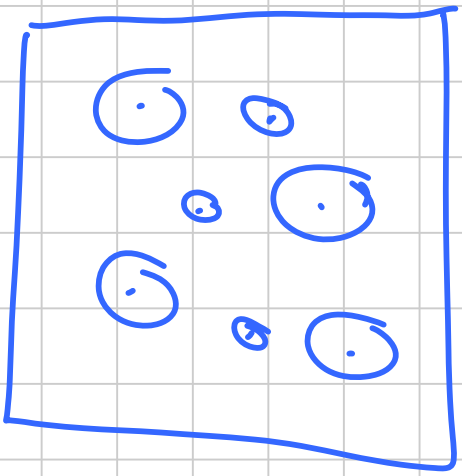
Note Title 2/13/2009



centers $x_1, \ldots, x_n$

$\sigma_1, \ldots, \sigma_n$

y : image $\qquad \frac{1}{\sigma} \varphi\left(\frac{x - x_0}{\sigma}\right)$

$$y(x) = \sum_{i=1}^{n} \alpha_i \; \varphi\left(\frac{x - x_i}{\sigma_i}\right) + \varepsilon(x)$$

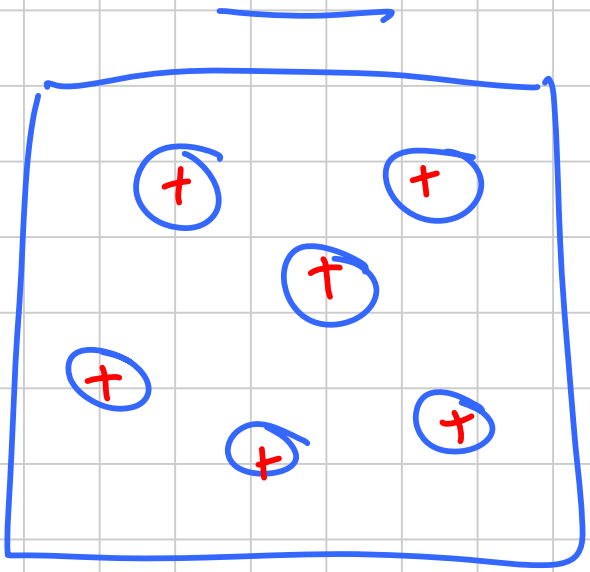
$$\frac{1}{\sigma} \int \varphi\left(\frac{x - x_0}{\sigma}\right) dx = \begin{matrix} y = \frac{x - x_0}{\sigma} \\ dy = \frac{1}{\sigma} dx \end{matrix}$$

$$= \int \varphi(y)\, dy = 1$$

$$\sum_x \left[y(x) - \sum_{i=1}^{n} \alpha_i \, \varphi\left(\frac{x - x_i}{\sigma_i}\right) \right]^2$$

$$\frac{\partial}{\partial x_i} = 0 \Leftrightarrow \sum_x \alpha_i \frac{\partial}{\partial x_i} \varphi\left(\frac{x - x_i}{\sigma_i}\right)$$

$$\left[y(x) - \sum_{j=1}^{n} x_j \, \varphi\left(\frac{x - x_j}{\sigma_j}\right) \right] = 0$$



Compute the gradient:

Image: $y(x)$ $\quad x = (x_1, x_2)$

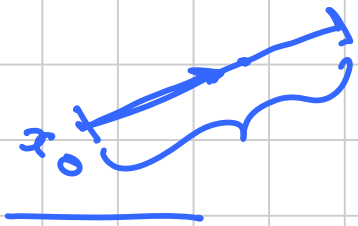
$$\frac{\partial}{\partial x_1} \left[y * f_\sigma \right] = y * \frac{\partial}{\partial x_1} f_\sigma$$

$$\begin{pmatrix} \frac{\partial}{\partial x_1} y * f_\sigma \\ \frac{\partial}{\partial x_2} y * f_\sigma \end{pmatrix}$$

Initial point x_0

Compute the direction of the gradient

Find the largest value for y

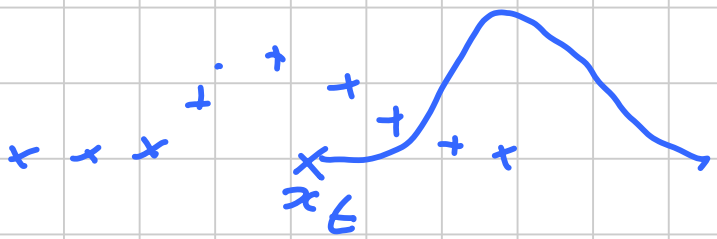


1 Dimension

$$\frac{\partial}{\partial x_i} \sum_x \left[y(x) - \alpha_i \varphi\left(\frac{x - x_i}{\sigma_i}\right) \right]^2$$

$$\sum_x \left[y(x) - \alpha_i \varphi\left(\frac{x - x_i}{\sigma_i}\right) \right] \left(\frac{x - x_i}{\sigma_i}\right) \varphi\left(\frac{x - x_i}{\sigma_i}\right)$$

$$x_{\epsilon+1} = x_\epsilon + \lambda \nabla f(x_\epsilon)$$


x_0