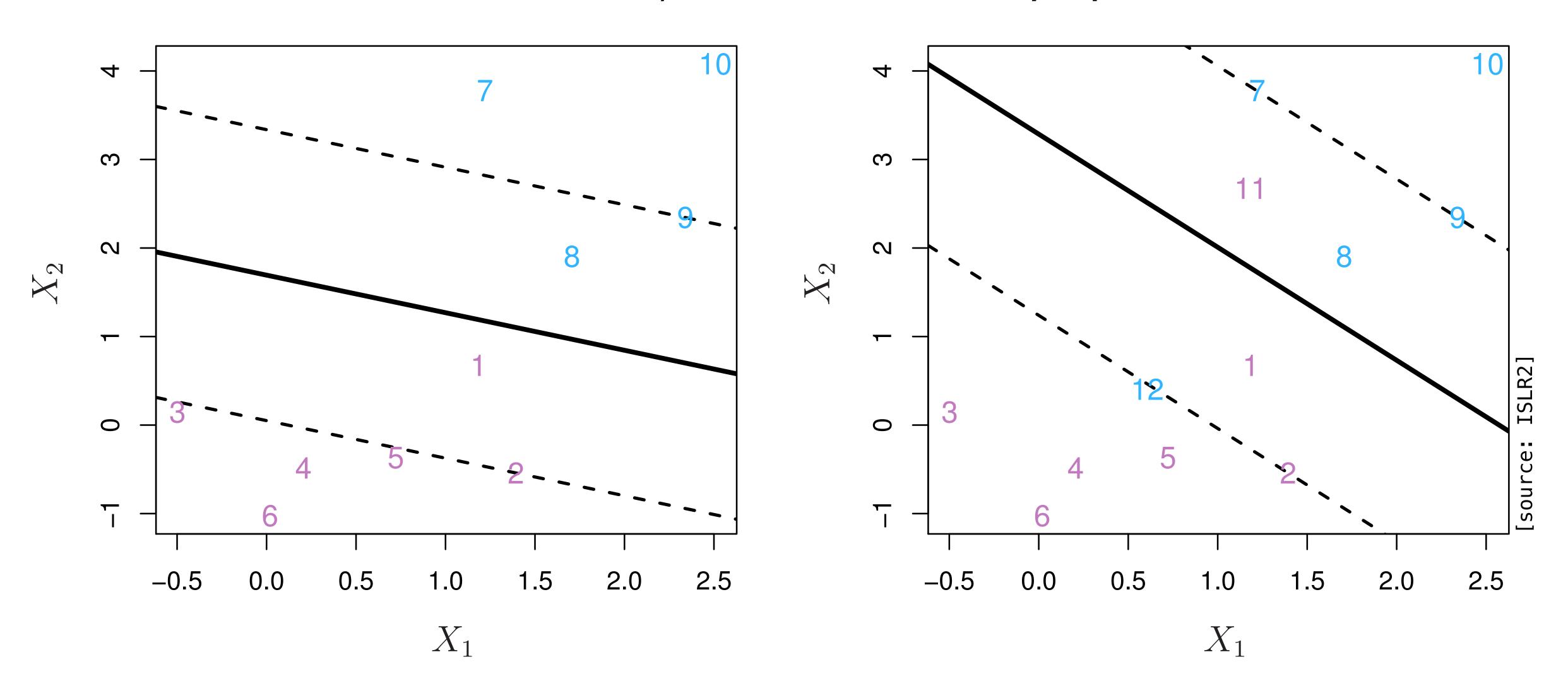
## Support Vector Classifier

allows us to classify data that is not linearly separable



## Support Vector Classifier

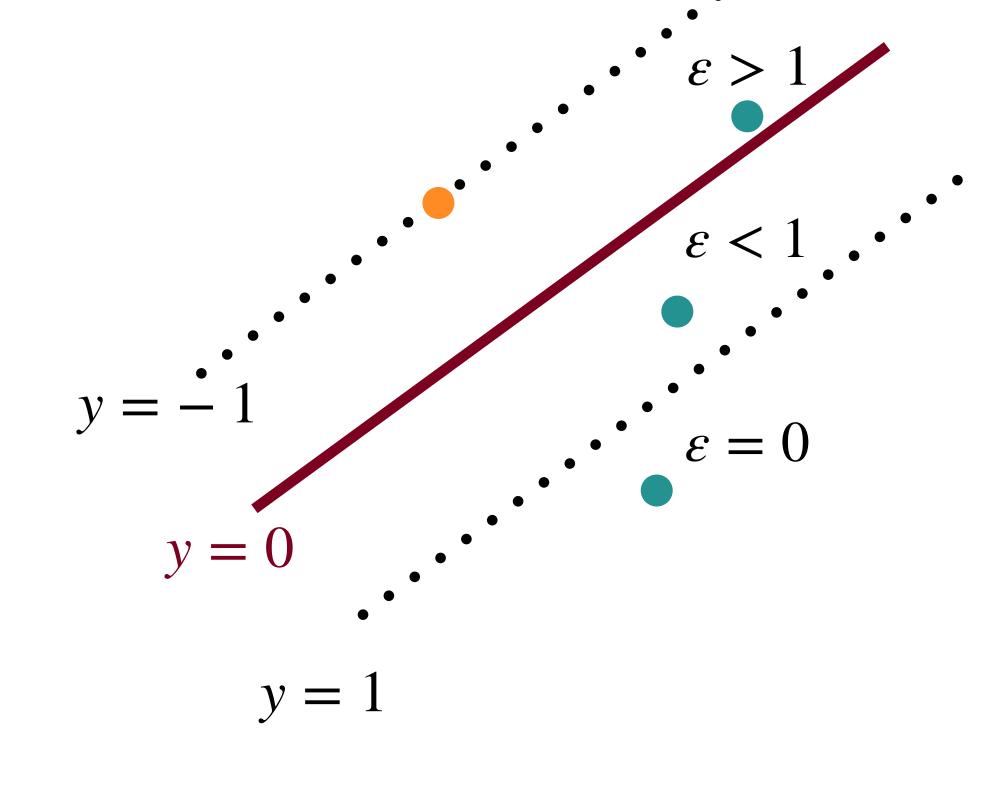
$$\max_{\beta_0,\beta_1,\ldots,\beta_p,\varepsilon_1,\varepsilon_2,\ldots,\varepsilon_n} M$$

## subject to:

$$\|\beta\| = 1$$

$$y_i(\beta_0 + \beta^T x_i) \ge M(1 - \varepsilon_i)$$

$$\varepsilon_i \ge 0, \sum_{i=1}^n \varepsilon_i \le C$$



 $\epsilon_1, ..., \epsilon_n$  are **slack variables** where  $\epsilon_i = 0$  means  $i^{\text{th}}$  observation is on correct side of margin < 1 means  $i^{\text{th}}$  observation is on wrong side of hyperplane