# Linear SVM with Soft Margin

**Classifier:** $f(x)=w^Tx+b>0?$

**Parameters**: $w$, $b$

**Training Data:** $T=\{(x_i, y_i)\}$, $i=1, \ldots, |T|$.

Added to allow training errors

**Find w, b, and $\xi_i$ to minimize** $\Phi(w)=w^Tw+C\Sigma_{i\in[1,|T|]}\xi_i$

**Subject to** $\forall i\in[1,|T|],\ y_i(w^Tx_i+b)\geq 1-\xi_i, \quad \xi_i\geq 0$

C>0 is a parameter to control the trade-off between minimizing the errors and maximizing the margin

**The optimization problem is still quadratic programming with linear constraints**