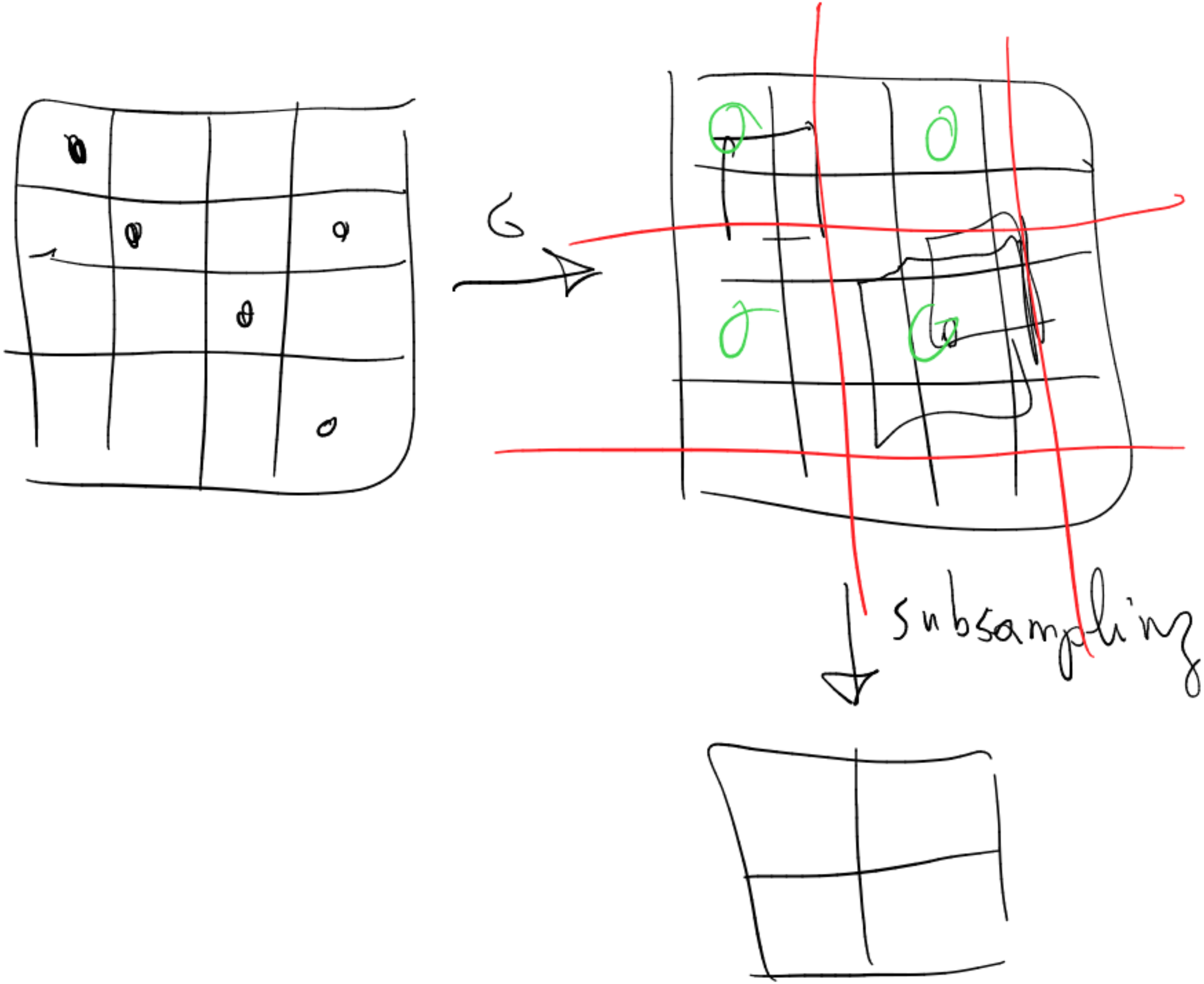
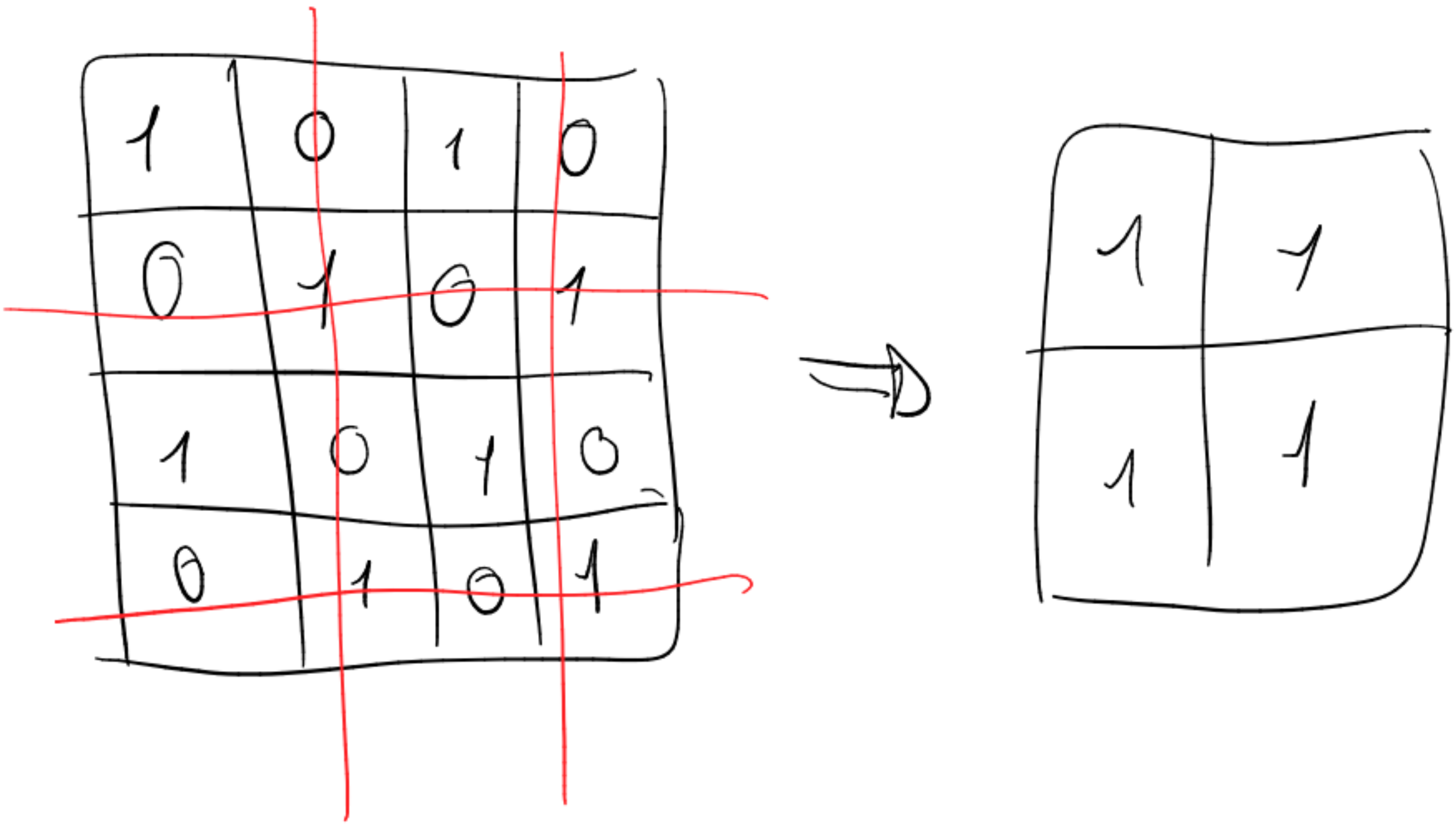
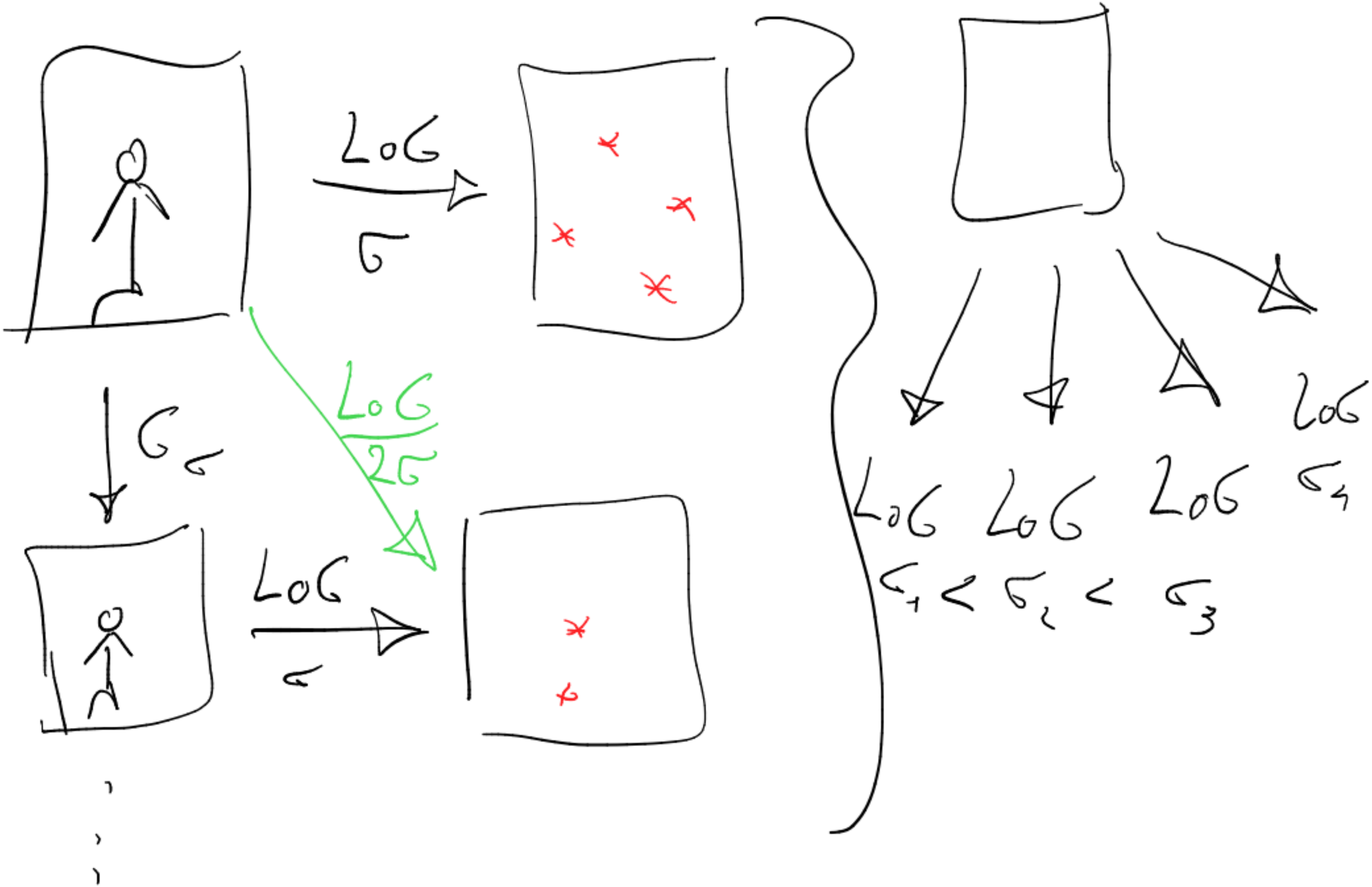
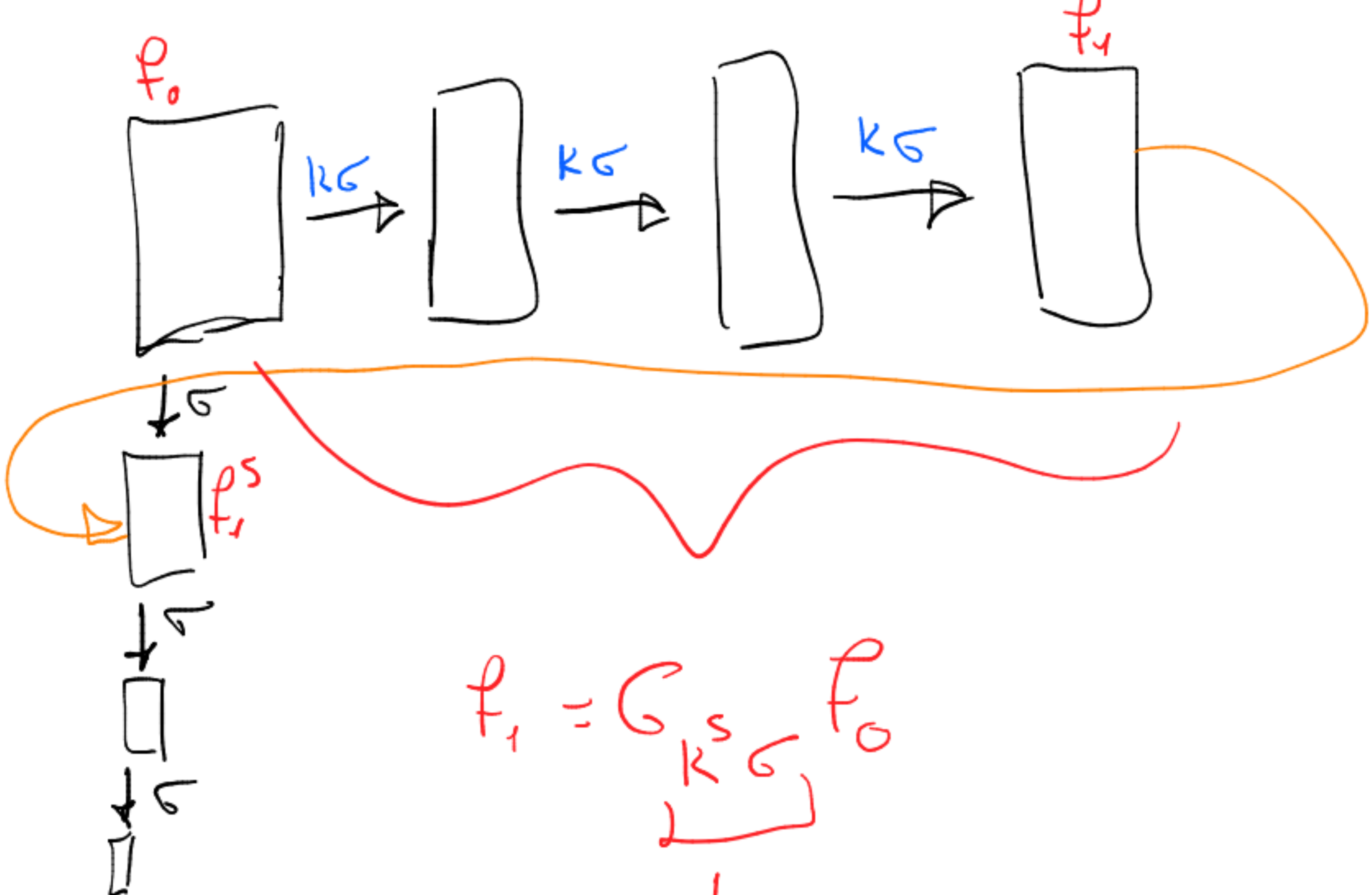

G
subsampling



Aliasing


LoG
σ
G σ
LoG
2σ
LoG
σ
LoG
σ4
LoG LoG LoG
σ1 < σ2 < σ3

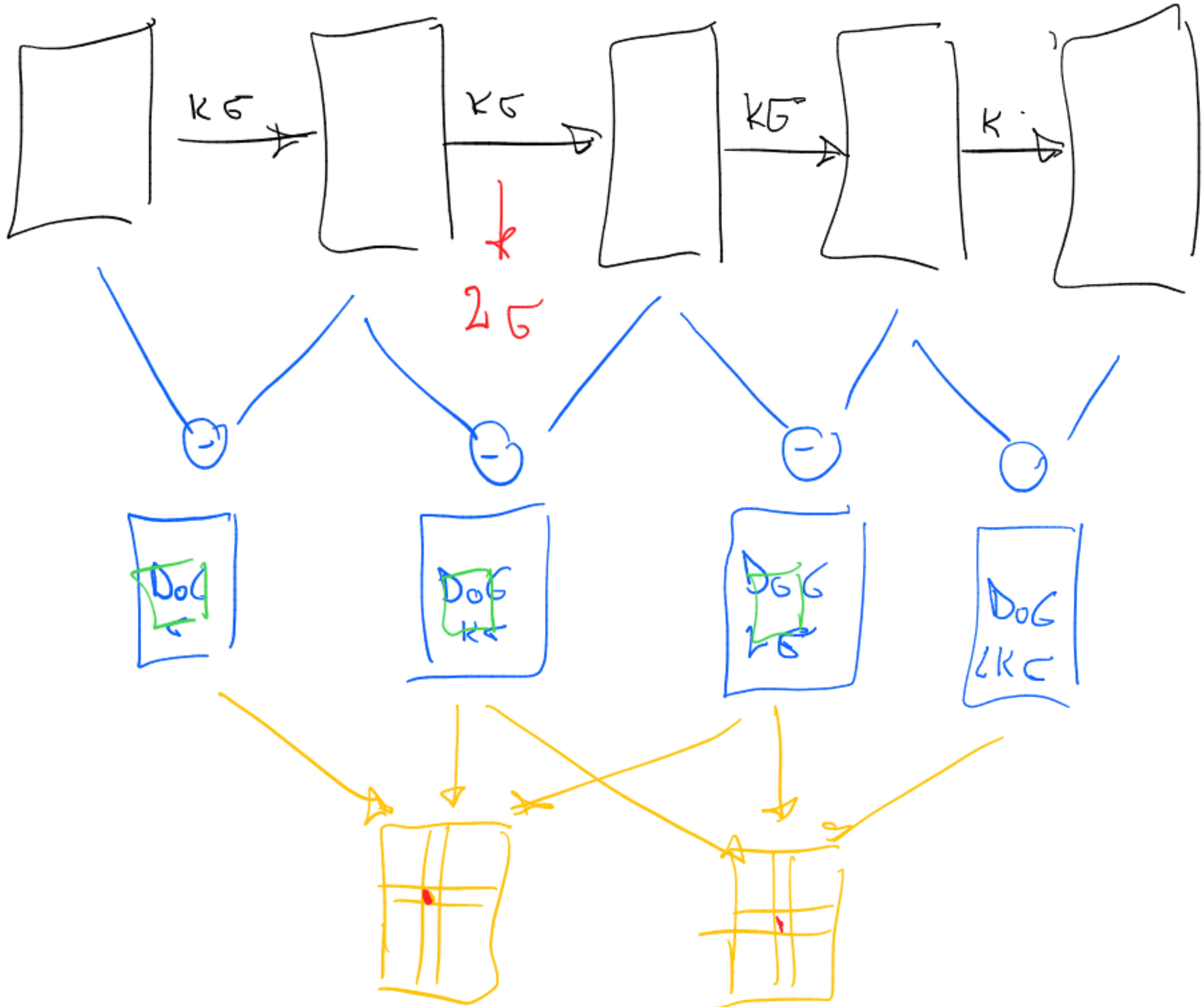


$$f_1 = G_{\underbrace{k^s\sigma}} f_0$$

$$\downarrow$$

$$k^s\sigma = 2\sigma \Rightarrow k = 2^{1/s}$$

s=2

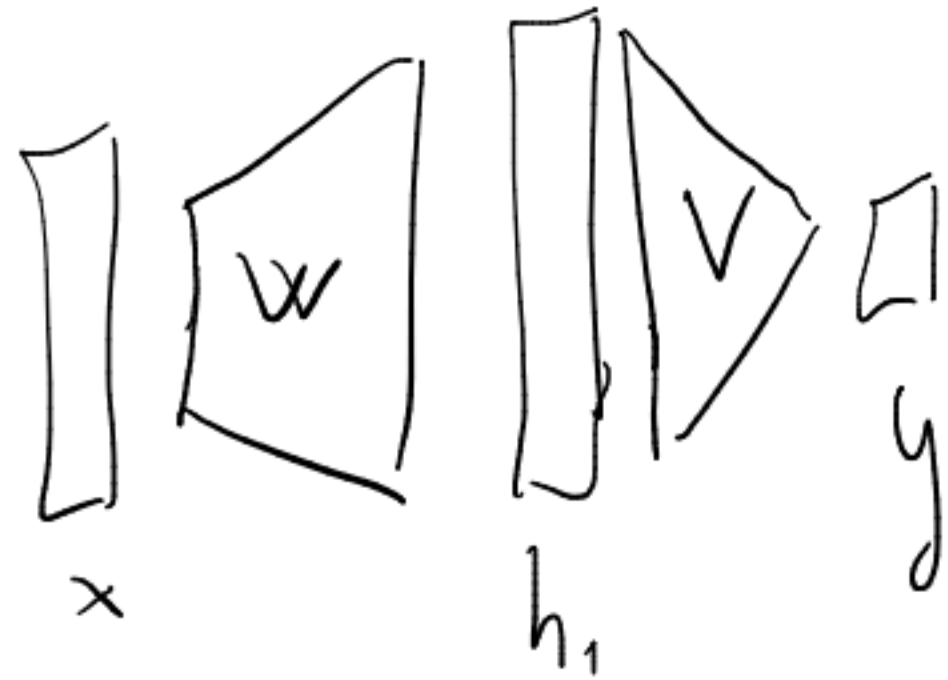


- I punti significativi → Gradienti → Filtri
- La scala → Filtri ripetuti (Gaussiani) → Filtri
- I descrittori → ampiezze, direzioni, Gabor, ... → Filtri

$\vec{x} \in \mathbb{R}^n$

$W \in \mathbb{R}^{n \times k_1}$ | f_1

$V \in \mathbb{R}^{k_1 \times 1}$ | f_2



$$y = f_2\left(V \cdot f_1\left(W \cdot \vec{x}\right)\right)$$

$$\hat{y} = \sigma(w^T x + b) \qquad D = \{(x_1, y_1) \ldots (x_n, y_n)\}$$

Problema: quale coppia w, b ottimale w.r.t D?

Soluzione:

$$w, b = SGD(D, \eta)$$

$$l(w,b) = \sum_{i \in B} y_i \log \sigma(w^T x_i + b)$$

repeat

$$w^{(t)} \leftarrow w^{(t-1)} + \boxed{\eta \frac{\partial l}{\partial w}}$$

$$b^{(t)} \leftarrow b^{(t-1)} + \boxed{\eta \frac{\partial l}{\partial b}}$$

until convergence

$$\hat{y} = \sigma\left(W_n^T f_{n-1}\left(W^T f_{n-2}\left(\ldots \ldots f_\phi\left(W_1^T x + b_1\right) + b_2\right) + \ldots\right) + b_n\right)$$

$$loss = \sum_{i \in B} y_i \log \hat{y}_i$$

$$\boxed{\frac{\partial\, loss}{\partial W_n}}$$

$$e = \left(a + b/2\right) * \frac{1}{b}$$