Relationship between Margin and Optimal Hyperplane →

→ Given a particular hyperplane, we can compute the distance between the hyperplane and the closest data point.

→ Once we get this value, if we double it, we will get what is called the margin.

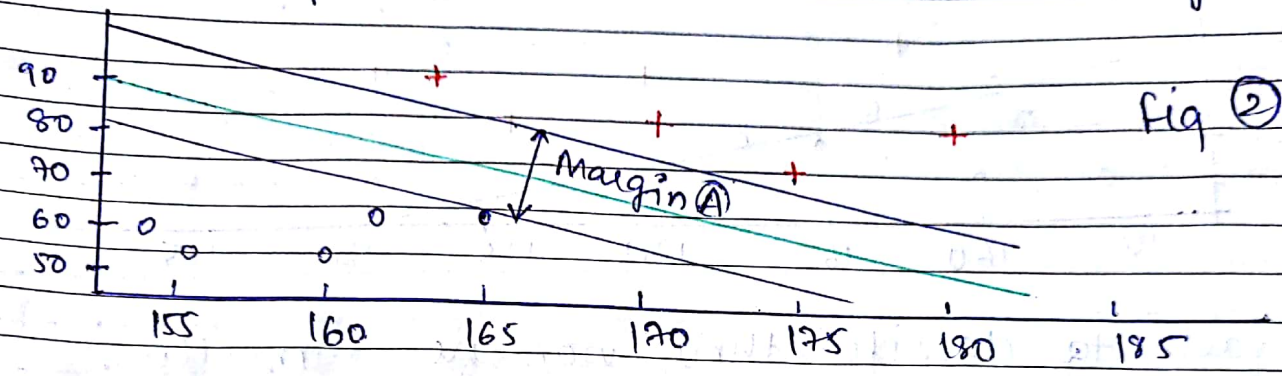
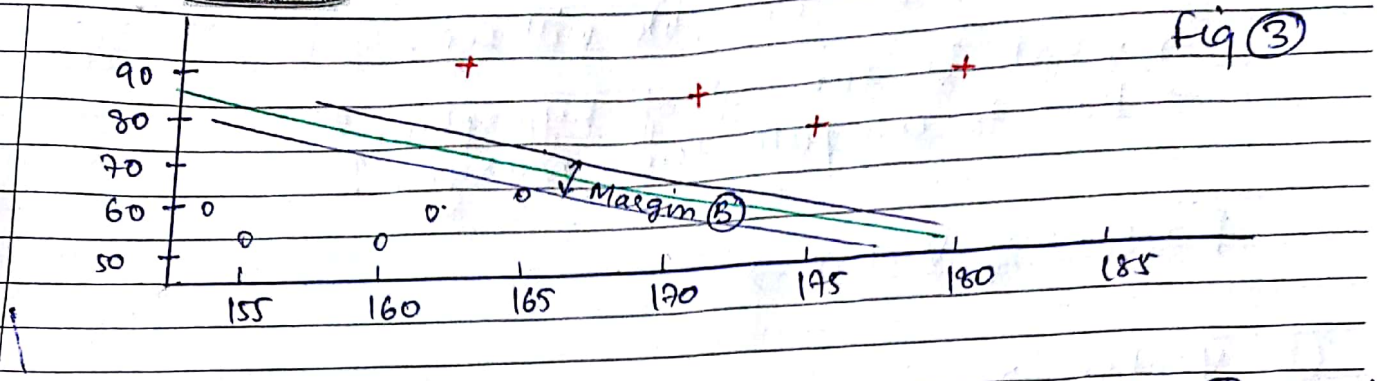


Fig (2)

→ Basically the Margin is No-man's land. There will never be any data point inside the margin.

A margin can have varying widths. The width is dependent on the location of datapoint.

For another hyperplane Margin will look like -



This can be visualized from fig (2) and fig (3) that Margin (B) is smaller than Margin (A).
This observation leads to the following inferences :

(1) If a hyperplane is very close to a data point, its margin will be small.

(2) The further a hyperplane is from a data point, the larger will be its margin.

These inferences leads to a conclusion that -

** The optimal hyperplane will be the one with biggest margin.

That is why the objective of SVM is to find the optimal seperating hyperplane which maximize the margin of training data.

Vectors :- To understand vectors well and how to use them, we will see :-

→ what is vector?
→ what is its norm?
→ its direction?
→ How to add & subtract vectors?
→ what is dot product?
→ How to project a vector onto another