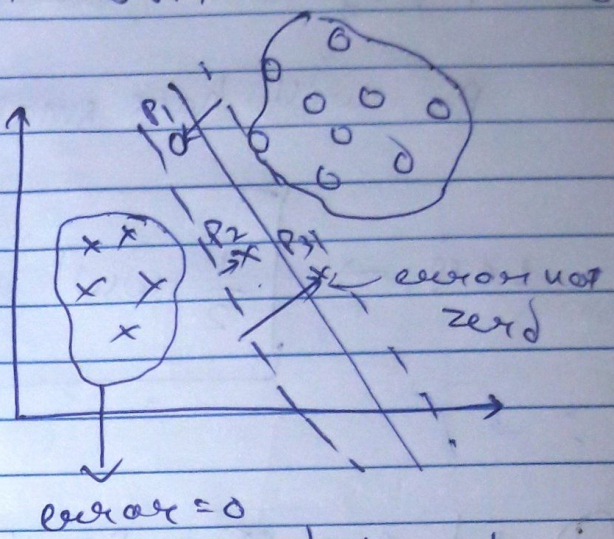
(09) SVM - Handling Outliers

Handling Outliers in SVM



- Allow algorithm (our objective) to do some error on the training examples.

$$(x_i, y_i) \rightarrow \varepsilon^{(i)}$$

(x_i, y_i): example; $\varepsilon^{(i)}$: error

- **Primal Objective**:

Minimize $\frac{1}{2} w w^T$

such that $y^{(i)} (w^T x^{(i)} + b) \geq 1$

- for some examples it can less than one (for outliers)

$$\therefore \quad y^{(i)} (w^T x^{(i)} + b) \geq 1 - \varepsilon^{(i)}$$

$\varepsilon^{(i)} = 0$ for

Allow some error. with some cost.

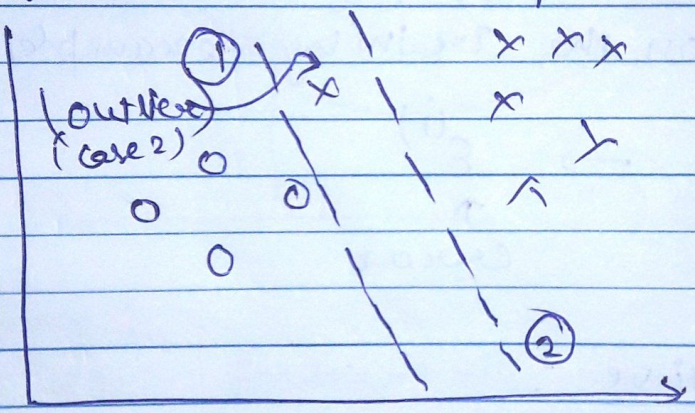
P_1, P_3 will have large error

P_2 will have small error.

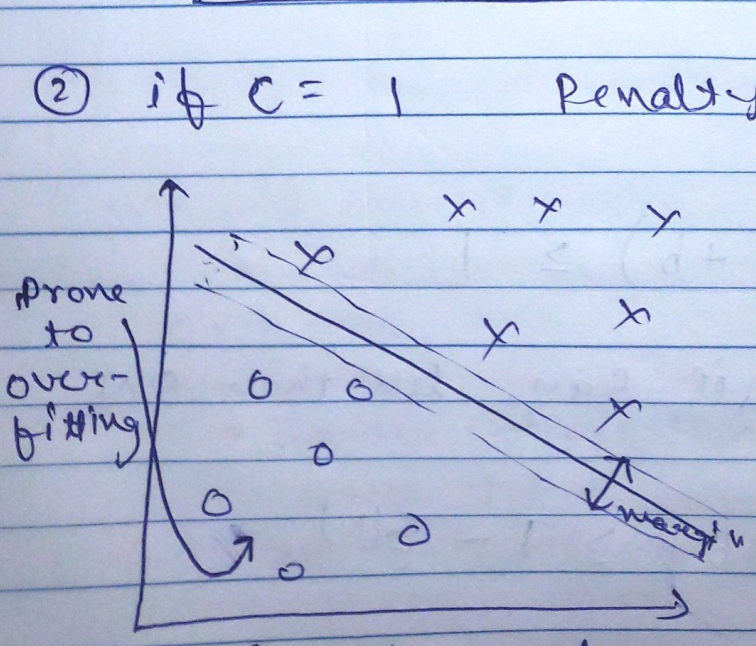
Loss → $\frac{1}{2} w w^T + C \sum_{i=1}^{m} \varepsilon_i$

↑ minimum error

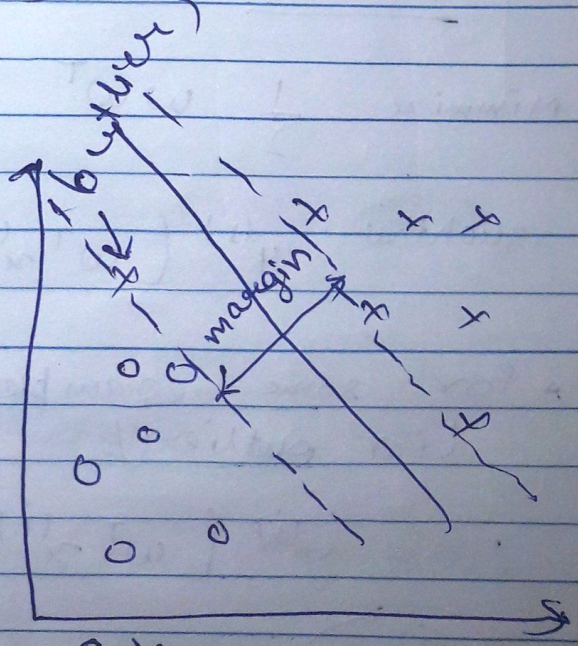
① if $C = \infty$ Penalty (infinity)



② if $C = 1$ Penalty



$C \to \infty$ very large (less margin)



C → small misclassification

C → hyperparameter