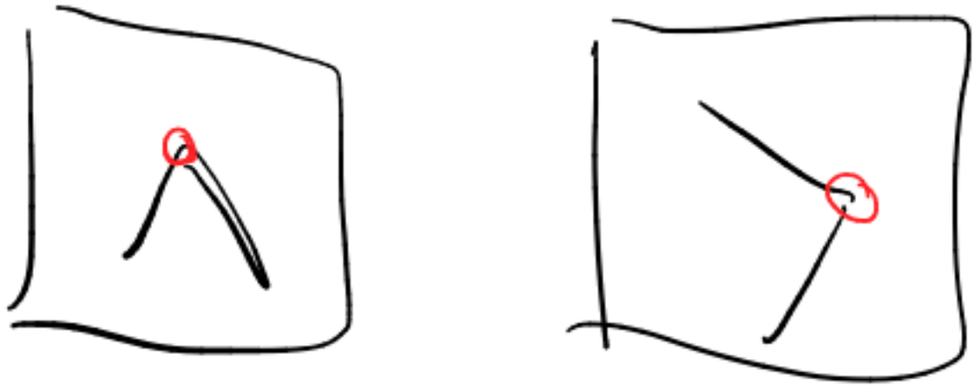
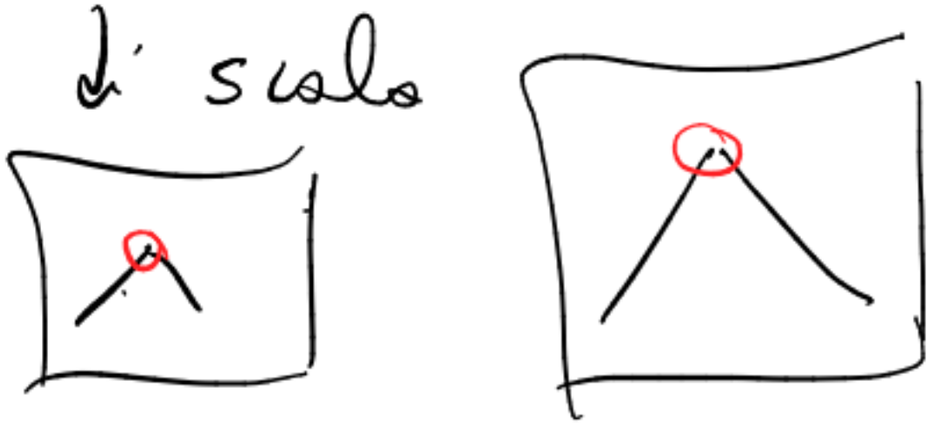
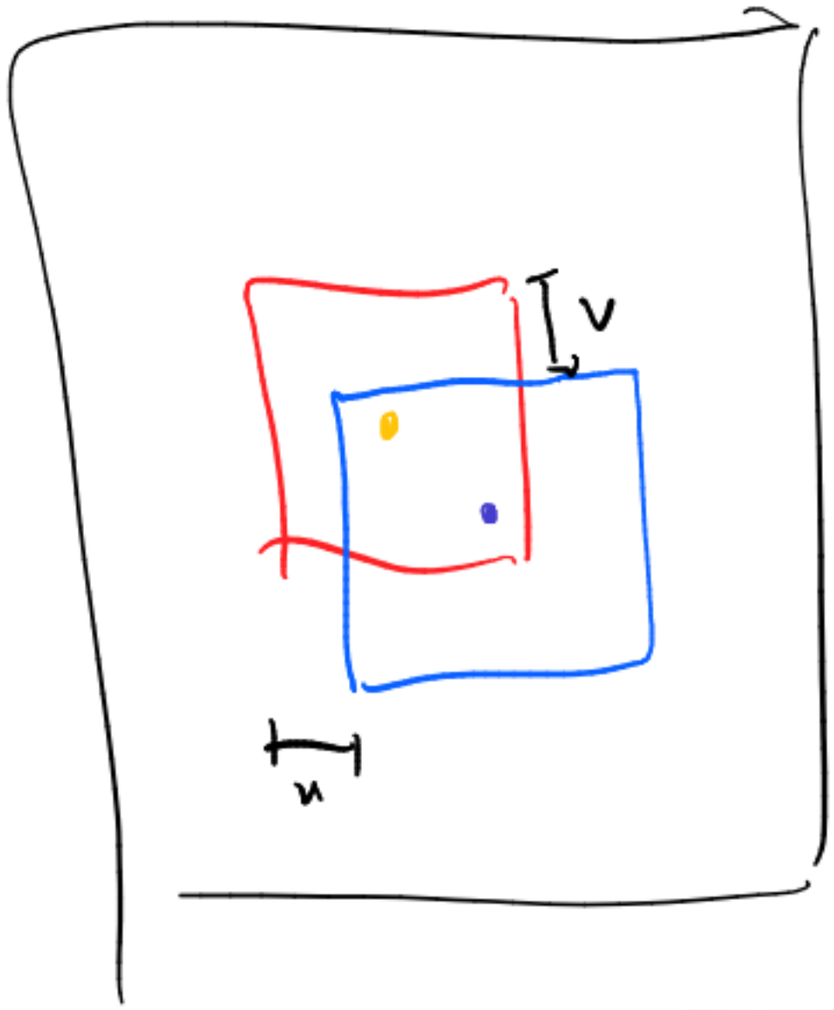
- Invariante di Rotazione



- Invariante di Intensità

- Invariante di scala






$$f(x) \approx a + b(x - x_0) + c(x - x_0)^2$$

$$f(x) = \boxed{f(x_0)} + \boxed{\frac{\partial}{\partial x} f(x_0)}\,(x - x_0) + \boxed{\frac{1}{2}\frac{\partial^2}{\partial x^2} f(x_0)}\,(x - x_0)^2$$

a b c

$$f(\delta_x, \delta_y) \approx f(0,0) + \begin{bmatrix} \frac{\partial f}{\partial x}(0,0) \\ \frac{\partial f}{\partial y}(0,0) \end{bmatrix}^T \begin{bmatrix} \delta_x \\ \delta_y \end{bmatrix}$$

$$+ \frac{1}{2} \begin{bmatrix} \delta_x & \delta_y \end{bmatrix} \begin{bmatrix} \frac{\partial^2 f}{\partial x^2}(0,0) & \frac{\partial f}{\partial x}\frac{\partial f}{\partial y}(0,0) \\ \frac{\partial f}{\partial x}\frac{\partial f}{\partial y}(0,0) & \frac{\partial^2 f}{\partial y^2}(0,0) \end{bmatrix} \begin{bmatrix} \delta_x \\ \delta_y \end{bmatrix}$$

$$E(0,0) = 0$$

$$E_u(u,v) = \sum_{xy} w(x,y)\left[I(x+u, y+v) - I(x,y)\right] \frac{\partial I}{\partial u}(x+u, x+v)$$

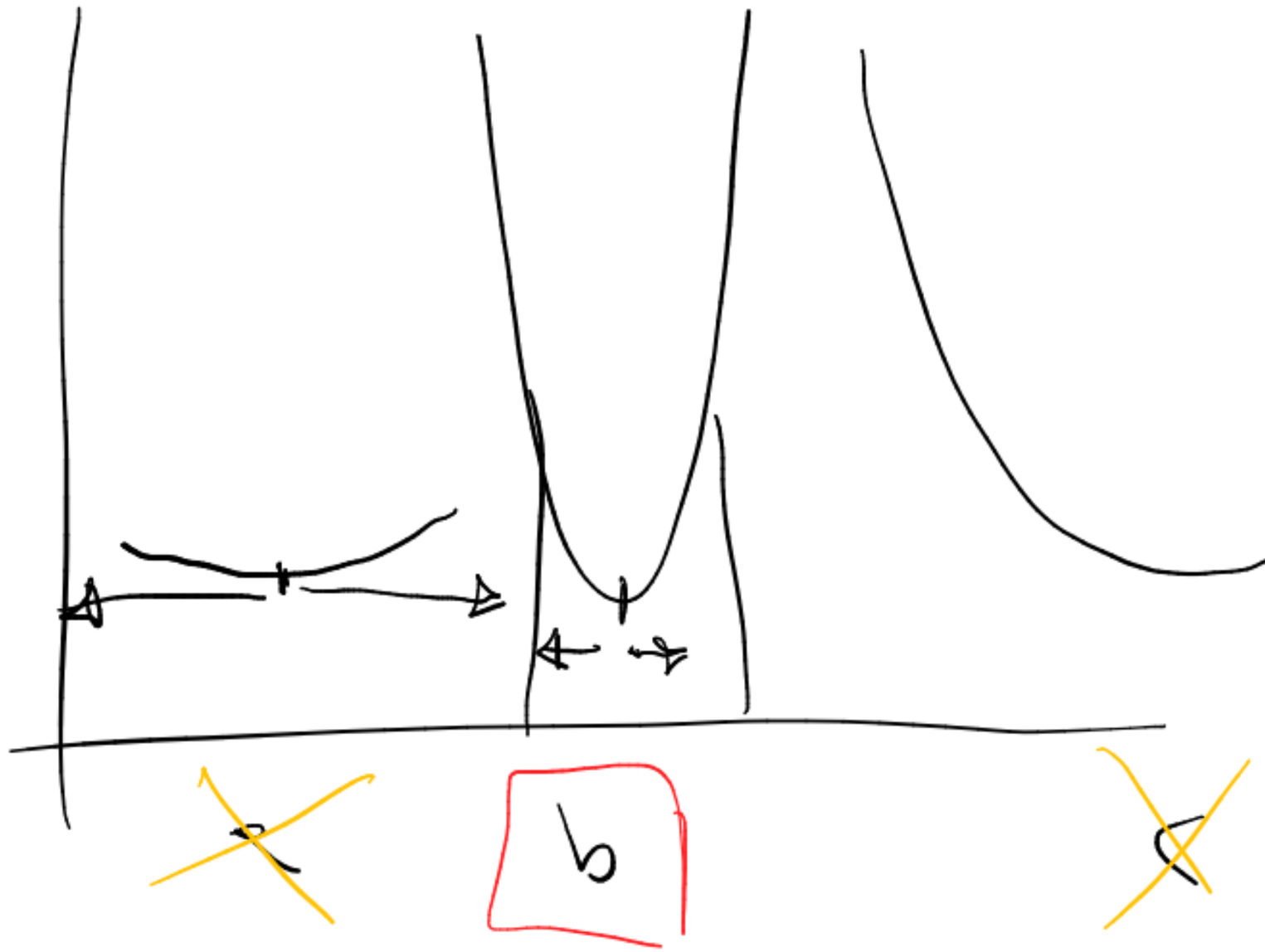
$$E_u(0,0) = 0 = E_v(0,0)$$

$$E_{uu}(u,v) = \frac{\partial}{\partial u} 2 \sum_{x,y} w(x,y)\left[I(x+u,y+v) - I(x,y)\right]\frac{\partial I}{\partial u}(x+u,y+v)$$

$$= 2\sum_{x,y} w(x,y)\frac{\partial}{\partial u} I(x+u,y+v)\cdot \frac{\partial I}{\partial u} I(x+u,y+v)$$

$$= 2\sum_{x,y} w(x,y) I_x^2(x+u,y+v)$$

$$E_{uu}(0,0) = 2\sum_{x,y} w(x,y) I_x^2(x,y)$$


b