Om Shete

THADOMAL SHAHANI TSEC ENGINEERING COLLEGE

Experiment NO: 6

Aim: Implement Support Vector Machines for non-linear classification.

Theory:

- **Support Vectors**

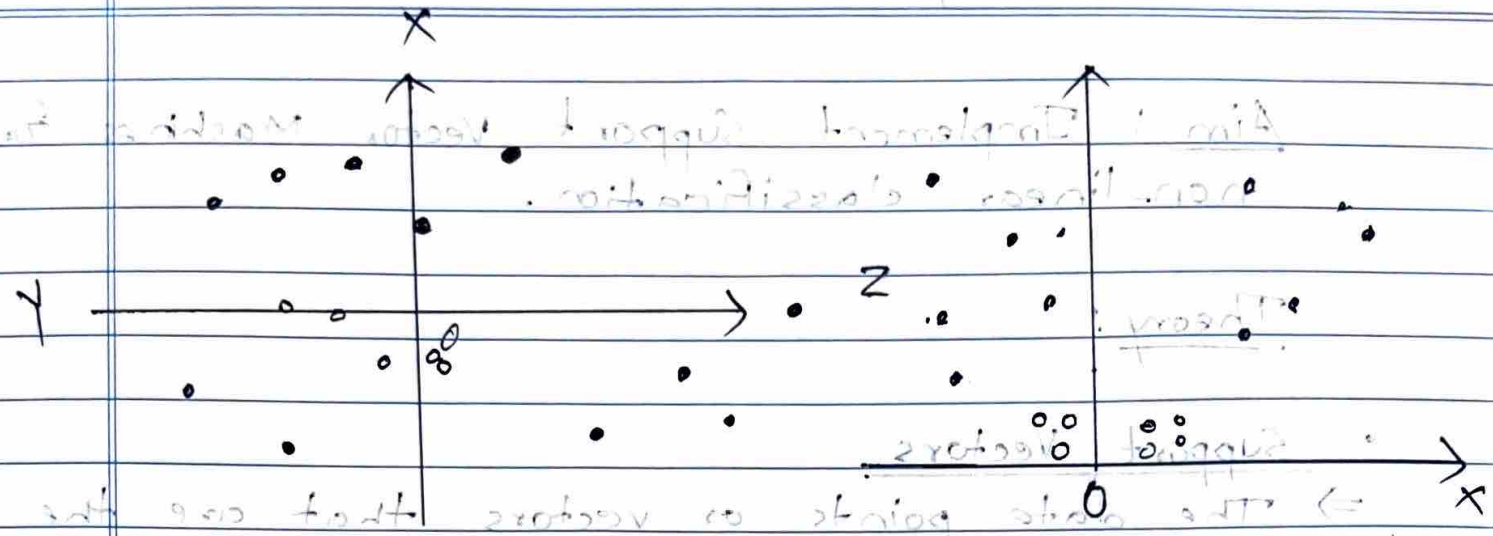
⇒ The data points or vectors that are the closest to the hyperplane and which affect the position of the hyperplane are termed as support vectors.

- Since these vectors support the hyperplane, hence called a support vector.

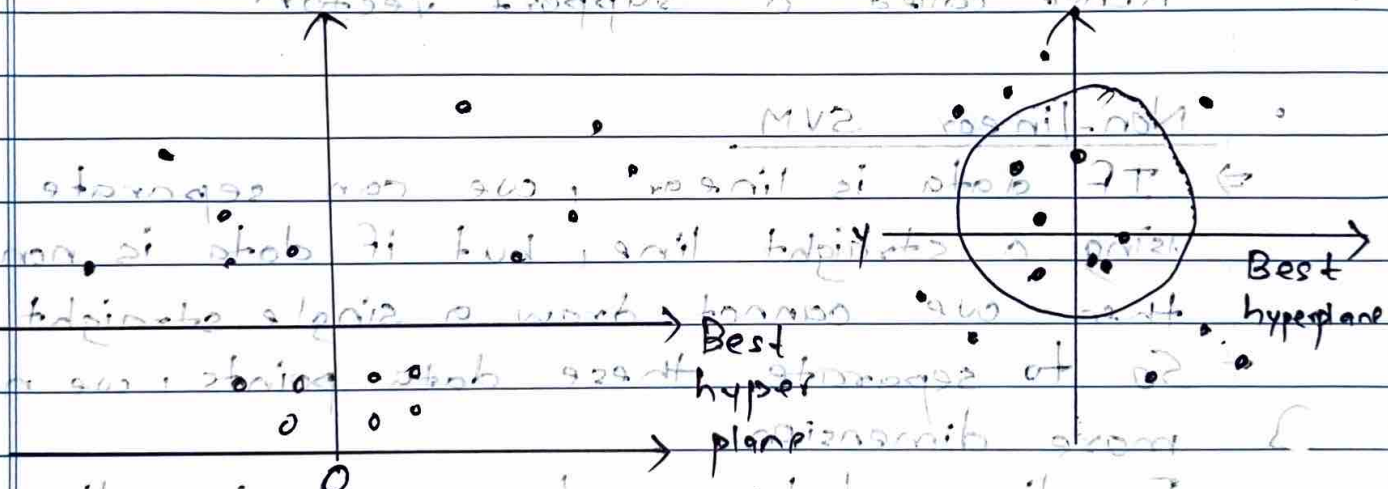
- **Non-linear SVM**

⇒ If data is linear, we can separate it by using a straight line, but if data is non-linear, then we cannot draw a single straight line.

- So to separate these data points, we need one more dimension.
- For linear data, we have used two dimensions x and y, so for non-linear data, we add a third dimension Z.
- It can be calculated as (say), $Z = x^2 + y^2$.
- After adding the third dimensions, the sample space becomes:



- Now, SVM will decide the datapoints into classes in the following way.



- If we put $z_i = 1$, then it will becomes $x_i^2 + y_i^2 = 1$,
- we get circumference of radius 1 as hyperplane surface in case of non-linear data.

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