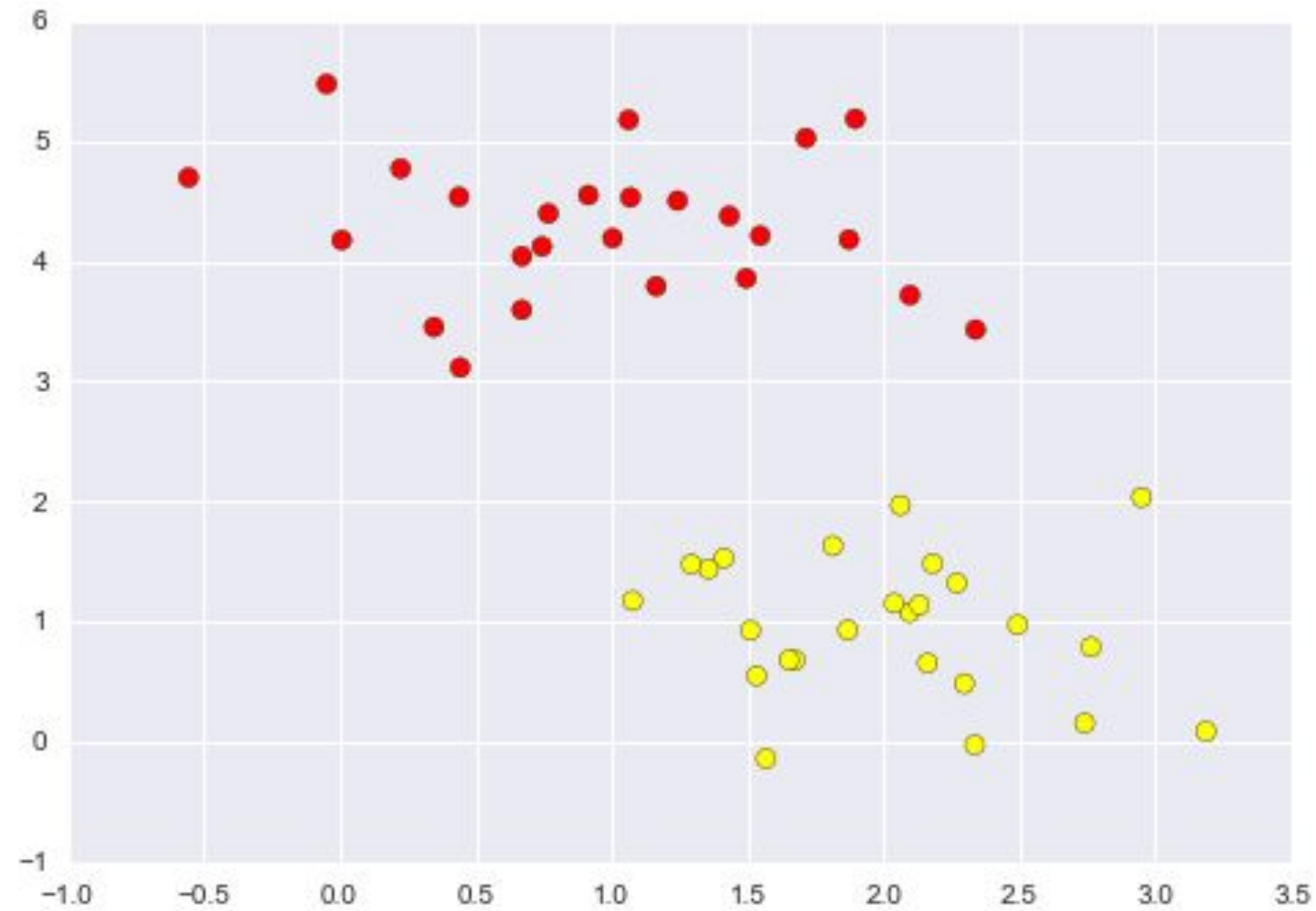
We learned a simple model describing the distribution of each underlying class, and used these generative models to probabilistically determine labels for new points. That was an example of generative classification.

Today, we will consider instead discriminative classification: rather than modeling each class, we simply find a line or curve (in two dimensions) or manifold (in multiple dimensions) that divides the classes from each other.

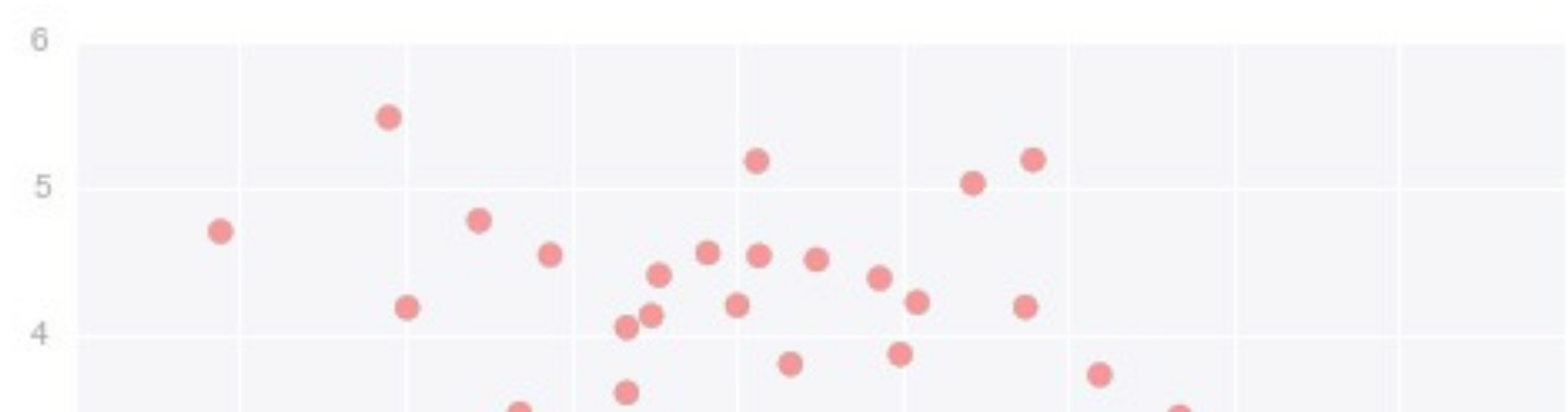
Support Vector Machines



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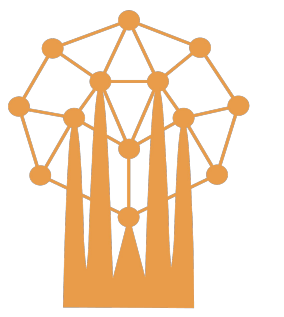
Support Vector Machines



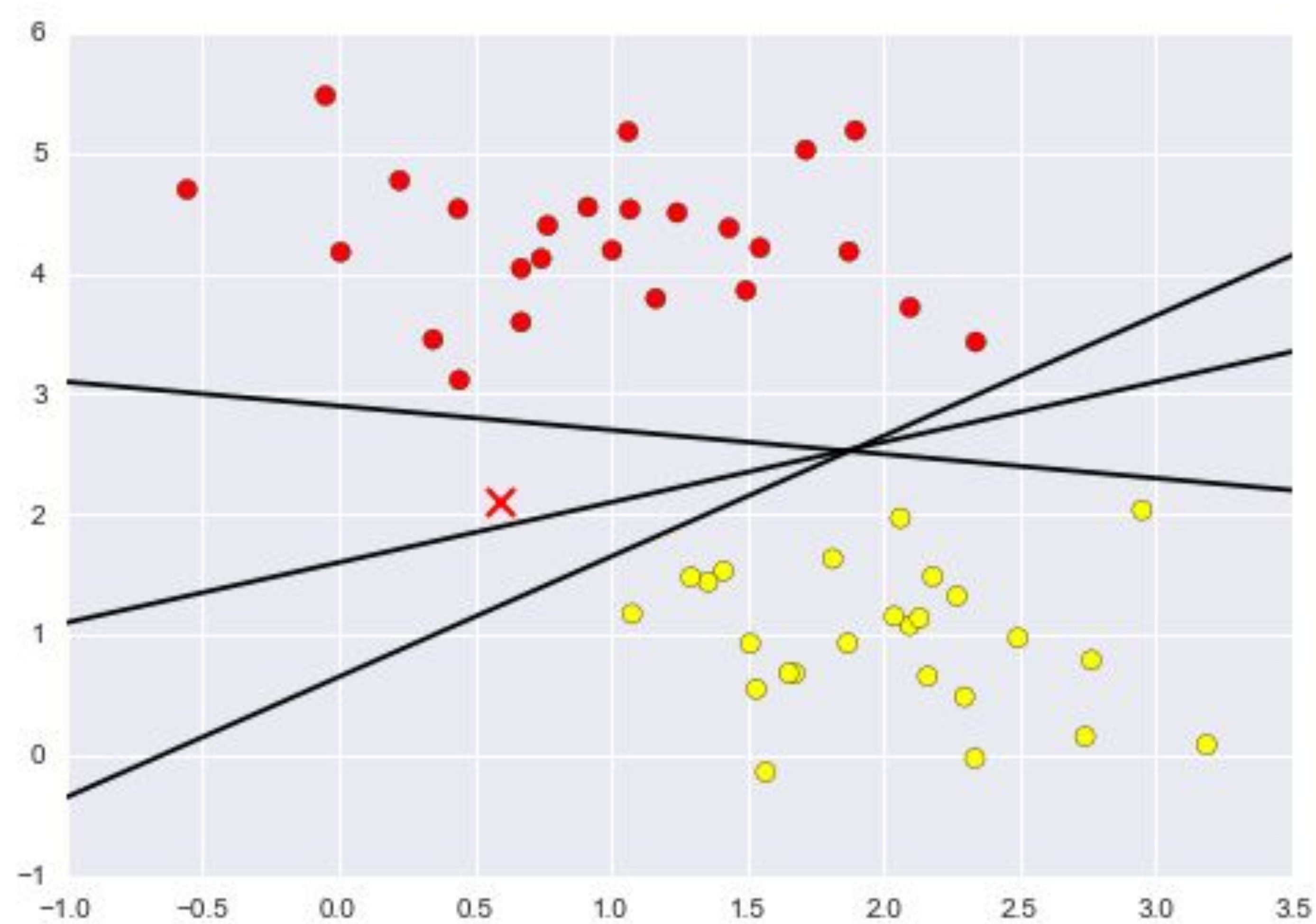
Separation of groups by “drawing a line”



Support Vector Machines



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Support Vector Machines



Support Vector Machines (SVM) are a way to optimize “drawing the line”

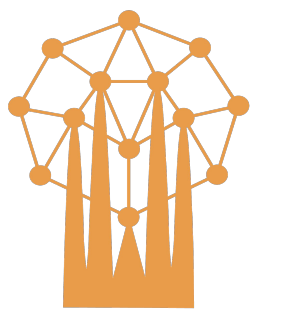


Support Vector Machines

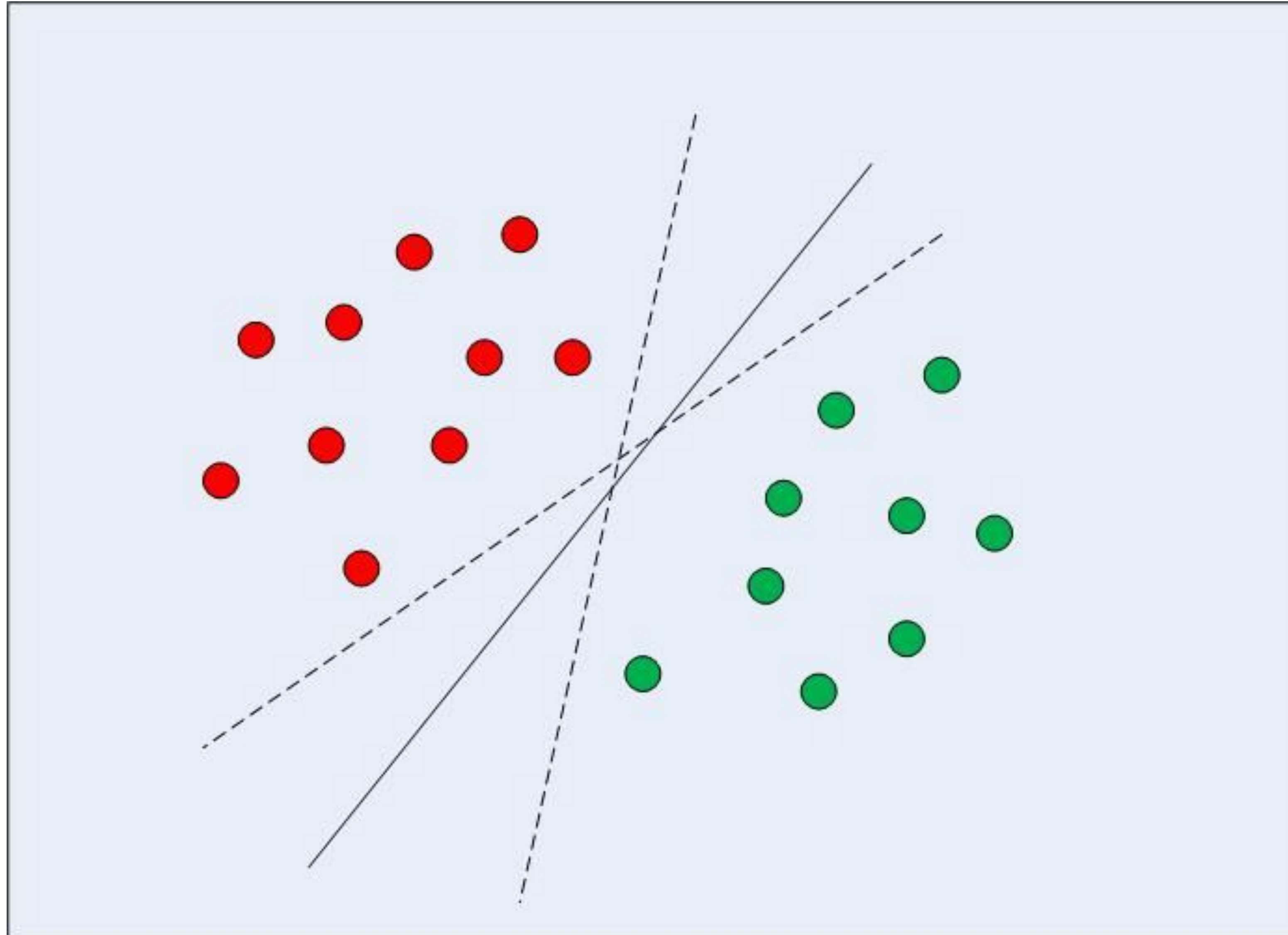
Two main ideas:

- Drawing the line of separation
- Margin around the line

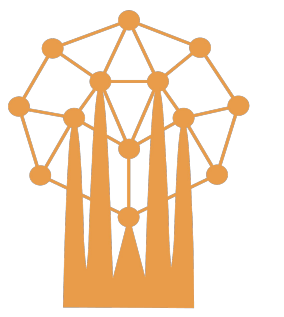
Support Vector Machines



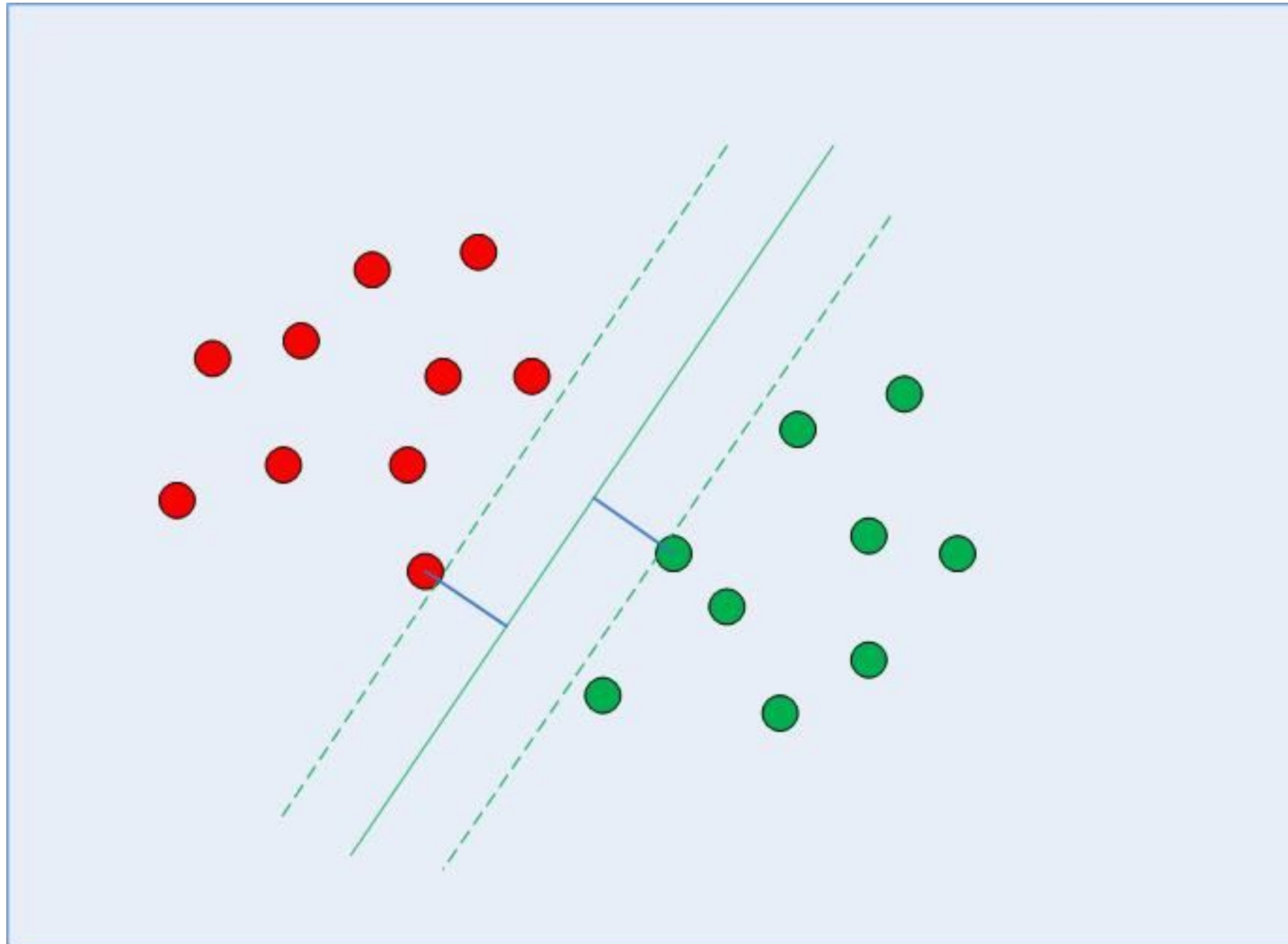
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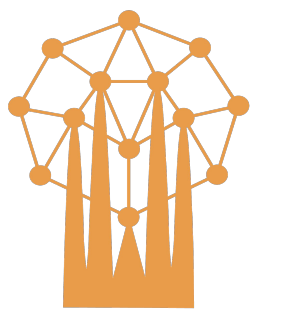
Support Vector Machines



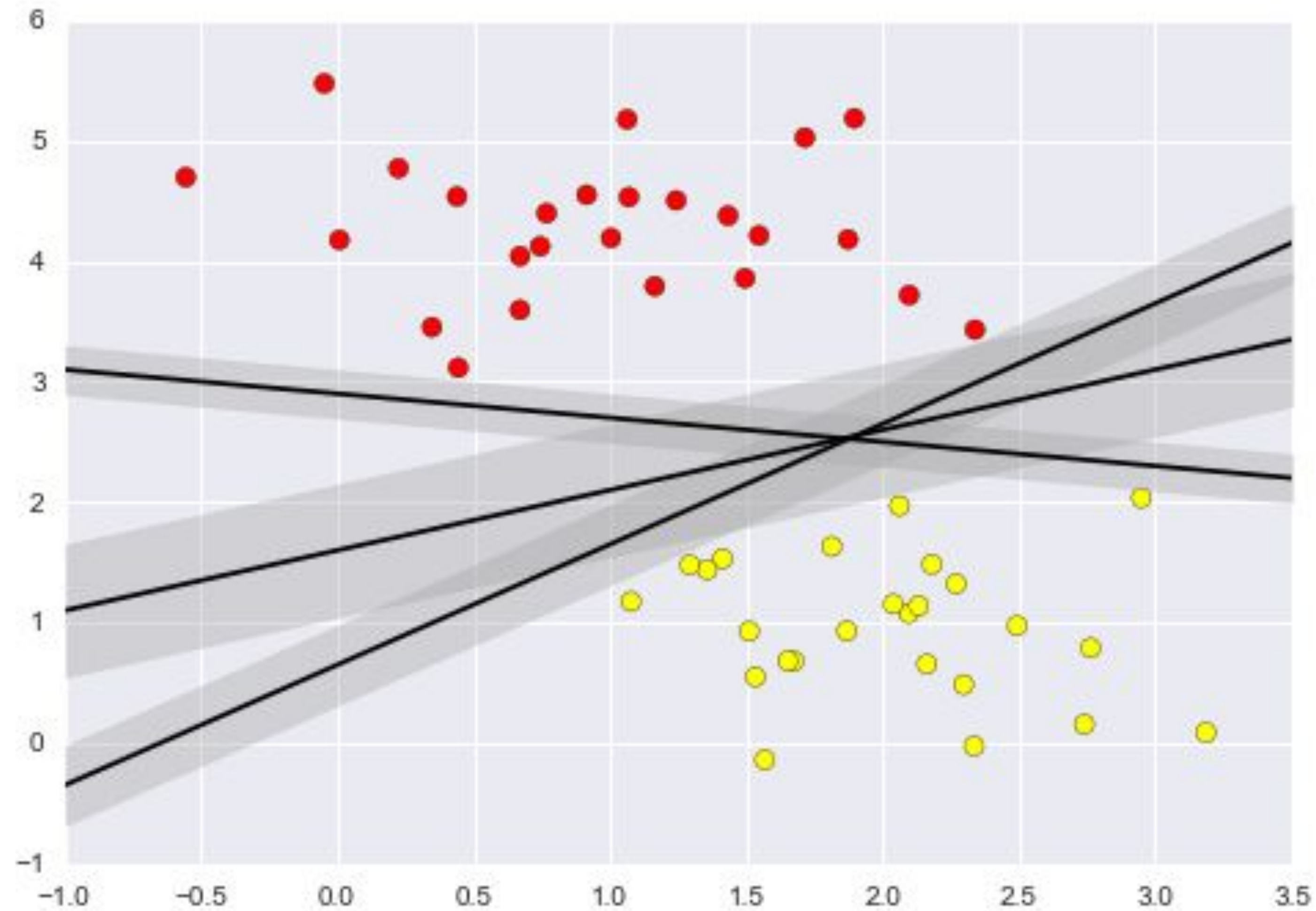
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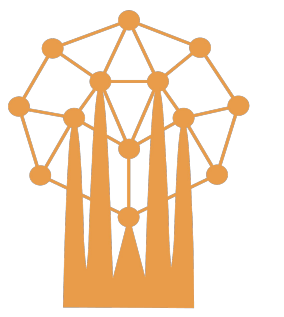
Support Vector Machines



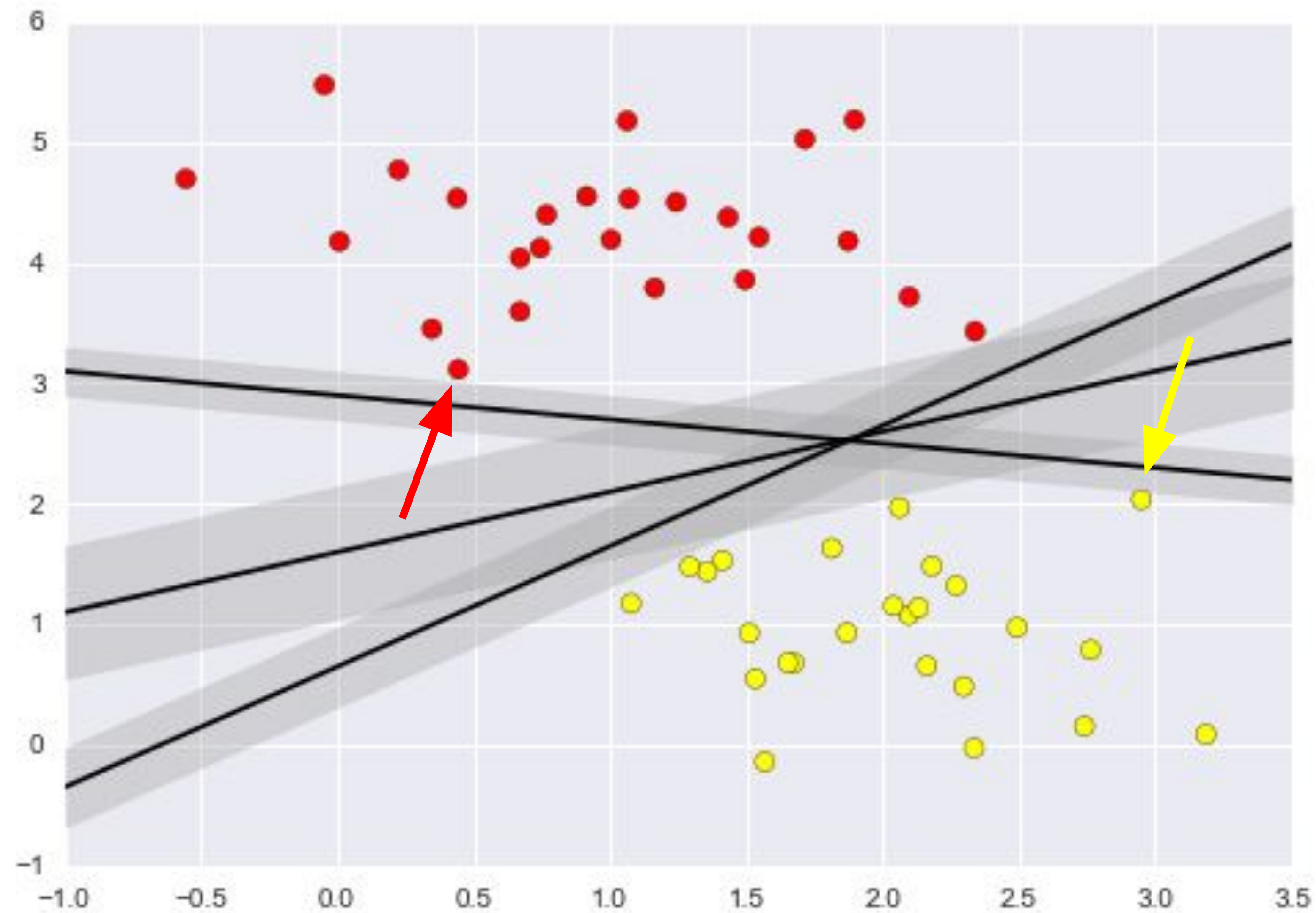
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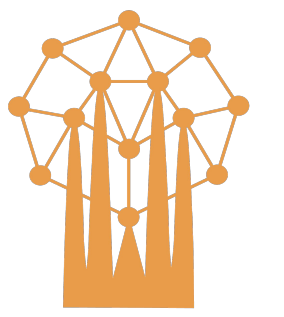
Support Vector Machines



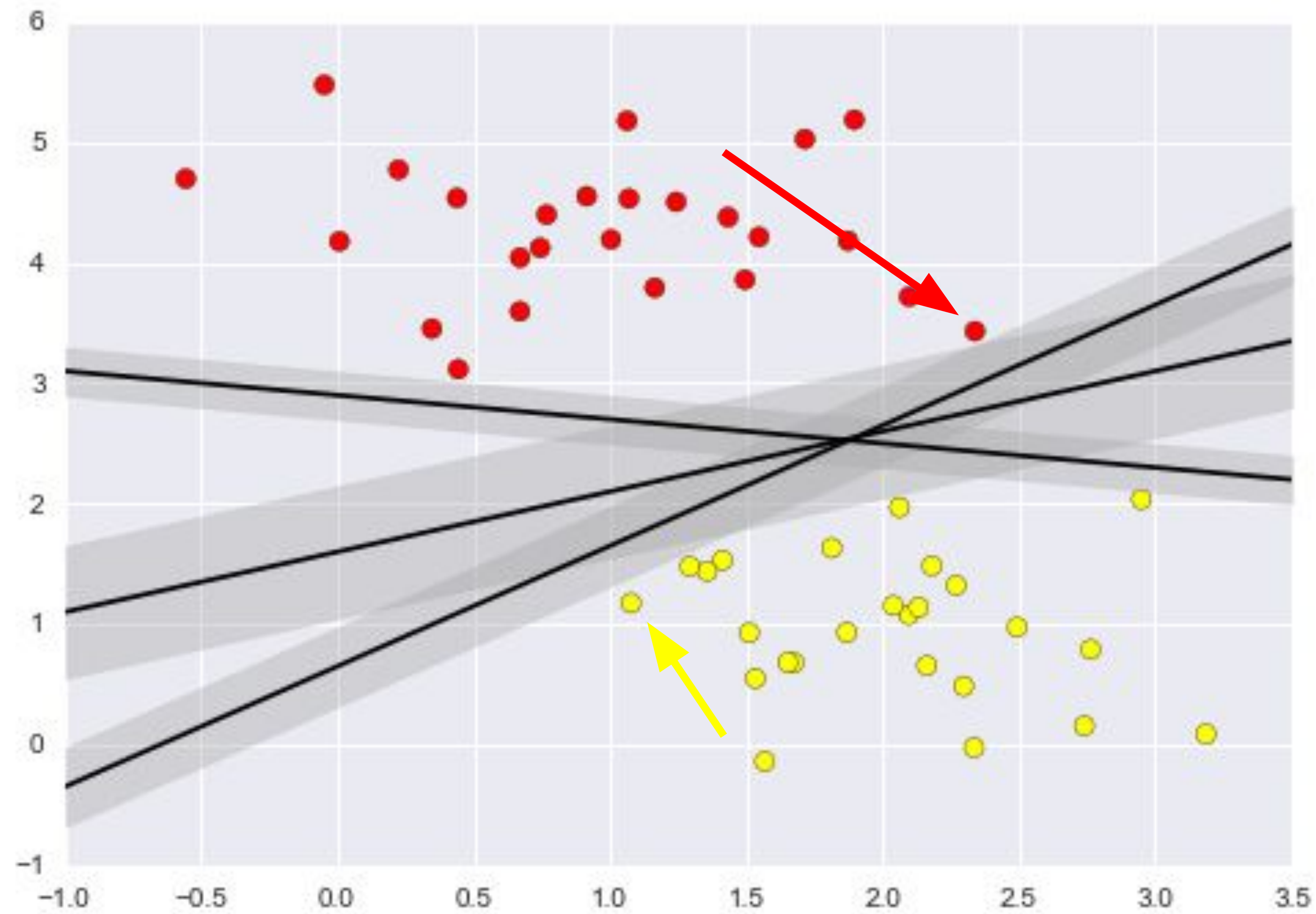
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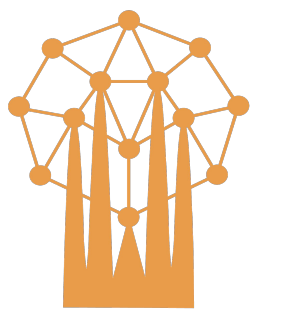
Support Vector Machines



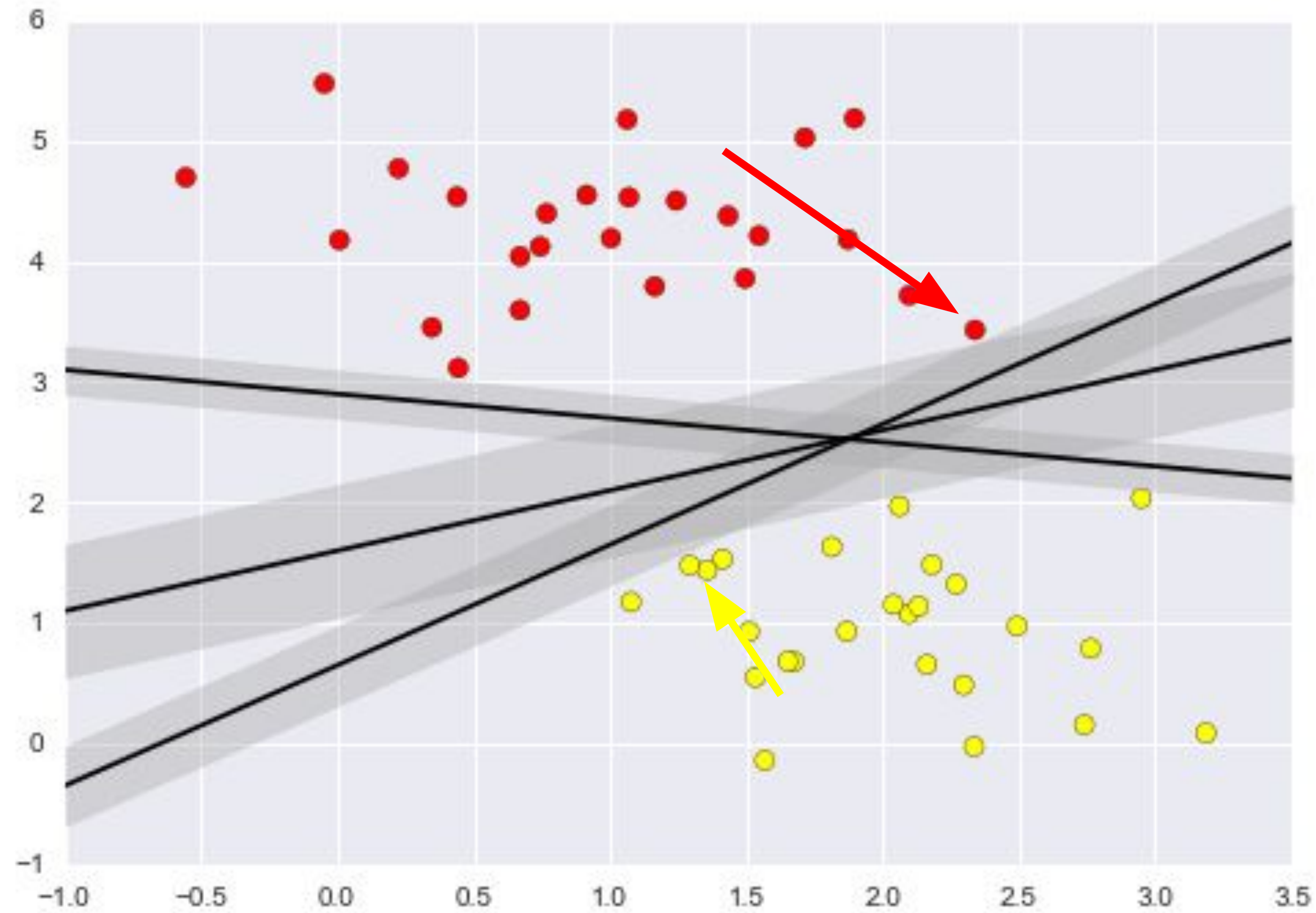
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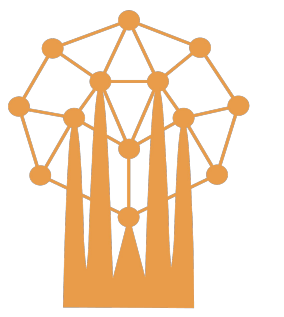
Support Vector Machines



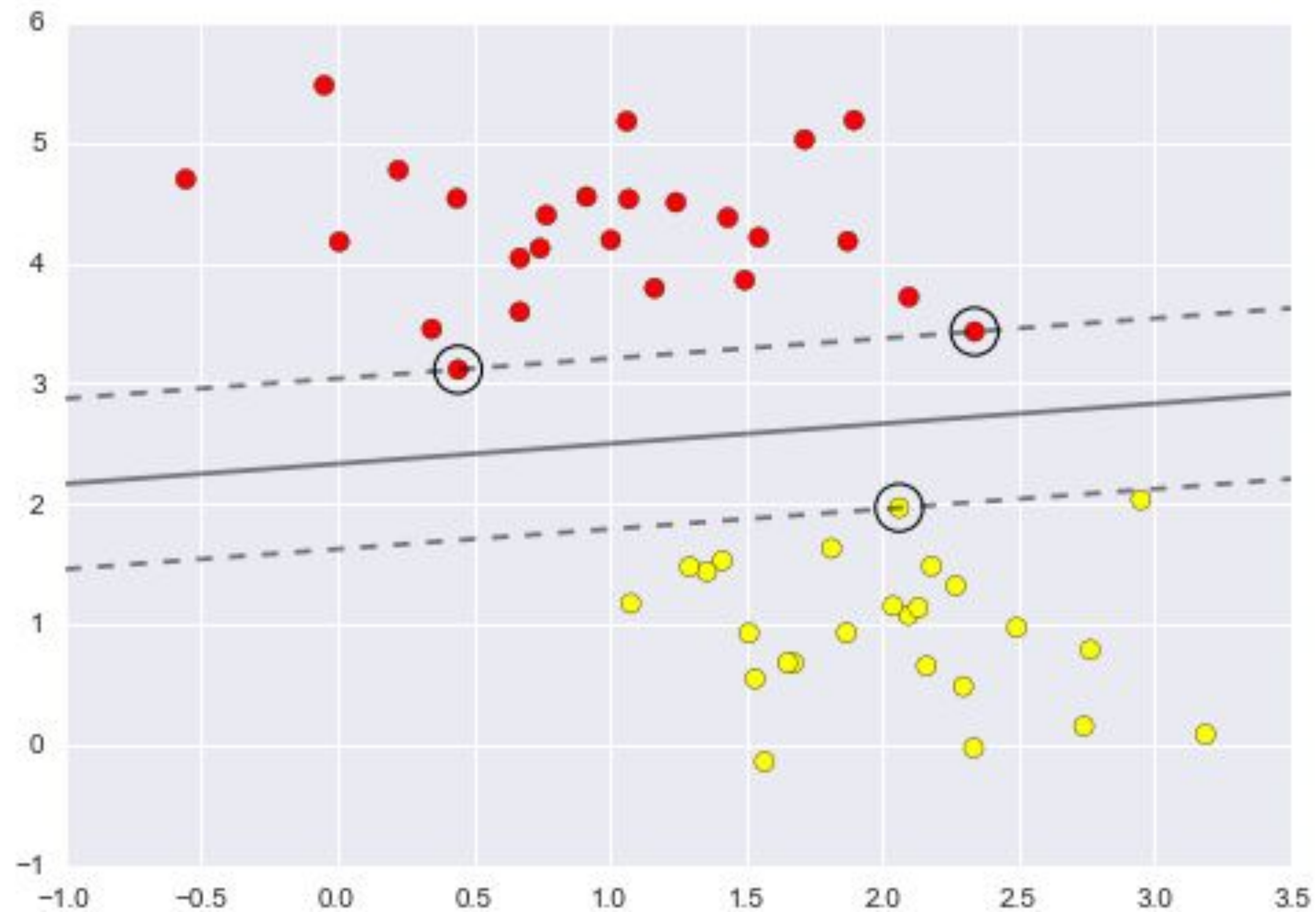
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Support Vector Machines

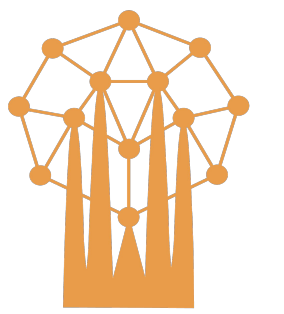


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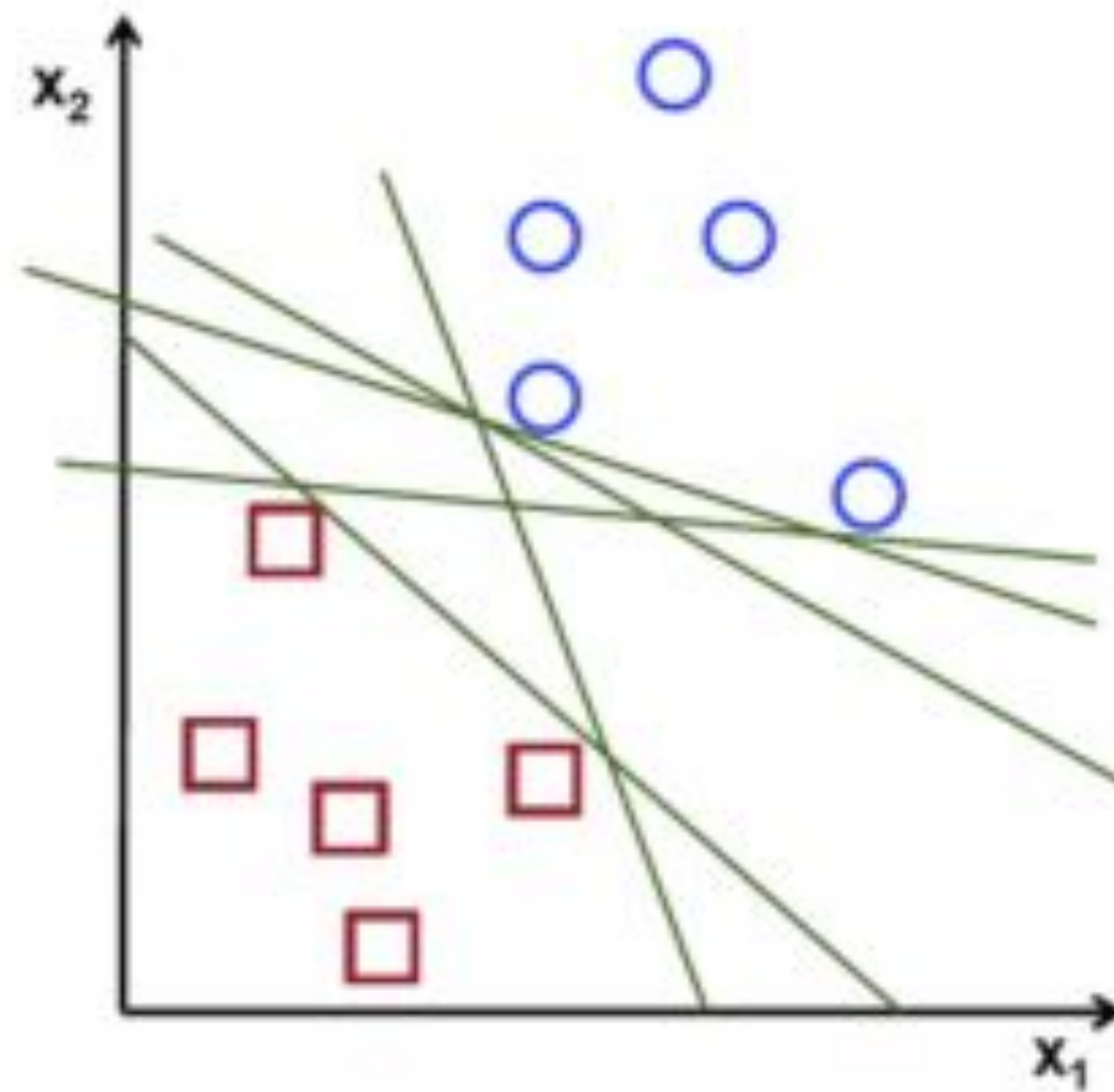


Dividing line that
maximizes the margin
between the two sets
of points

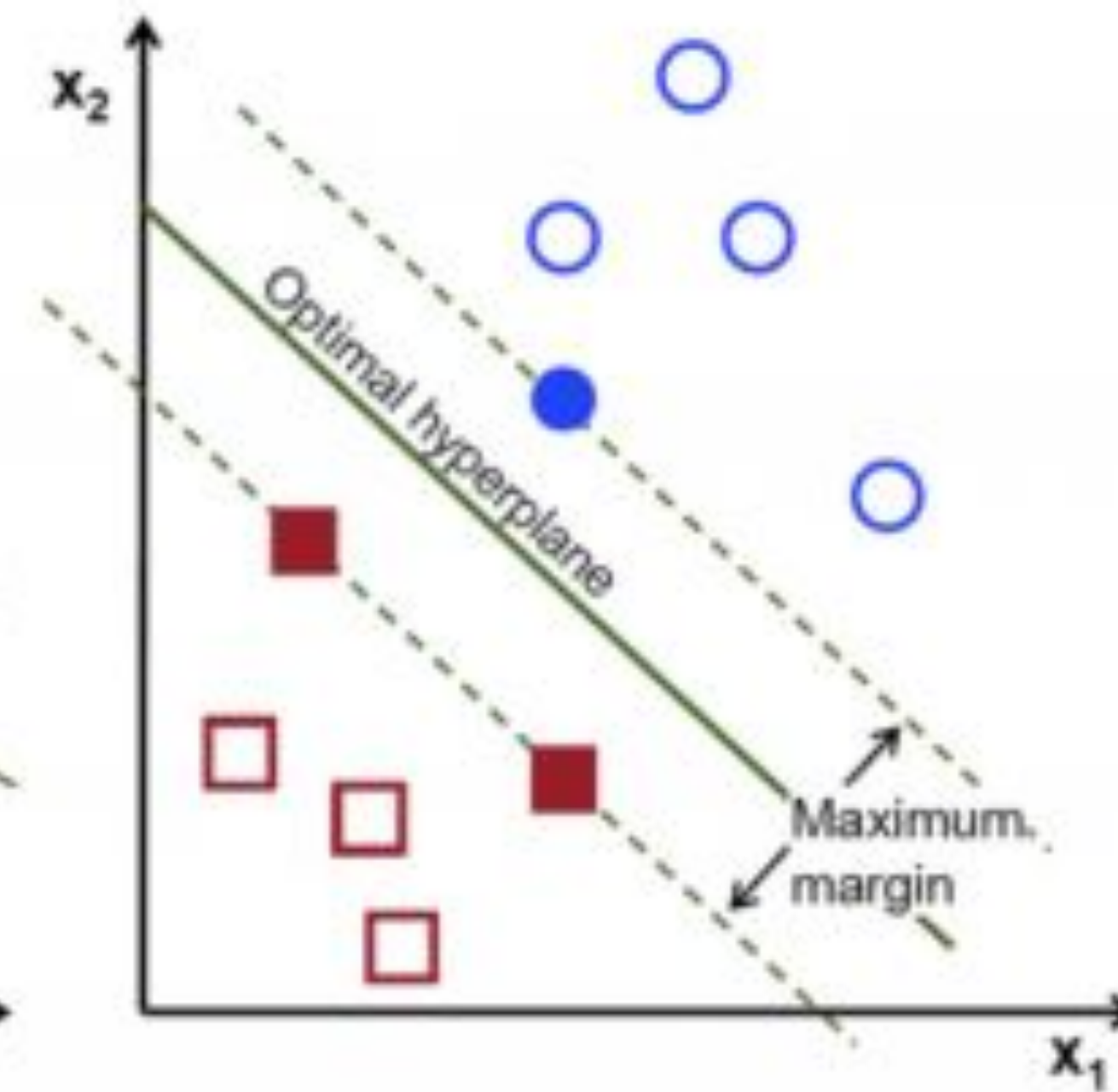
Support Vector Machines



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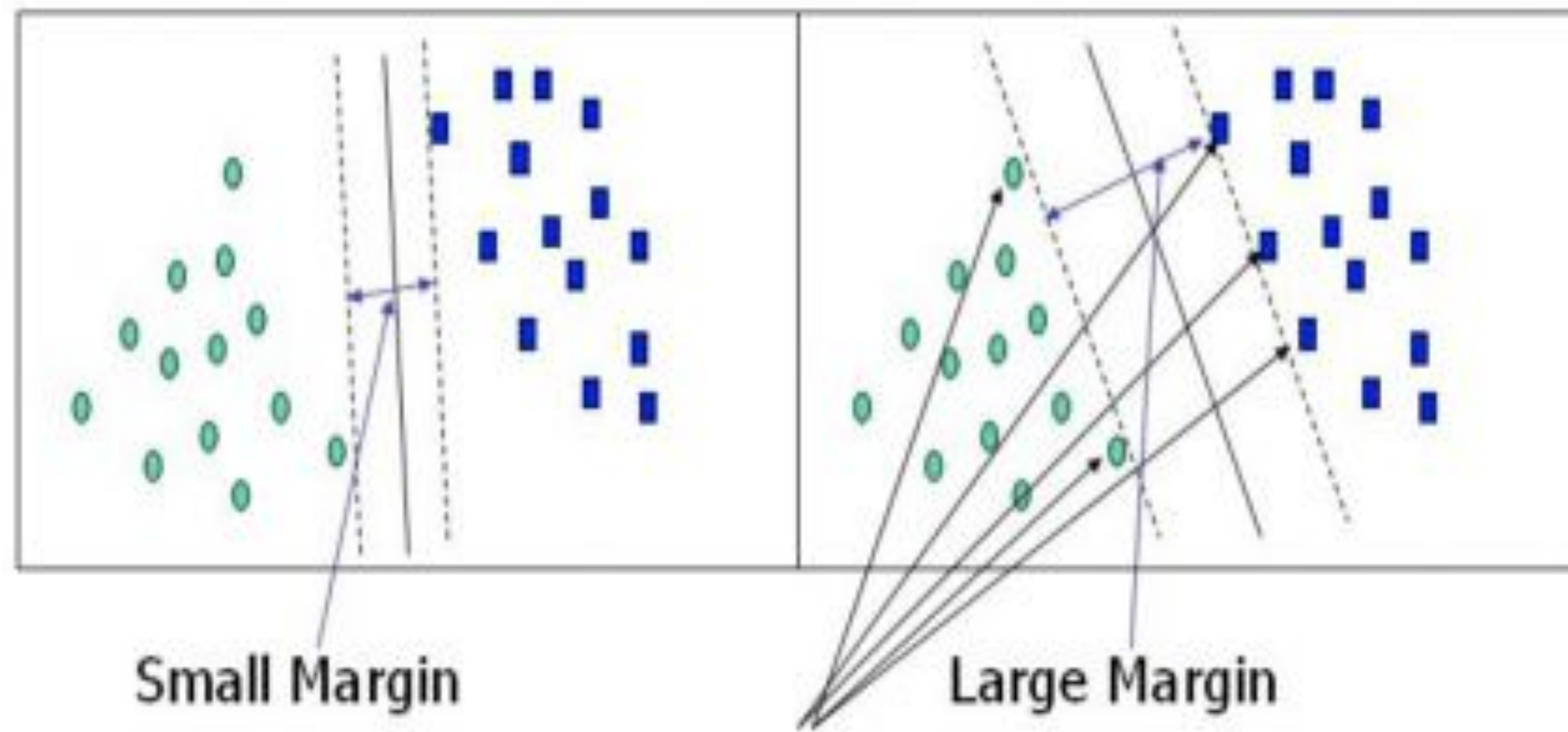
Possible hyperplanes



Optimal hyperplane

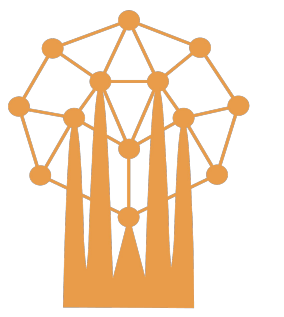
Support Vector Machines

Maximization of the margin

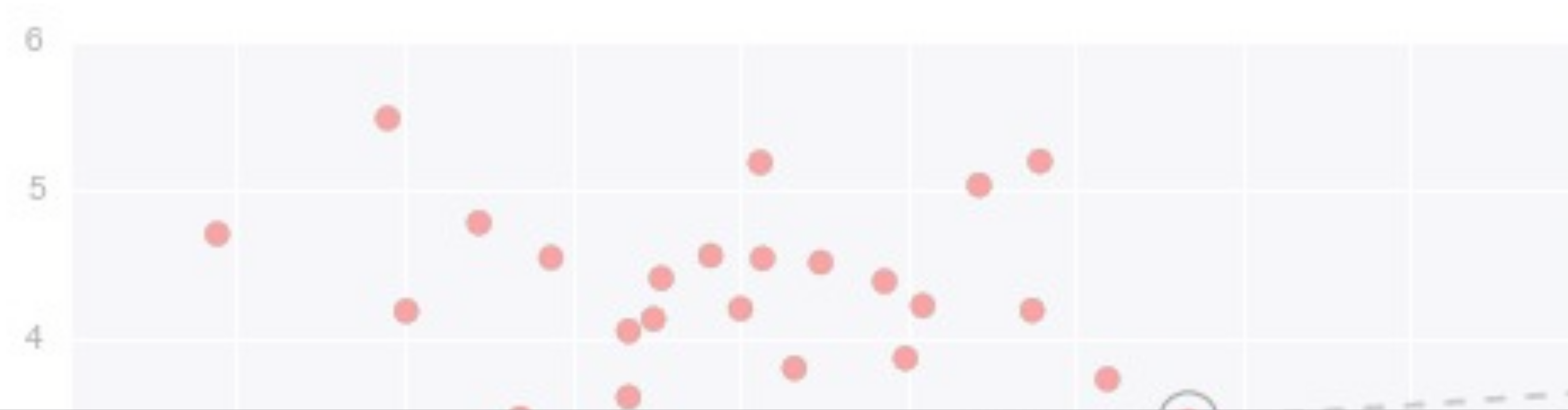


Support Vectors

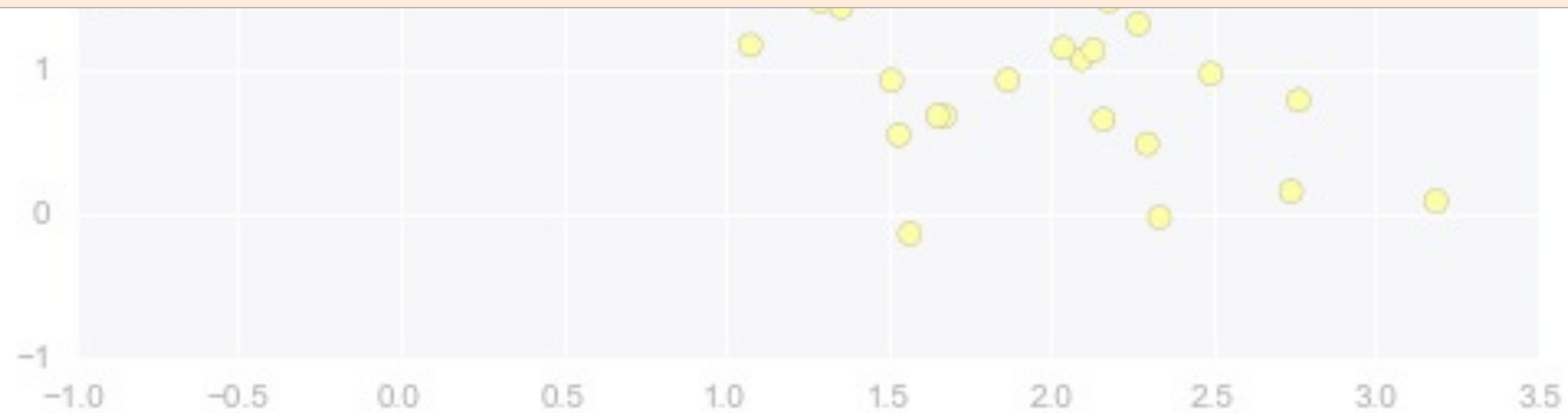
Support Vector Machines



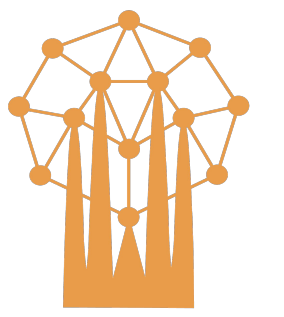
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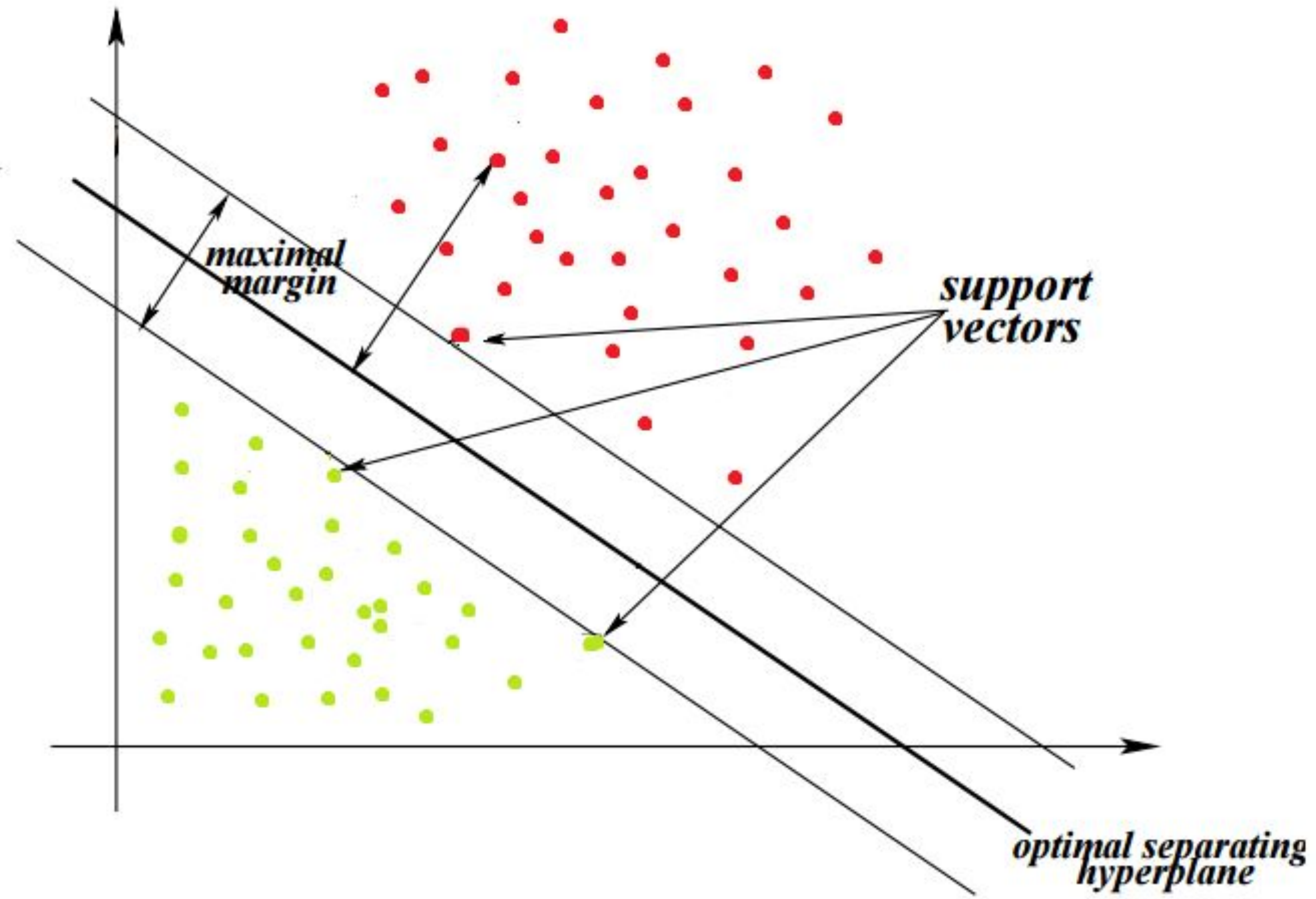
Dividing line that maximizes the margin between the two sets of point



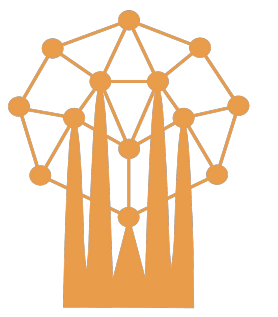
Support Vector Machines



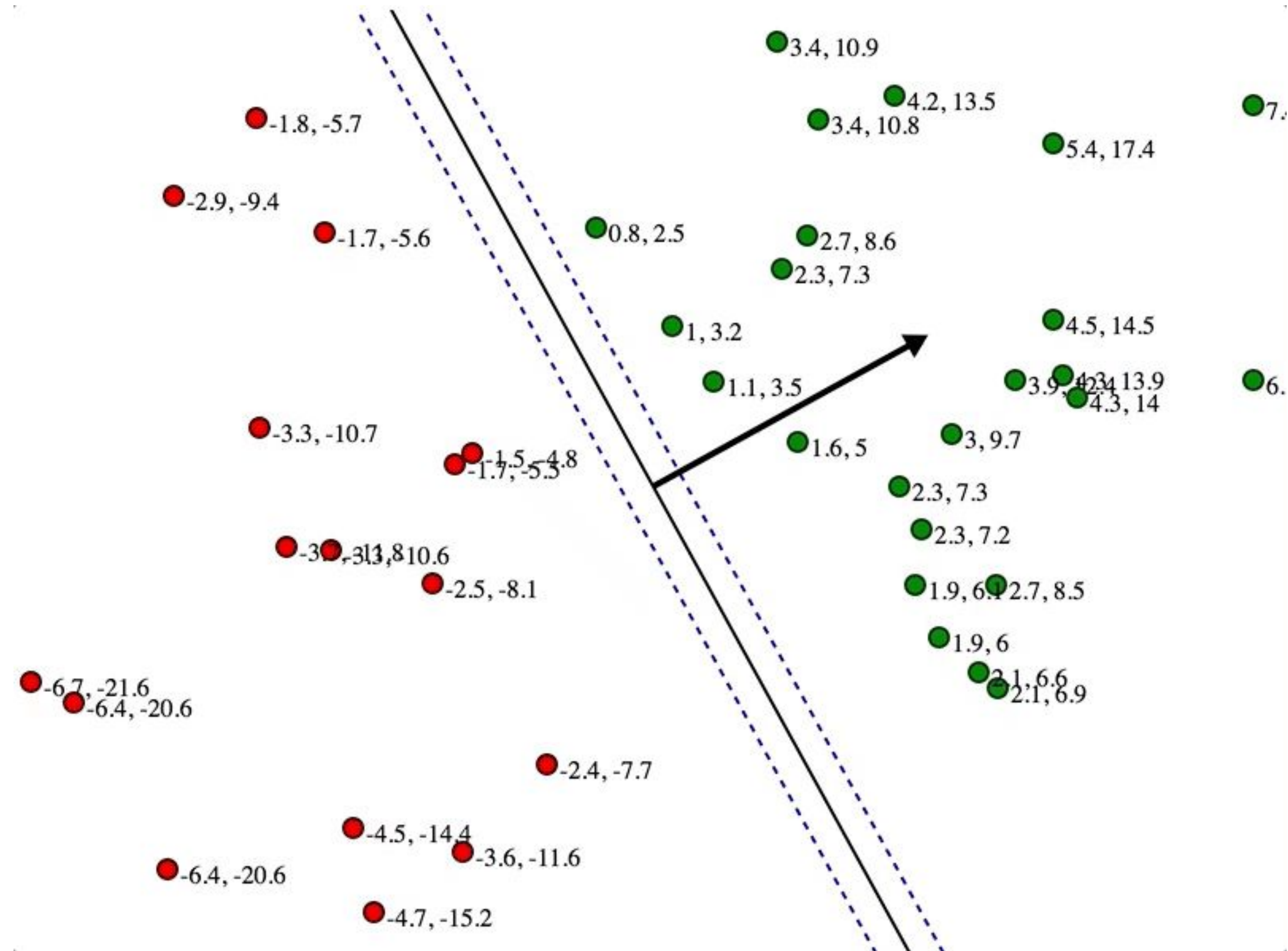
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Support Vector Machines

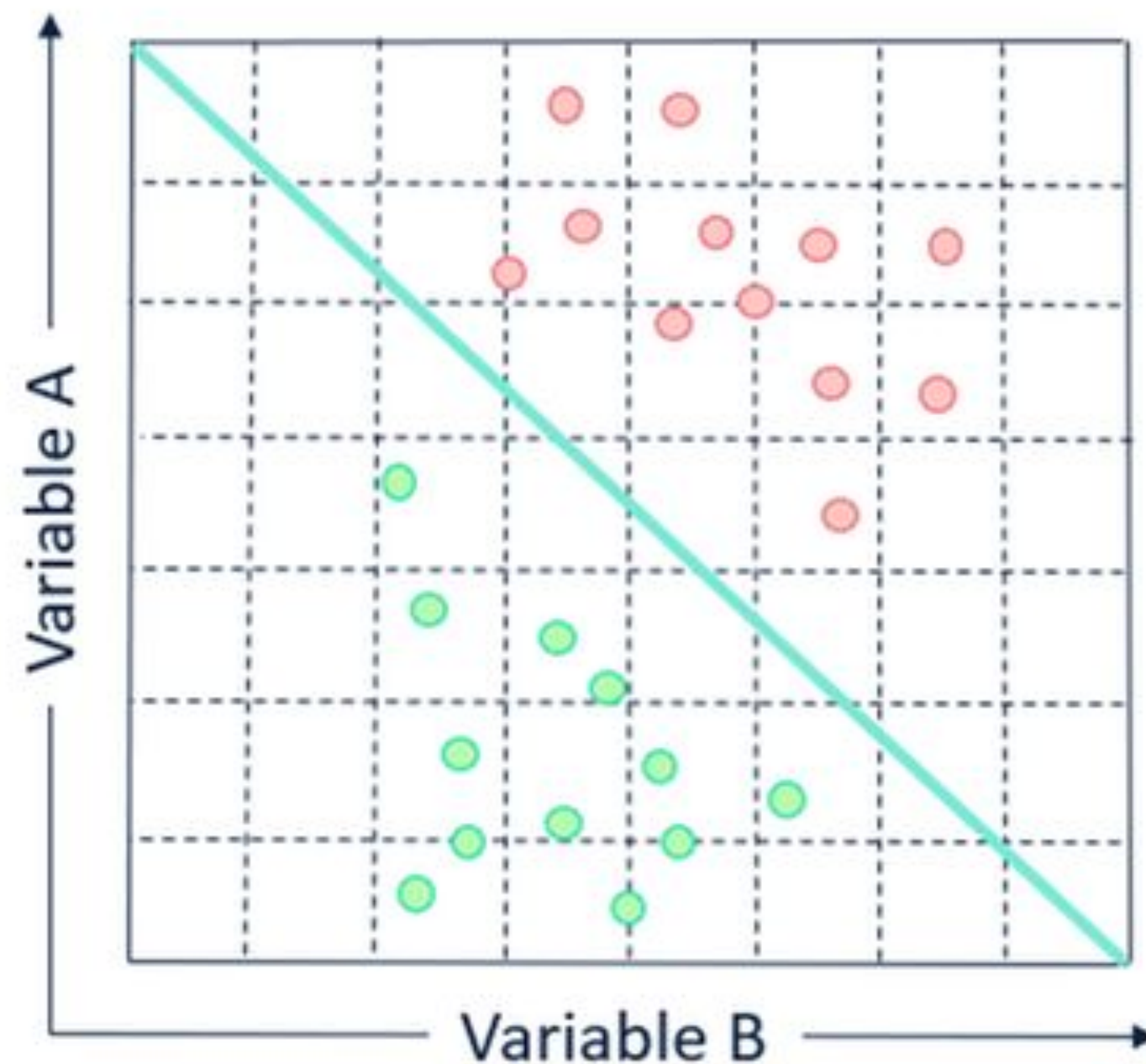


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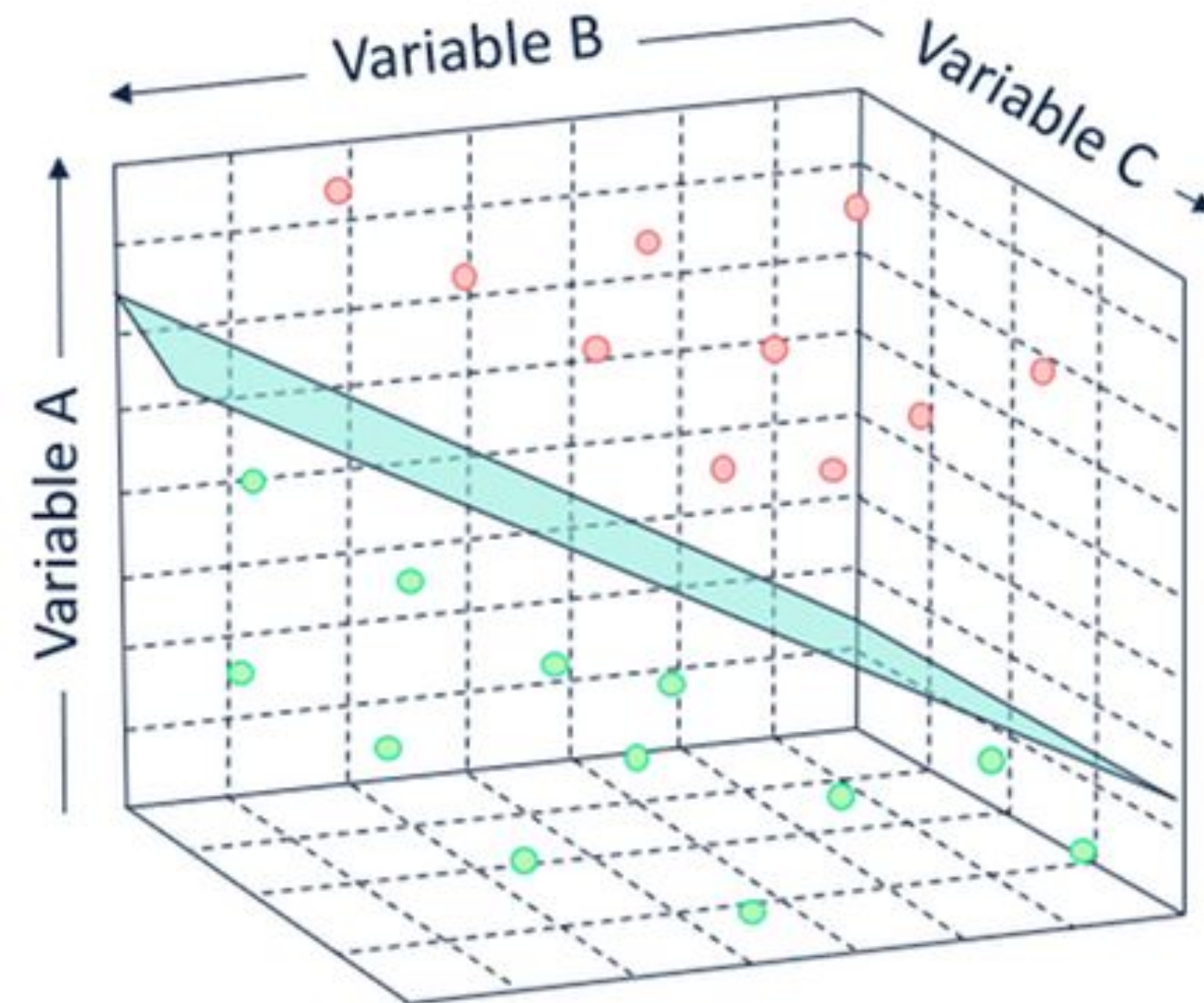


Support Vector Machines

Buscar un video que se vea SVC en tres dimensiones.

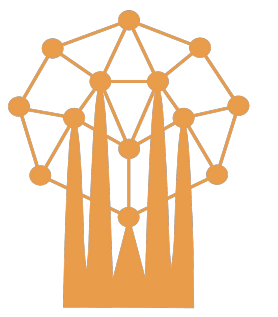


2-Dimensional Problem Space

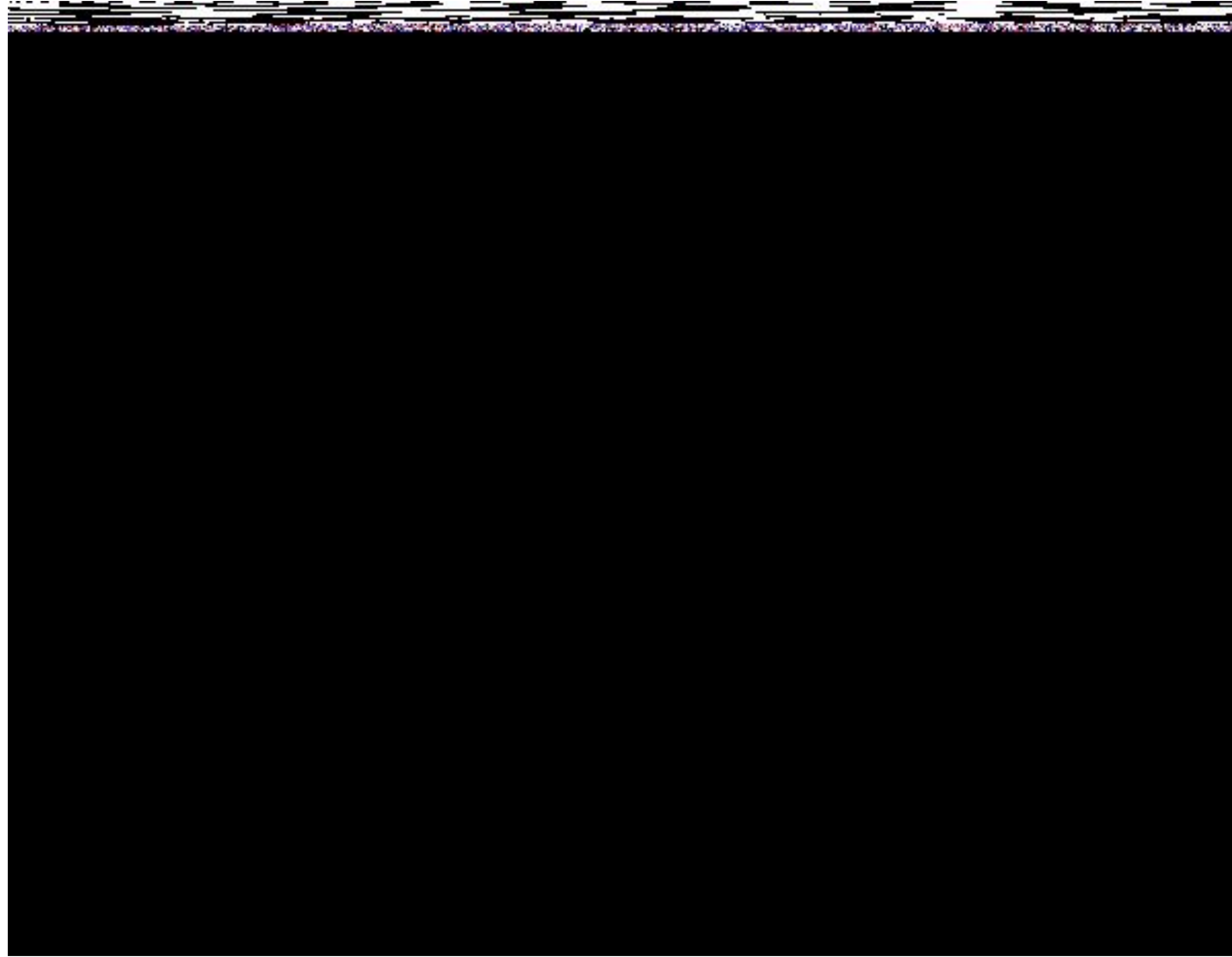


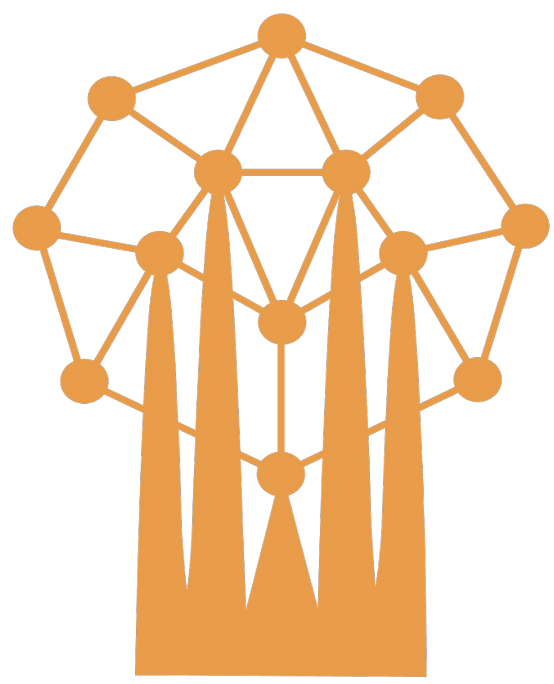
3-Dimensional Problem Space

Support Vector Machines



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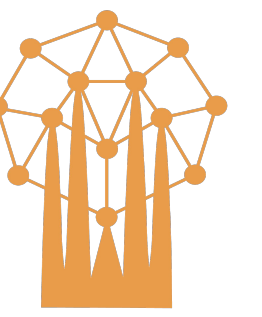
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Classification: K-Nearest Neighbors

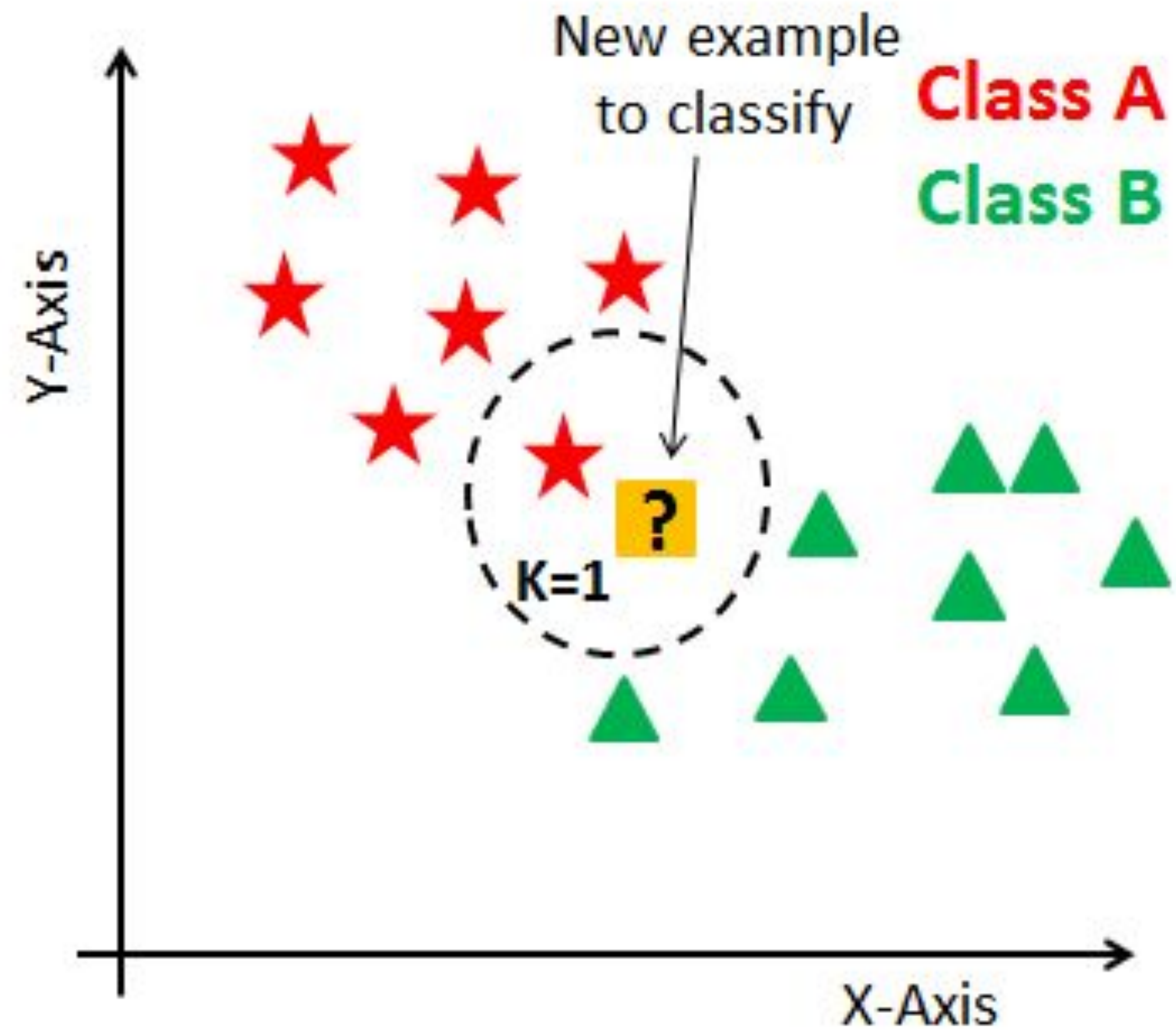
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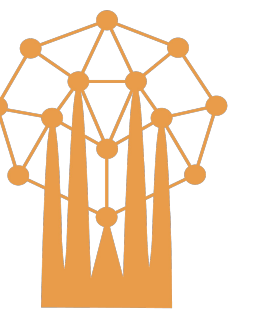
KNN



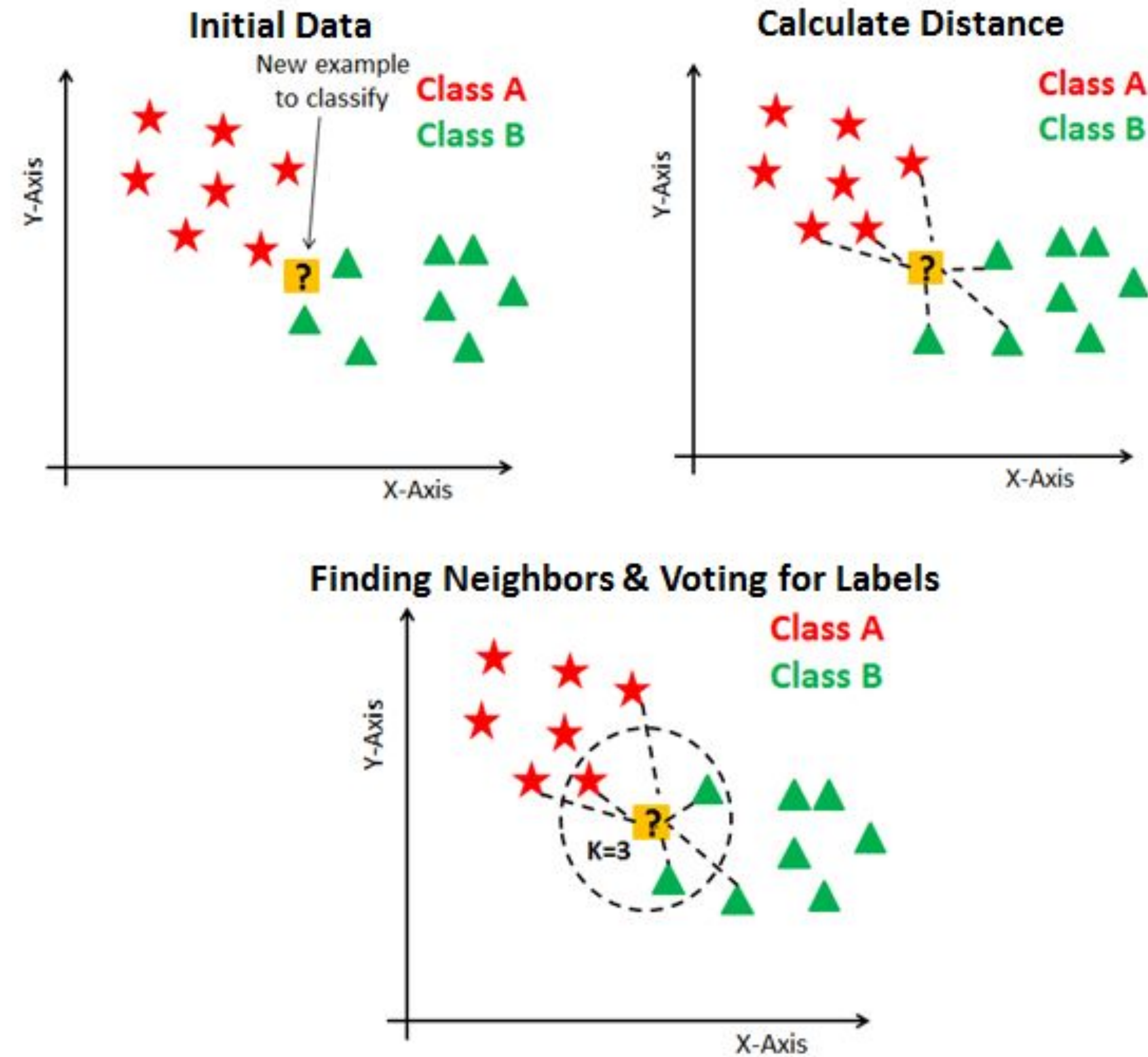
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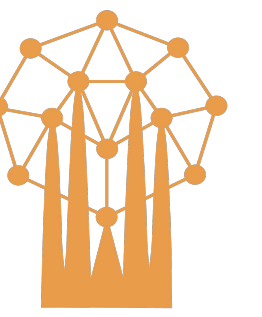
KNN



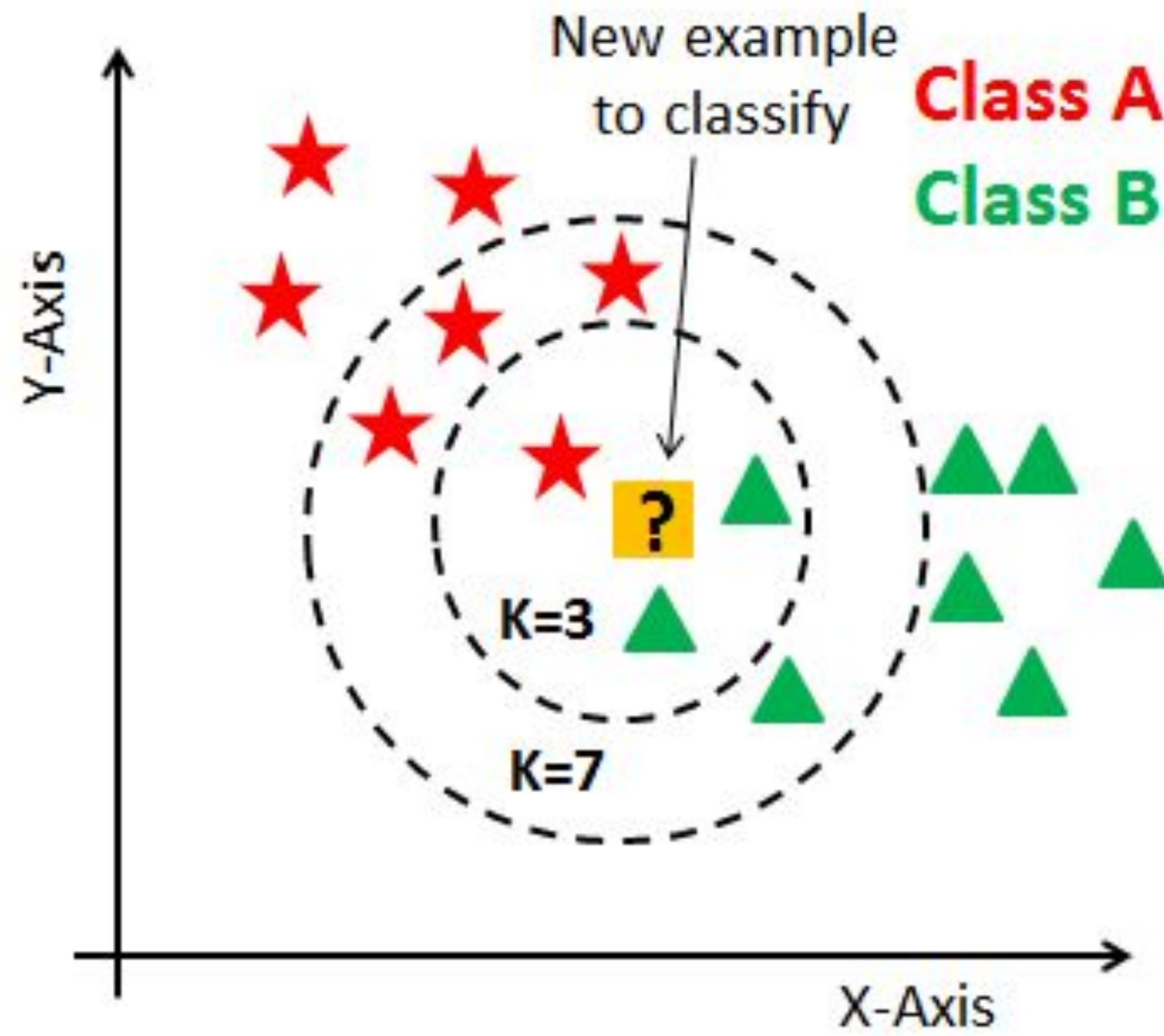
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KNN



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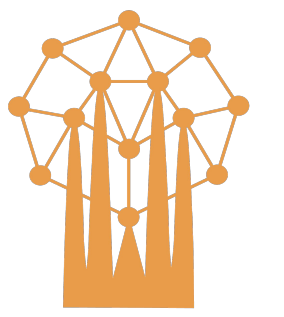


How do you decide the number of neighbors in **KNN**?

KNN is a hyperparameter that you need choose at the time of model building

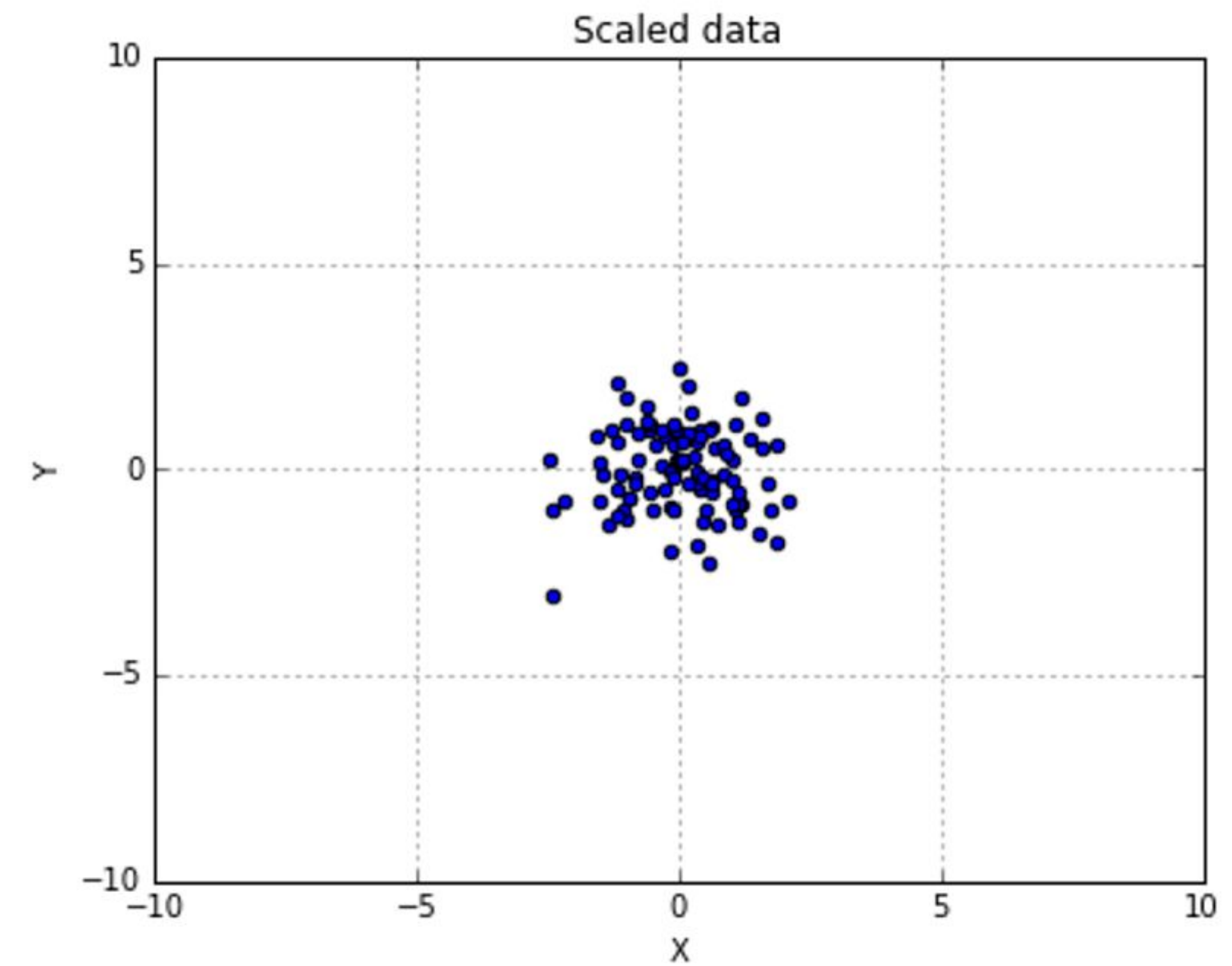
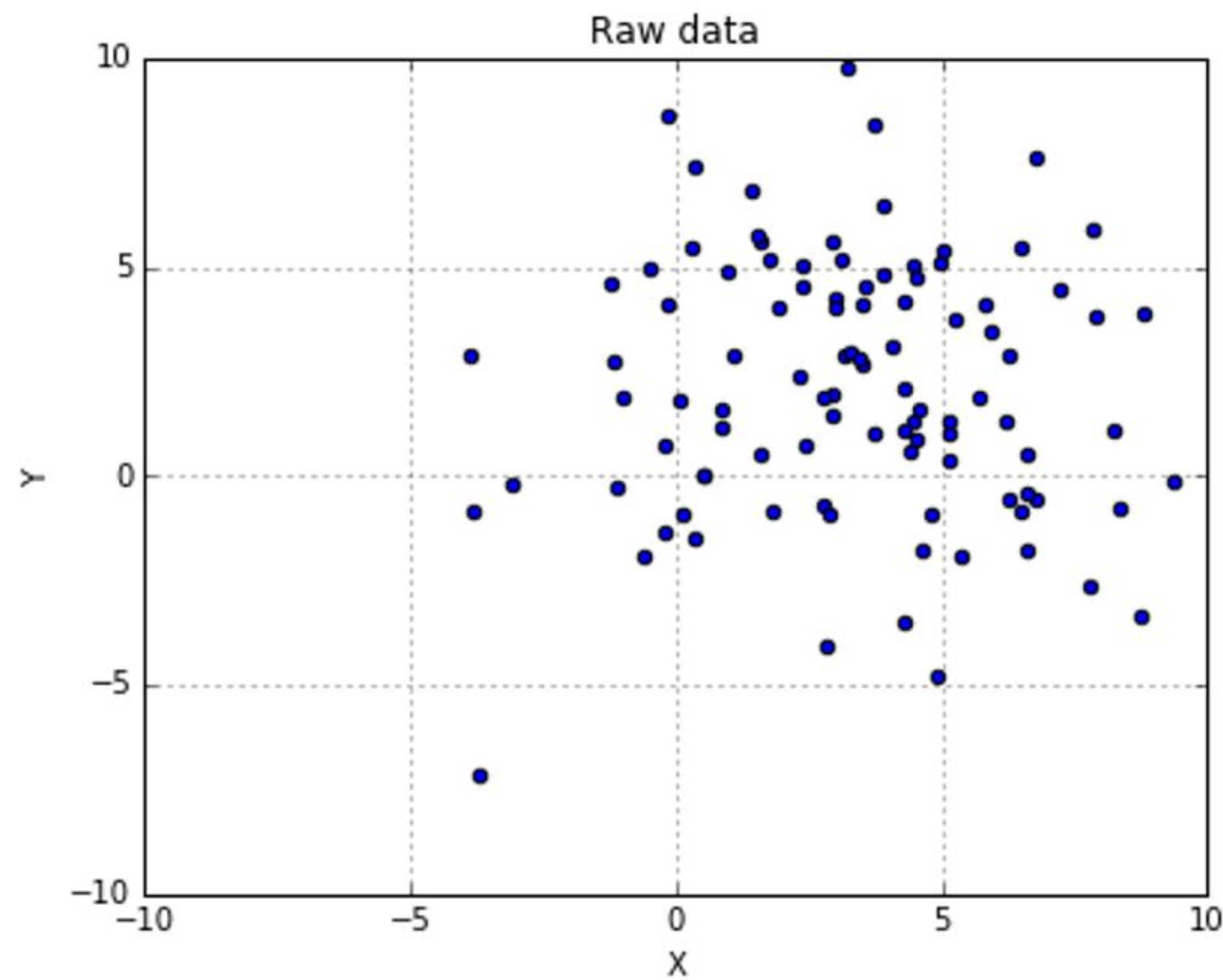
In the case of a small number of neighbors, the noise will have a higher influence on the result, and a large number of neighbors make it computationally expensive.

Improving k-NN



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Normalize data (range 0 -1)



Improving k-NN

Normalize data (range 0 -1)

If large dimensional data → reduce n° of variables

Improving k-NN

Normalize data (range 0 -1)

If large dimensional data → reduce n° of variables

Handling missing values