$$\boxed{I} * \boxed{G_\sigma} = \boxed{I_G}$$

$$\boxed{I} * \boxed{G'_\sigma} = \boxed{I_{G'}}$$

$$\boxed{I} * \boxed{\nabla G_\sigma} = \boxed{I_{\nabla G}}$$

Blobs!! 50 blobs. $\longrightarrow$ 50 convolution with LoG.

$$G_\sigma(x,y) = \frac{1}{2\pi\sigma^2} e^{-\frac{x^2+y^2}{2\sigma^2}} \longrightarrow \text{Gaussian kernel.}$$

$$\frac{\partial G_\sigma}{\partial x} = \frac{1}{2\pi\sigma^2} \frac{\partial}{\partial x} e^{-(x^2+y^2)/2\sigma^2} = \frac{1}{2\pi\sigma^2}\left(\frac{-x}{\sigma^2} e^{-(x^2+y^2)/2\sigma^2}\right)$$

$$\frac{\partial^2}{\partial x^2} G_\sigma(x,y) = \frac{1}{2\pi\sigma^2}\left(\frac{x^2-\sigma^2}{\sigma^4} e^{-(x^2+y^2)/2\sigma^2}\right)$$

$$\nabla^2 G_\sigma(x,y) = \frac{1}{2\pi\sigma^2}\left(\frac{x^2+y^2-2\sigma^2}{\sigma^4} e^{-(x^2+y^2)/2\sigma^2}\right)$$

where $\nabla^2 G = \frac{\partial^2 G}{\partial x^2} + \frac{\partial^2 G}{\partial y^2}$

$$\frac{\partial}{\partial \sigma} G_\sigma(x,y) = \frac{1}{2\pi}\left(\frac{x^2-y^2-2\sigma^2}{\sigma^5} e^{-(x^2+y^2)/2\sigma^2}\right)$$

$$\therefore \frac{\partial G_\sigma}{\partial \sigma} = \sigma \nabla^2 G_\sigma(x,y)$$

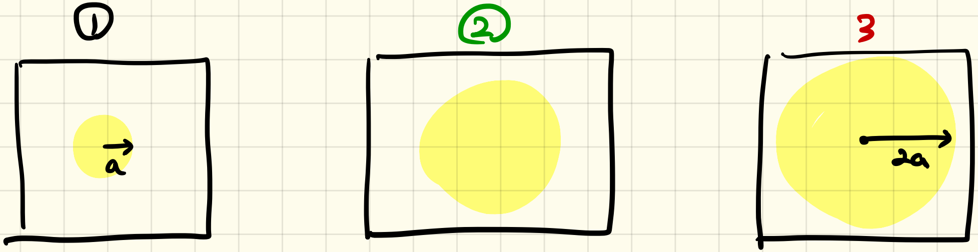
$$\therefore \quad \frac{\partial G_\sigma}{\partial \sigma} = \sigma \nabla^2 G_\sigma(x,y)$$

$$\frac{\partial G_\sigma}{\partial \sigma} \approx \frac{G(x,y,k\sigma) - G(x,y,\sigma)}{k\sigma - \sigma} \approx \sigma \nabla^2 G_\sigma(x,y)$$

$$G(x,y,k\sigma) - G(x,y,\sigma) \approx (k-1)\sigma^2 \nabla^2 G_\sigma(x,y).$$

$$\boxed{\therefore \quad \nabla^2 G_\sigma(x,y) \approx \frac{G(x,y,k\sigma) - G(x,y,\sigma)}{(k-1)\sigma^2}.}$$

$$I * \nabla^2 G_\sigma \approx I * G_{k\sigma} - I * G_\sigma$$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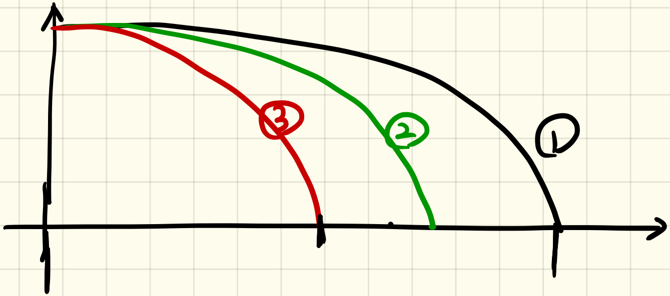
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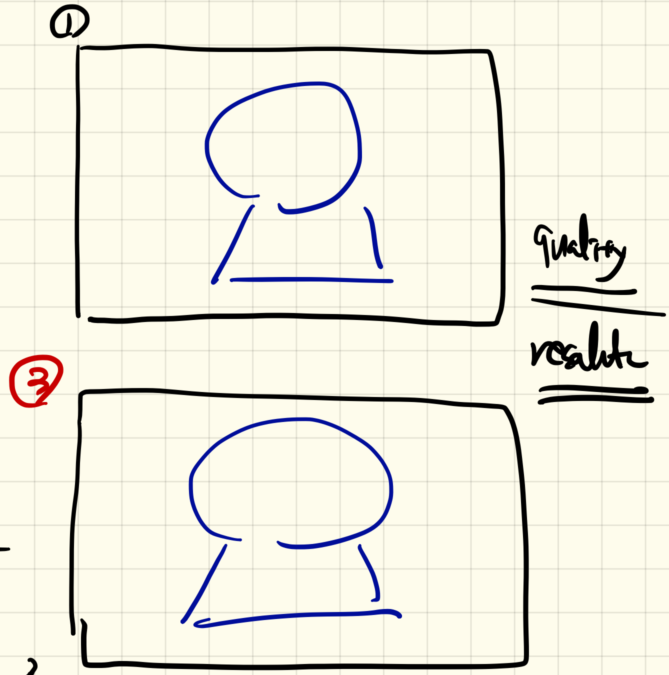
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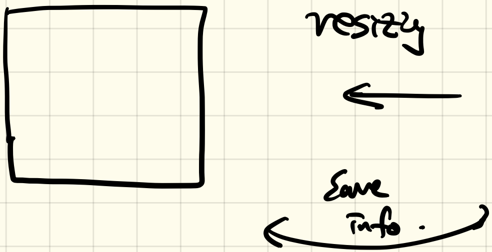
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