Online Course on Machine Learning, Deep Learning and Neural Networks

Day 3

Conducted by

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Agenda

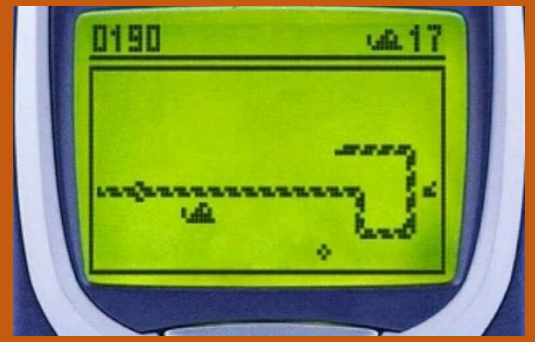
1. Recap of Supervised Learning
2. Introduction to Support Vector Machine (SVM)
3. Code implementation of that

Types of Machine Learning

Supervised Learning

Un-supervised Learning

Reinforcement Learning



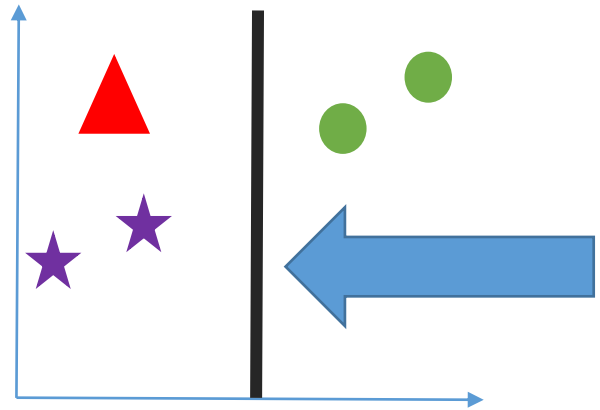
https://in.pinterest.com/pin/257690409914685423/

https://stock.adobe.com/in/images/teacher-pulling-her-student-ear/164847519

Supervised

	Age	Class
★	14	T
●	24	A
★	17	T
●	30	A

Teenager (T)
Adult (A)



Decision Surface

▲ New: 15 ⇨ ?

Unsupervised

Age
14
24
17
30

Find patterns

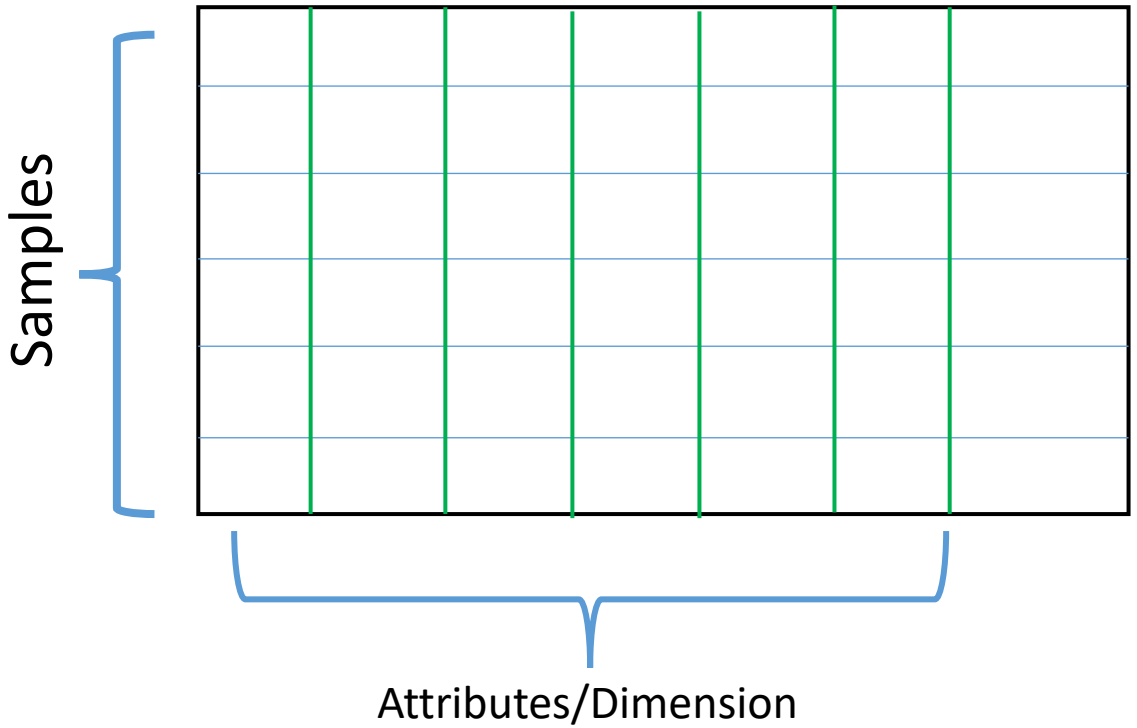
- Groups
- Clusters

?

Simple Structure of a Database

Supervised

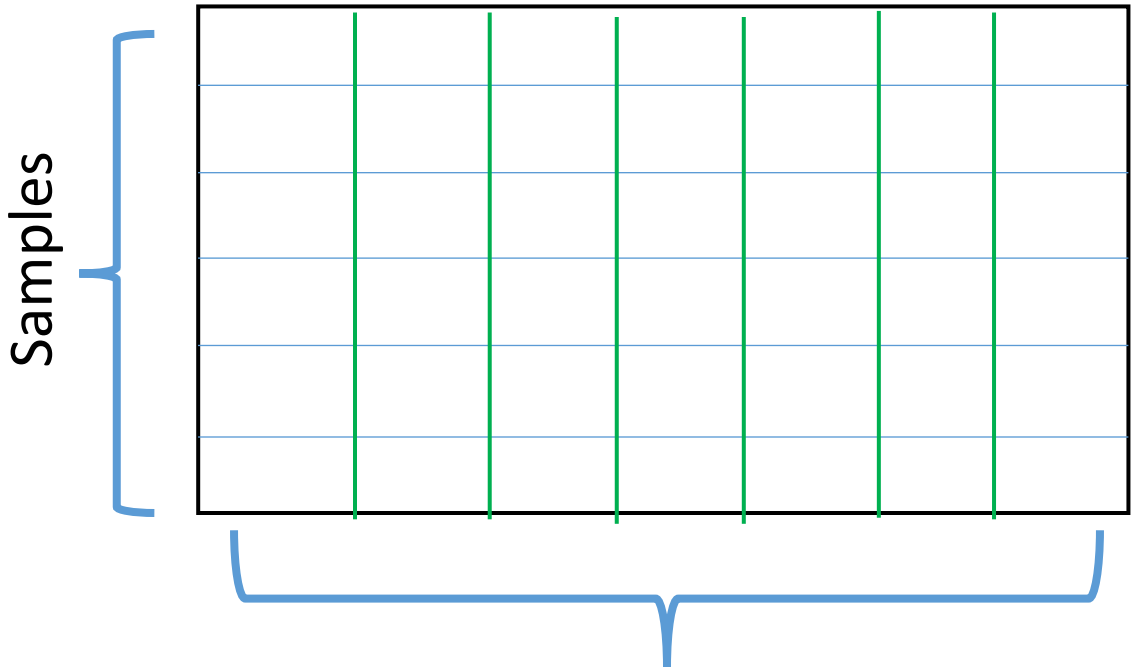
Class



Database

Unsupervised

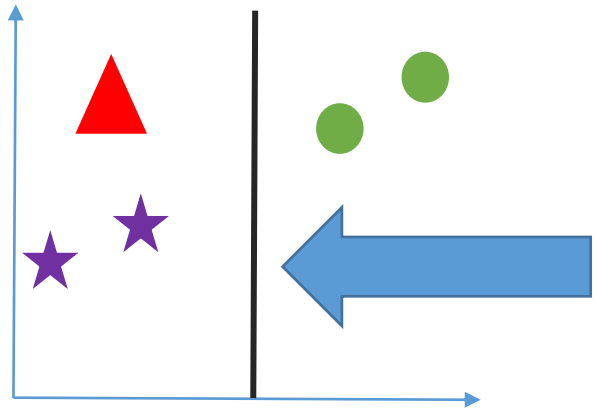
No Class is present



Database

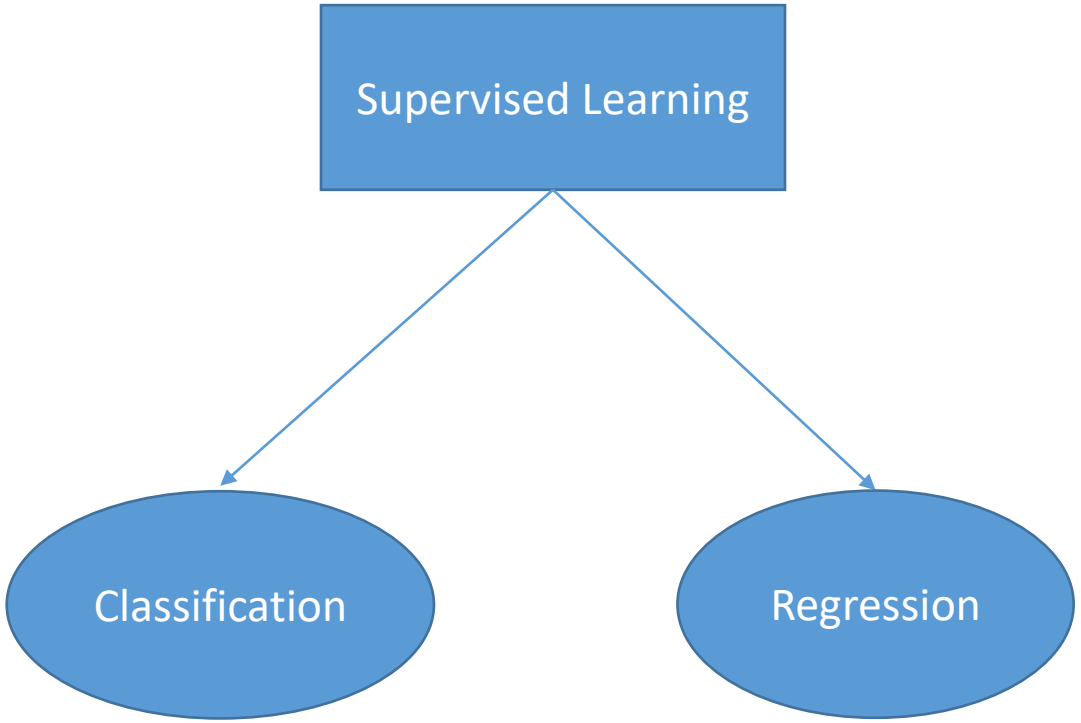
Supervised

	Age	Class
★	14	T
●	24	A
★	17	T
●	30	A

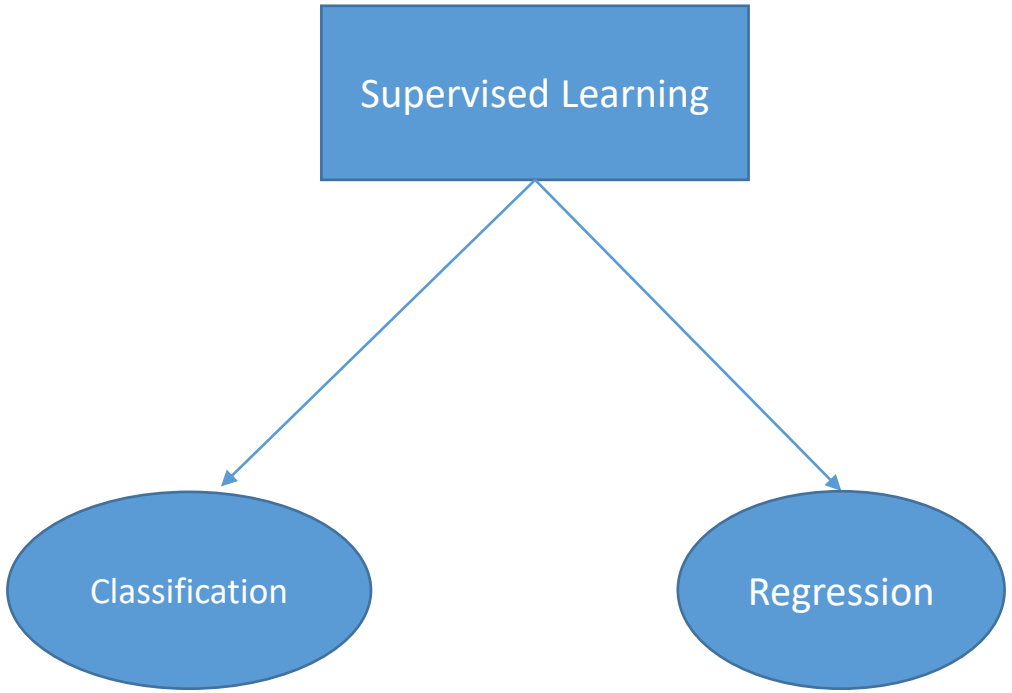


Decision Surface

Types of Supervised Learning



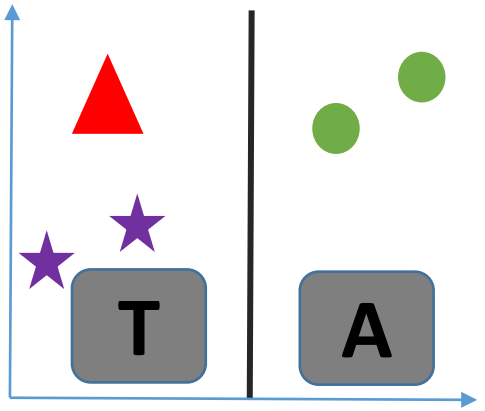
Types of Supervised Learning



Output having labels(discrete value)

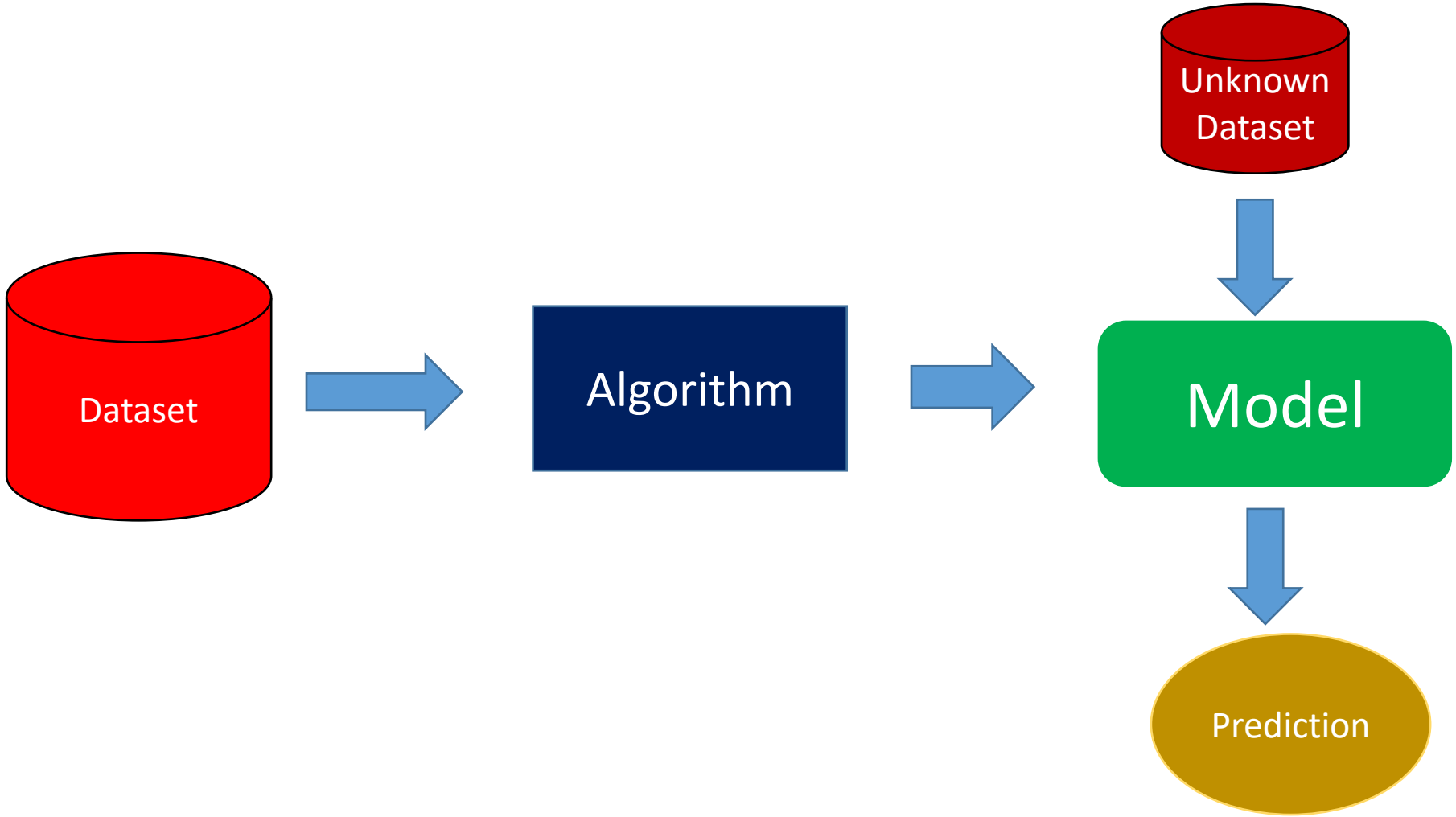
output having continuous value.

Age	Class
14	T
24	A
17	T
30	A



Classification

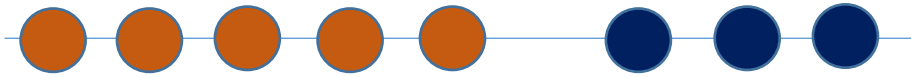
Simple Training Pipeline of Machine Learning



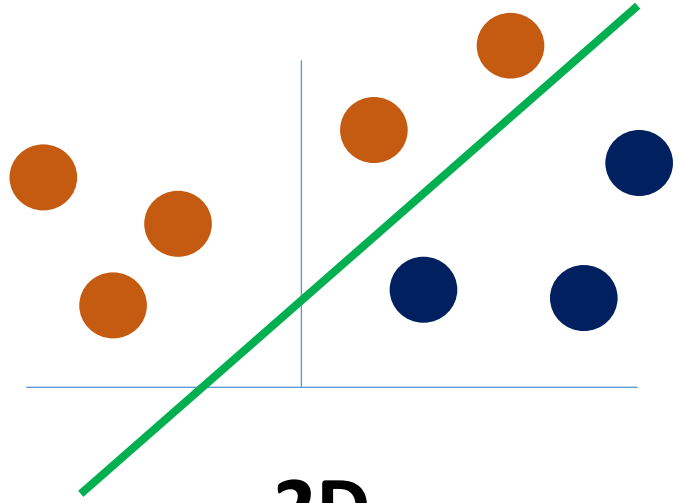
Introduction to Support Vector Machine (SVM)

1. 1D to 2D
2. Decision Surface/ Hyperplane
3. Linearly Separable
4. Margin
5. Support Vectors
6. Functional Margin
7. Non-linearly Separable

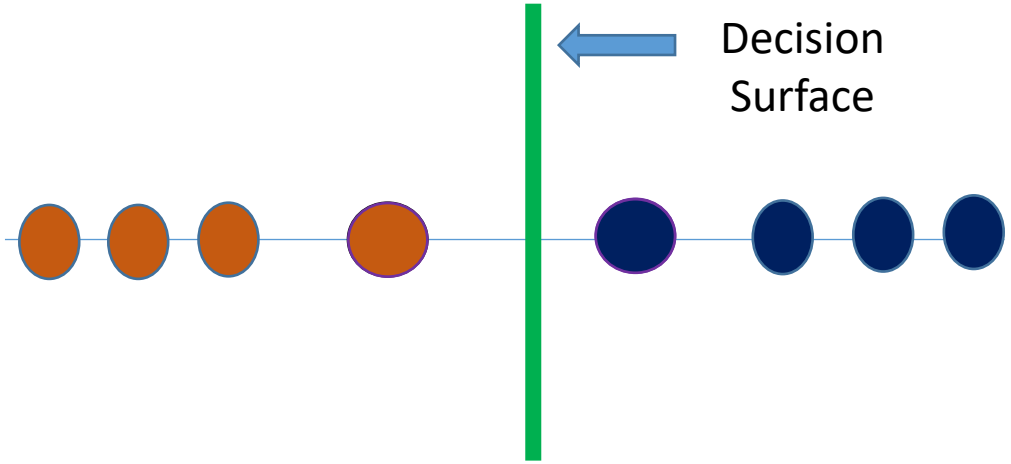
1D to 2D



1D

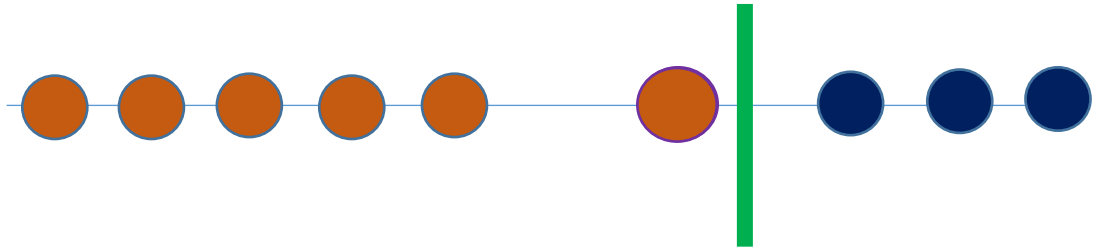


2D

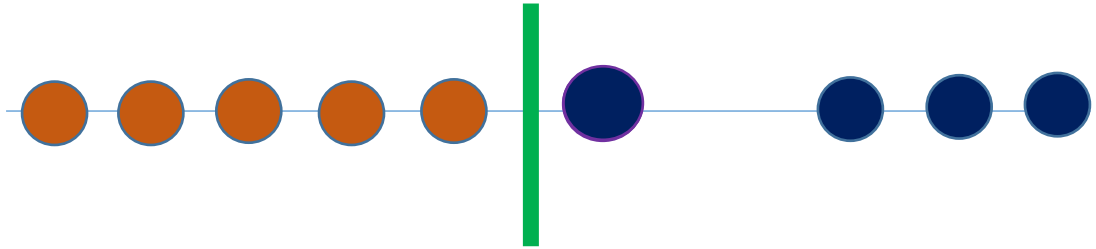


New point

But the point is more close to B

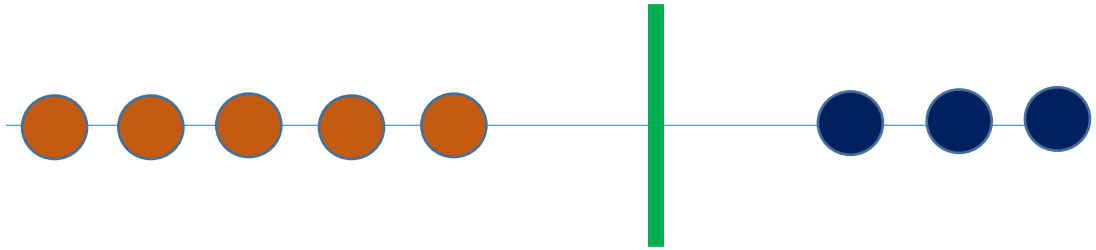


Close to Class A

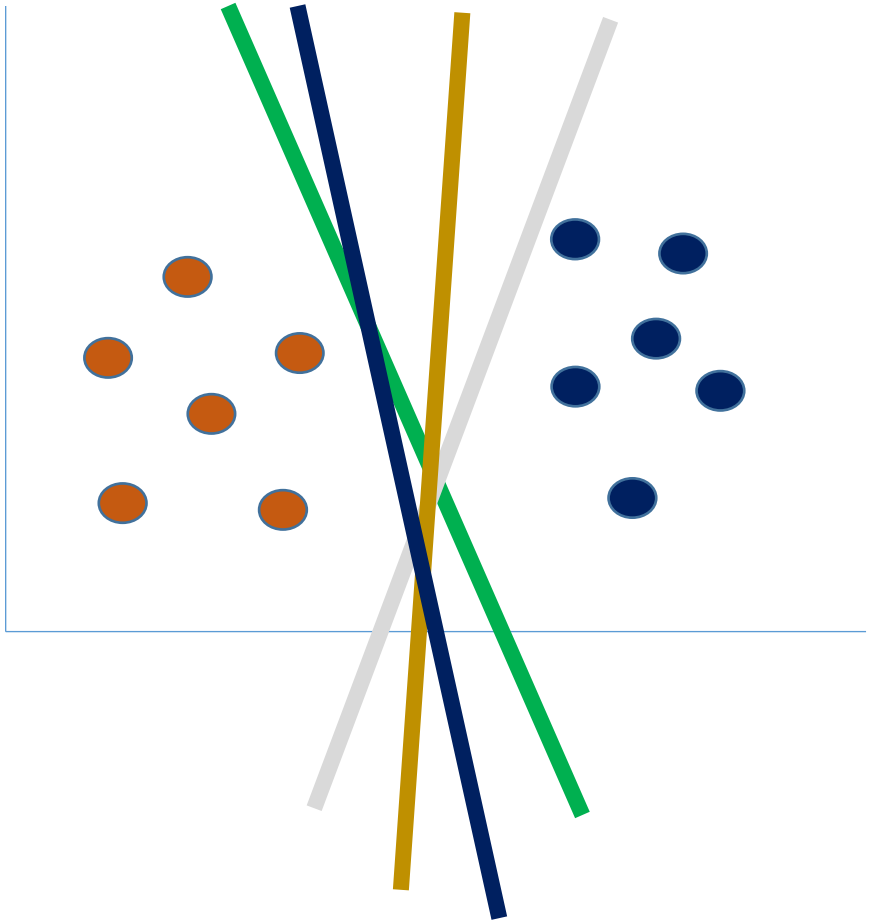


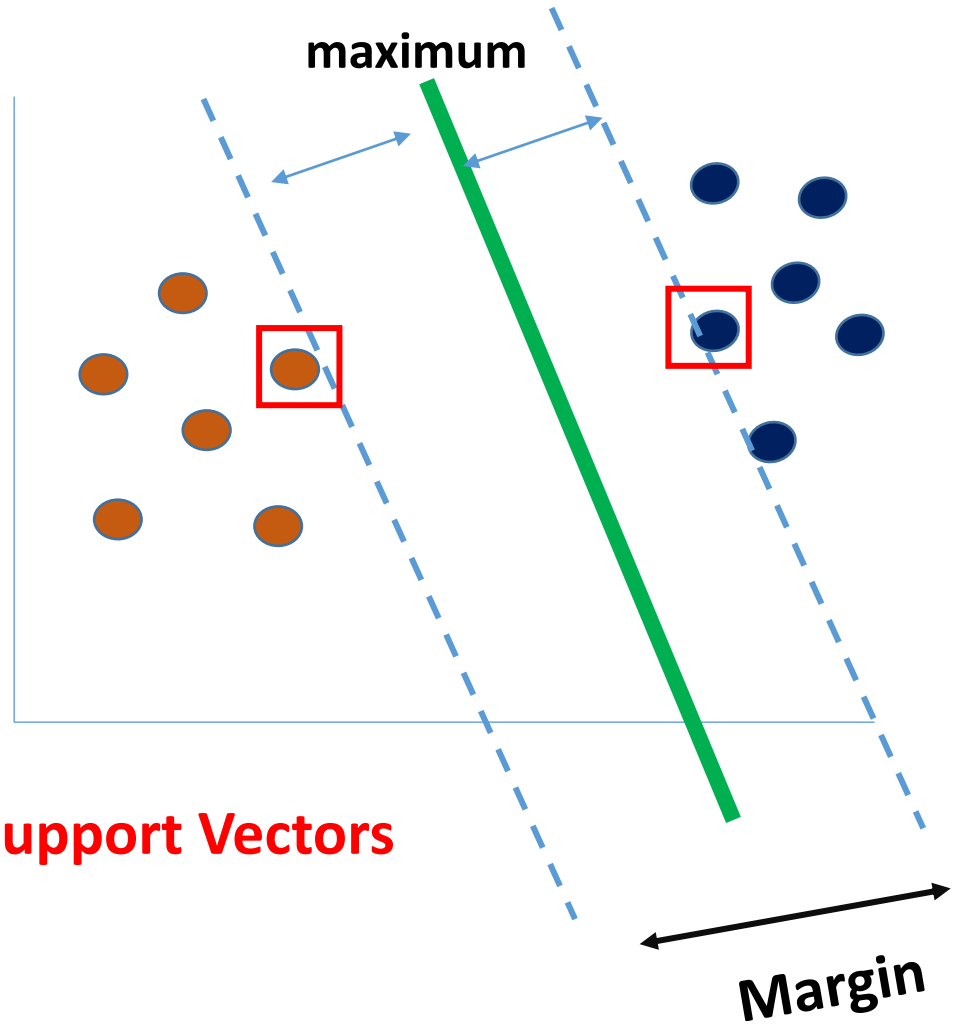
Close to Class B

But the point is more close to A



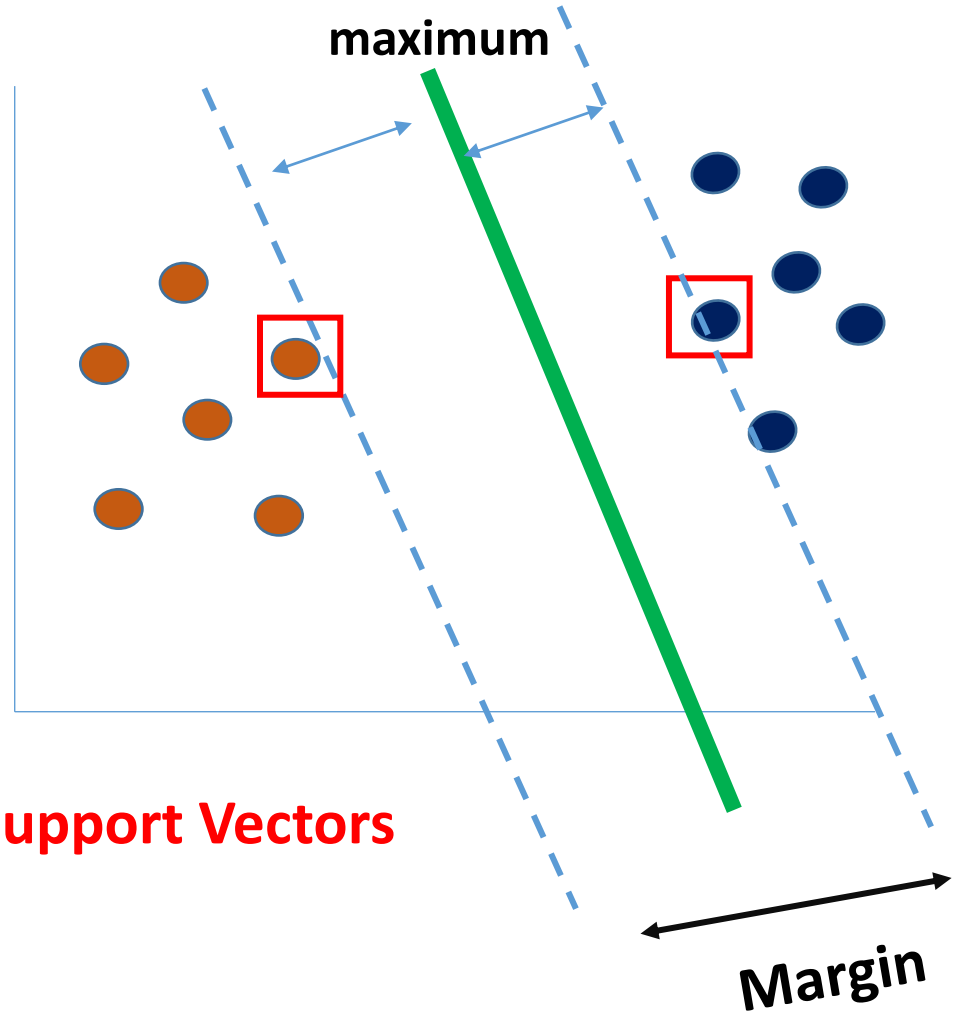
Middle





- How many decision surface there could be? → Infinite?
- Which decision surface to choose?

Minimum Distance of a training instance from the **Decision surface**

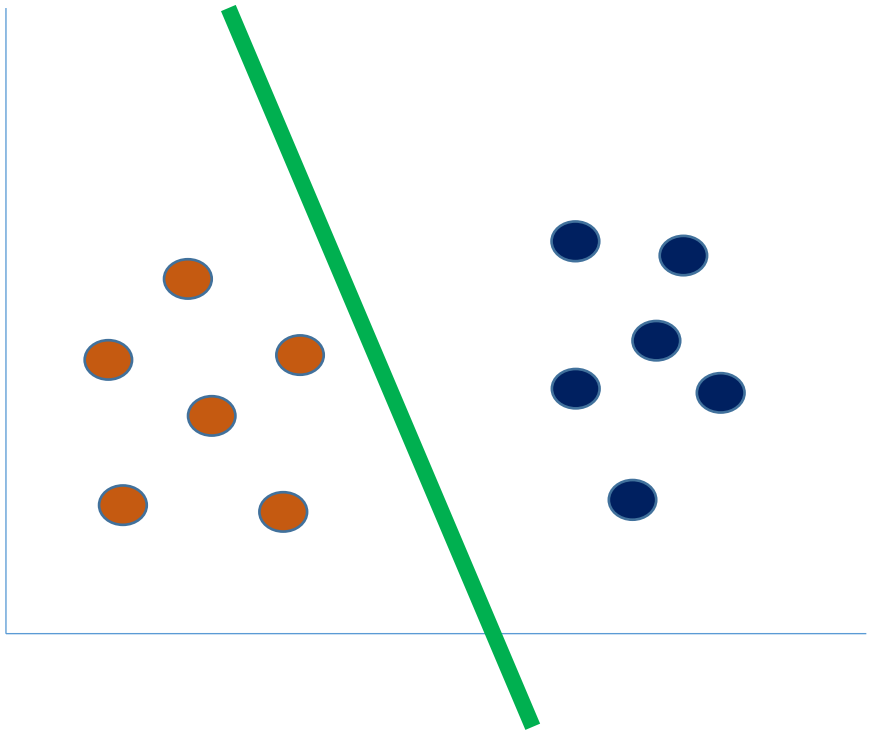


Minimum Distance of a training instance from the **Decision surface**

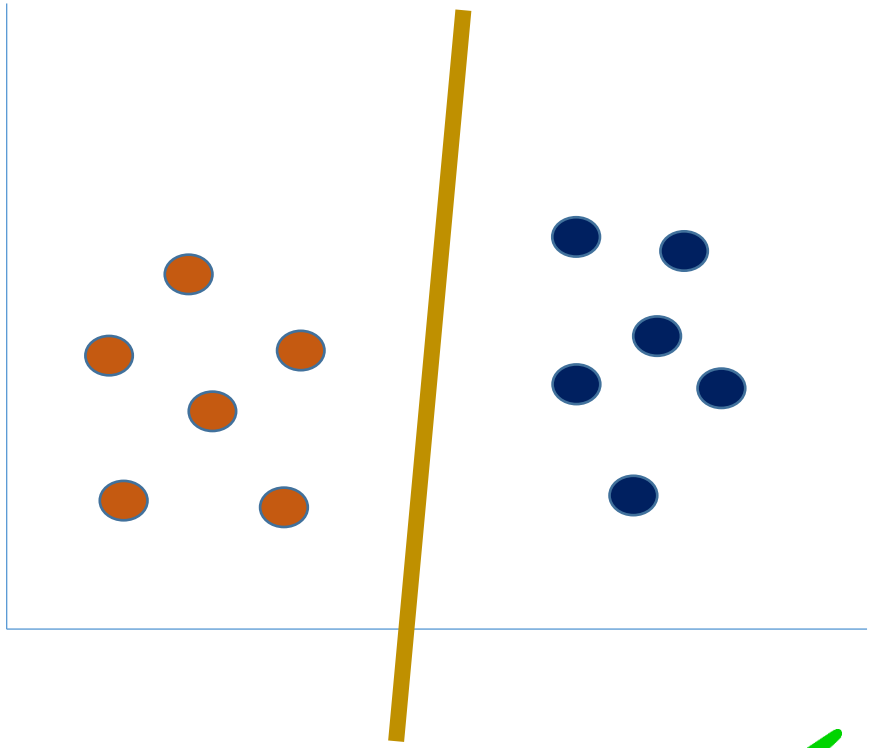
- ✓ **Margin: Minimum Distance** of a training instance from the **Decision surface**
- ✓ *Choose that Decision Surface for which the Margin width is maximum*
- ✓ Number of support vectors should be extremely small
- ✓ Minimum two support vectors should be there

Larger functional Margin more confidence in predicting

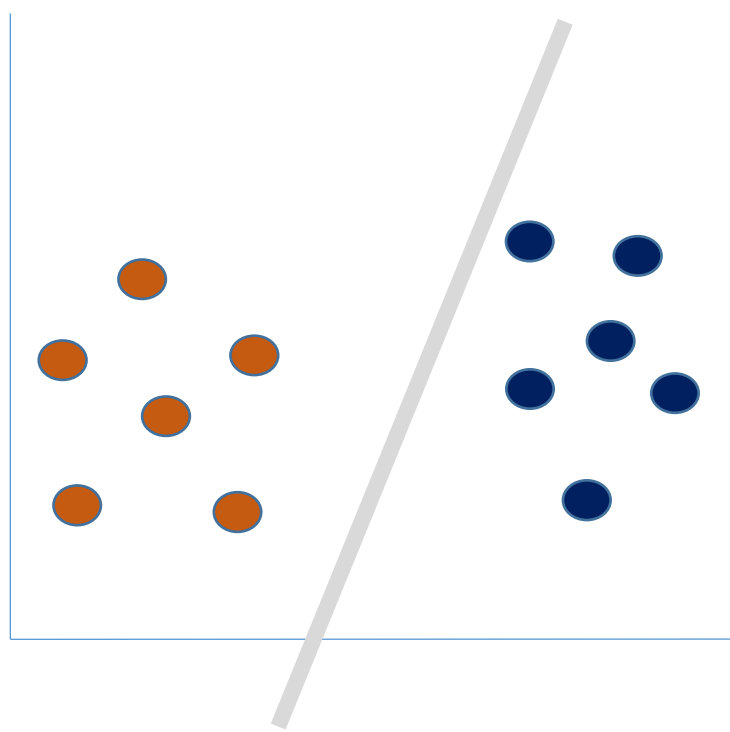
Which decision surface to choose?



Decision 1

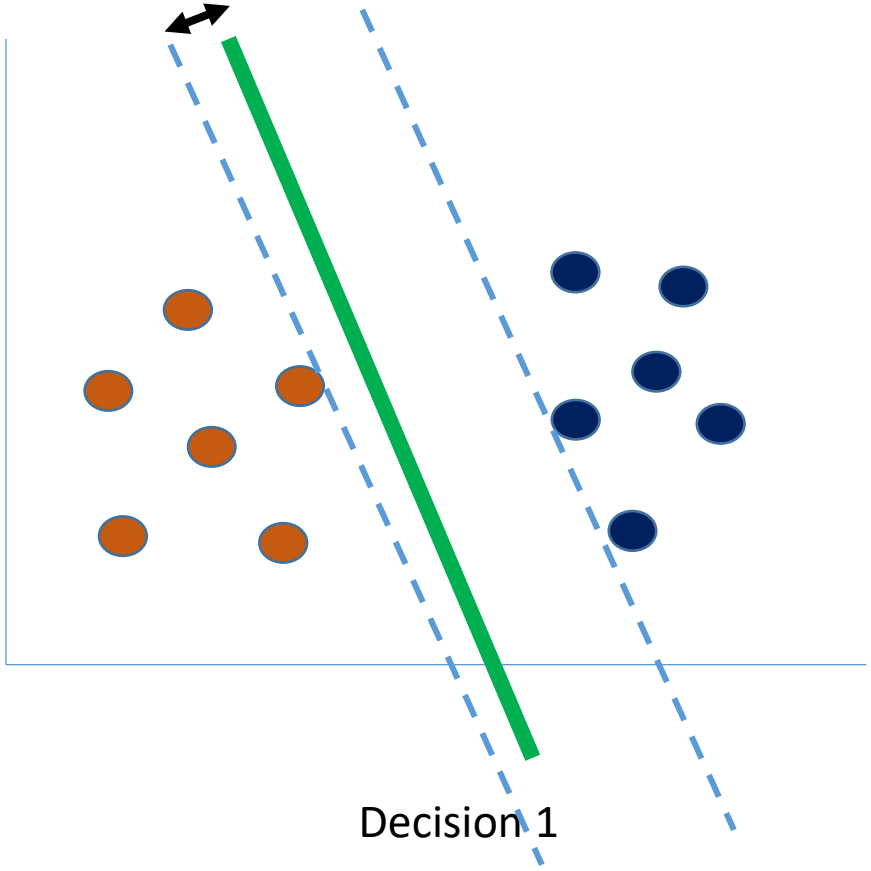


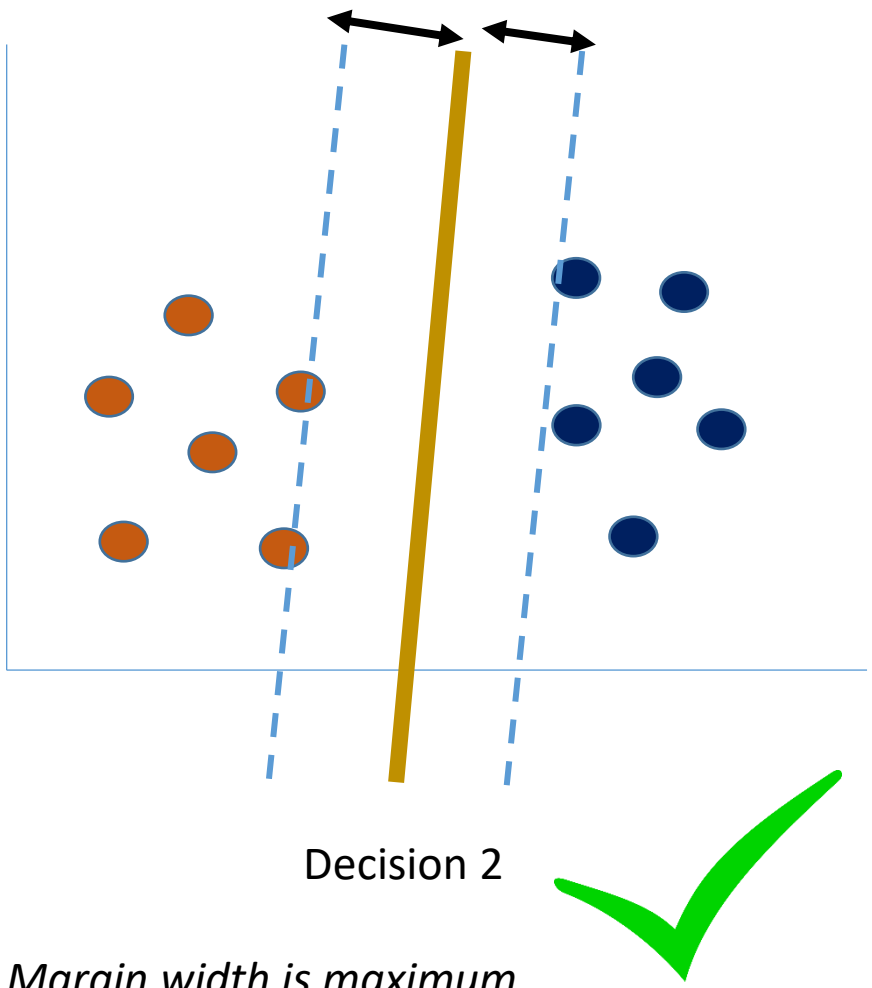
Decision 2

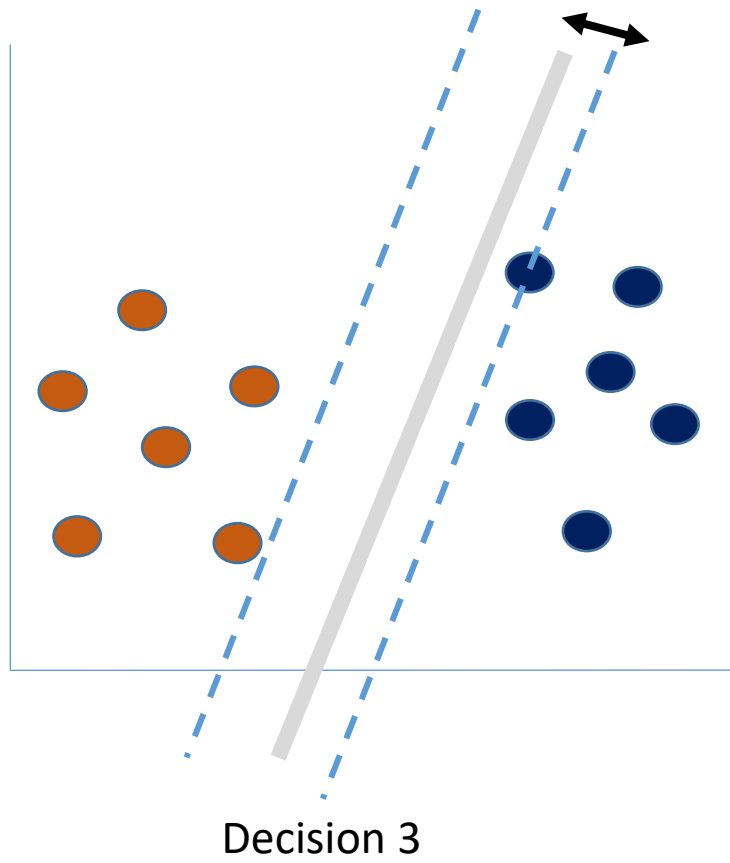


Decision 3

Reason which decision surface is best



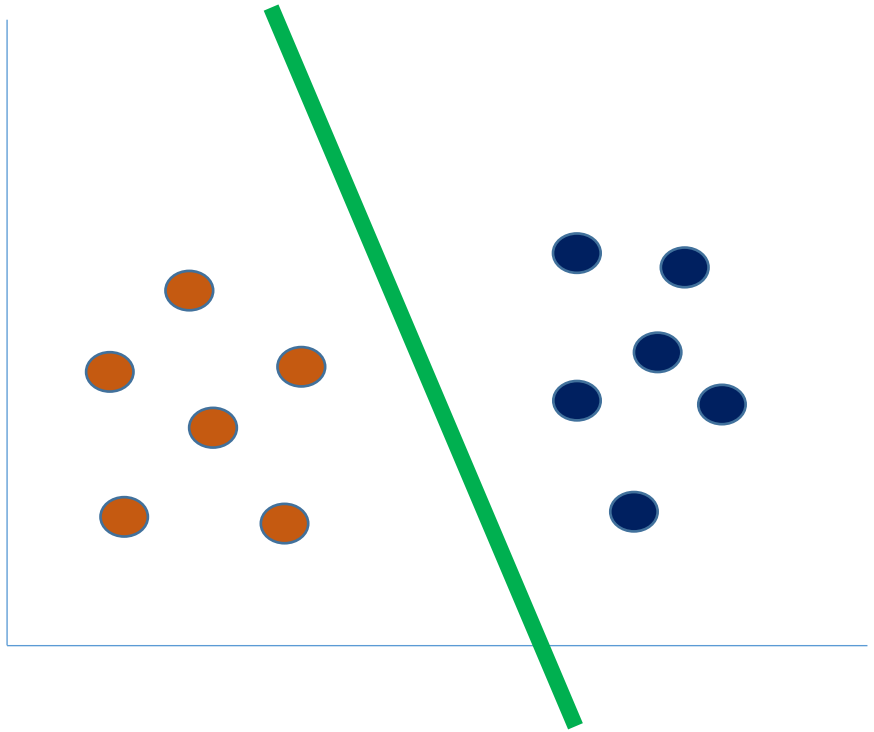




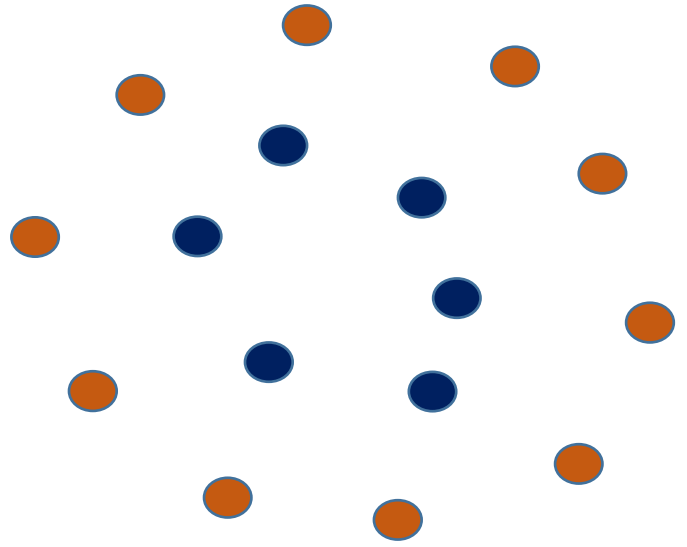
✓ *Choose that Decision Surface for which the Margin width is maximum*

Coding Tutorial

Difference between Linearly Separable and Non- Separable



Linearly Separable



Non- Separable

Thank You

For your Attention!

Any Questions?