Tema 3: Descenso por gradiente

- Función de Widrow-Hoff regularizada: $q_S(\boldsymbol{\theta}) = \frac{1}{2}\sum_{n=1}^{N}\left(\boldsymbol{\theta}^t\boldsymbol{x}_n - y_n\right)^2 + \frac{\boldsymbol{\theta}^t\boldsymbol{\theta}}{2}$
- El gradiente de la función: $\boldsymbol{\nabla} q_S(\boldsymbol{\theta}) = \sum_{n=1}^{N}\left(\boldsymbol{\theta}^t\boldsymbol{x}_n - y_n\right)\boldsymbol{x}_n + \boldsymbol{\theta}$
- Algoritmo batch:

$$\begin{aligned}\boldsymbol{\theta}(1) &= \text{arbitrario}\\ \boldsymbol{\theta}(k+1) &= (1-\rho_k)\,\boldsymbol{\theta}(k) + \rho_k \sum_{n=1}^{N}(y_n - \boldsymbol{\theta}(k)^t\boldsymbol{x}_n)\,\boldsymbol{x}_n\end{aligned}$$

- Algoritmo online (muestra a muestra):

$$\begin{aligned}\boldsymbol{\theta}(1) &= \text{arbitrario}\\ \boldsymbol{\theta}(k+1) &= (1-\rho_k)\,\boldsymbol{\theta}(k) + \rho_k \left(y(k) - \boldsymbol{\theta}(k)^t\boldsymbol{x}(k)\right)\,\boldsymbol{x}(k)\end{aligned}$$