

Support Vector Classifier

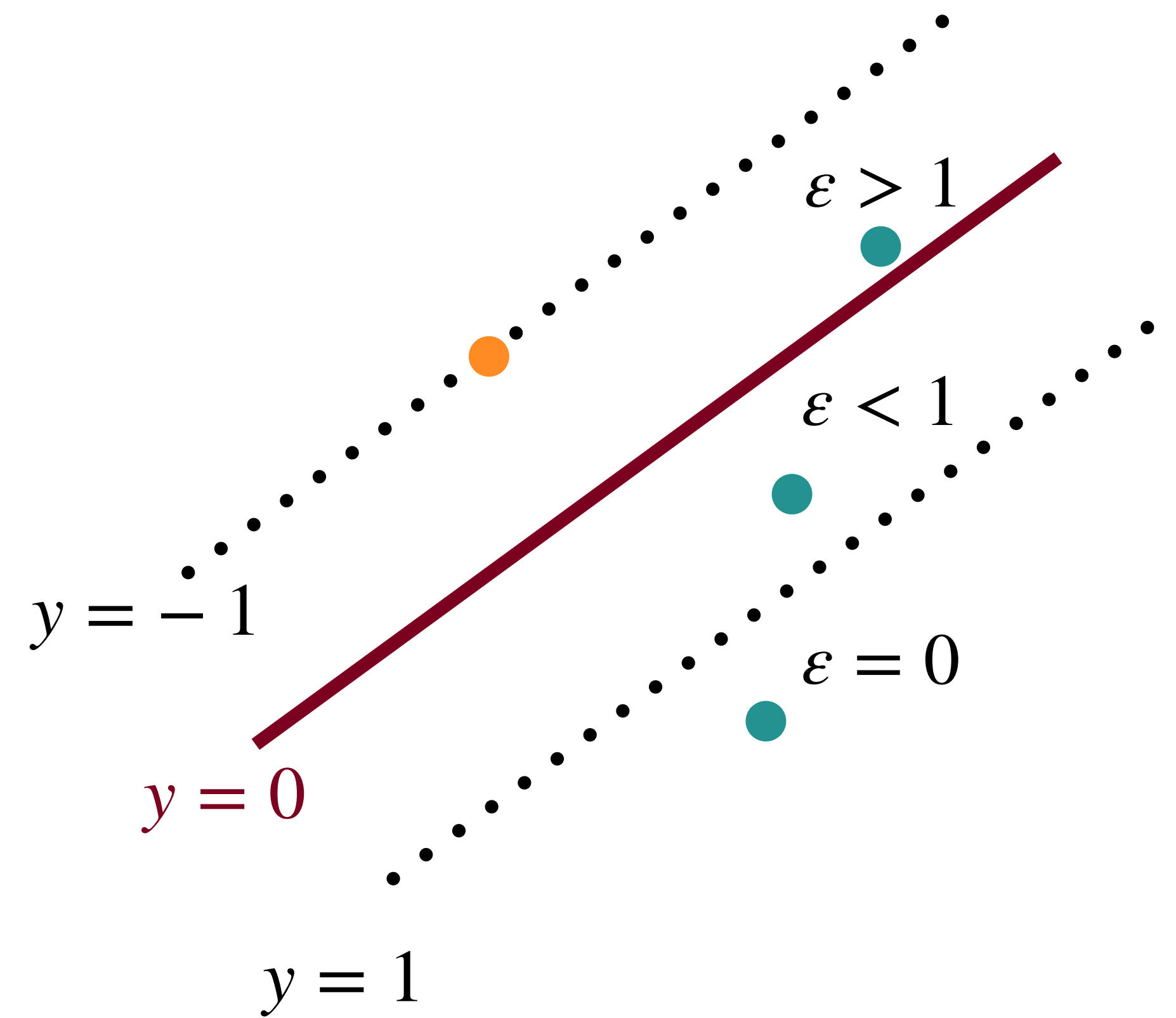
$$\max_{\beta_0, \beta_1, \dots, \beta_p, \varepsilon_1, \varepsilon_2, \dots, \varepsilon_n} M$$

subject to:

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

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

$$\varepsilon_i \geq 0, \sum_{i=1}^n \varepsilon_i \leq C$$



C is the tuning parameter/penalty on error:

$C = 0$ implies maximal margin hyperplane (superposed it exists)

$C > 0$ is the total violations to the margin that we can tolerate

\implies max C observations can be on the wrong side of hyperplane

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C: penalty on error

	Regularization	Margins	Bias/Variance
Small C	more	wider	prone to underfitting
Large C	less	narrower	prone to overfitting

