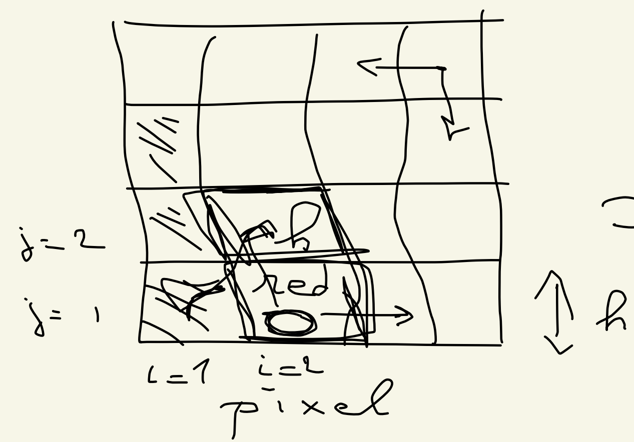
Fast Marching



D_{ij}

$D_{21} = 0$

r, g, b, (a)

- $D_{21} = 0$ figé

Narrow band : $[D_{31}, D_{22}, \underbrace{\cancel{D_{11}}}_{min}]$

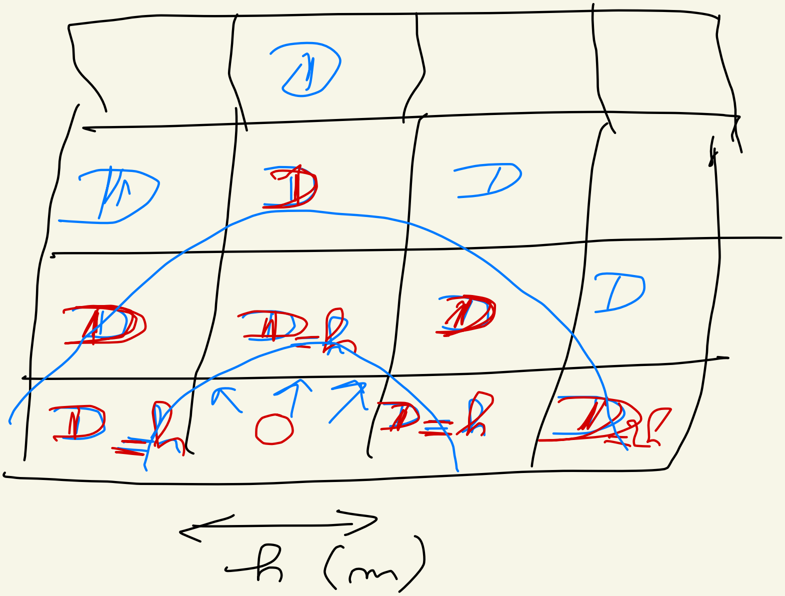
$'' \infty \; (1.e^{99})$

- Calcule D_{31} et D_{22}
- Je fige $\min\{D_{ij} \,/\, ij \in \text{Narrow band}\}$

et j'ajoute ~~ses~~ nouveaux voisins

$NB = [D_{31}, \cancel{D}, D_{23}, D_{32}]$

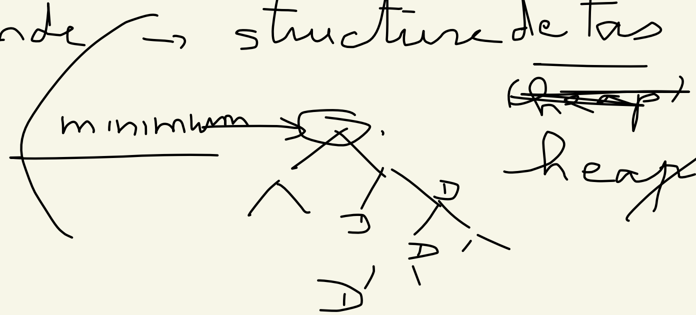
- Calcule D_{23}, D_{32}



Narrow bande → structure de tas

(~~heap~~)

heap



Vous avez resolu une équation Eikonal

$$\| \nabla D \| = \frac{1}{F} \quad (1)$$

$$\nabla D(x,y) = \begin{pmatrix} \frac{\partial D}{\partial x} \\ \frac{\partial D}{\partial y} \end{pmatrix} \qquad F = F(x,y)$$

$$\| \nabla D \| = \sqrt{\left|\frac{\partial D}{\partial x}\right|^2 + \left|\frac{\partial D}{\partial y}\right|^2}$$

$$\boxed{\left(\frac{\partial D}{\partial x}\right)^2 + \left(\frac{\partial D}{\partial y}\right)^2 = \frac{1}{F^2} \quad (2)}$$

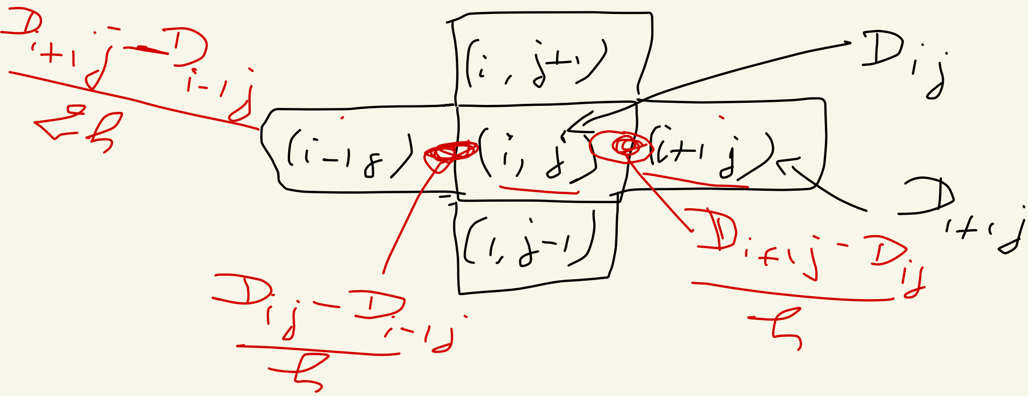
<u>Rmq</u>

- $F = 1$ => calcule la distance à l'objectif
- $F \neq 1$ => temps de trajet

$$D_{ij} \simeq D(x_i, y_j)$$

$$\underbrace{D(x_i + h, y_j)}_{D_{i+1\,j}} = \underbrace{D(x_i, y_j)}_{D_{ij}} + h\,\frac{\partial D}{\partial x}(x_i, y_j) + \frac{h^2}{2}\,\frac{\partial^2 D}{\partial x^2}(x_i, y_j) + \cdots$$

$$\frac{\partial D}{\partial x}(x_i, y_j) \simeq \frac{D_{i+1\,j} - D_{ij}}{h} \quad (+\,O(h))$$



FM. on ~~ne~~ calcule un D_{ij} en utilisant uniquement des cases où D est <

$$\max\left(\frac{D_{i+1j}-D_{ij}}{h}, \frac{D_{ij}-D_{i-1j}}{h}, 0\right)^2$$

$$+\max\left(\frac{D_{ij+1}-D_{ij}}{h}, \frac{D_{ij}-D_{ij-1}}{h}, 0\right)^2$$

$$= \frac{1}{F_{ij}}$$

F_{ij} donné.

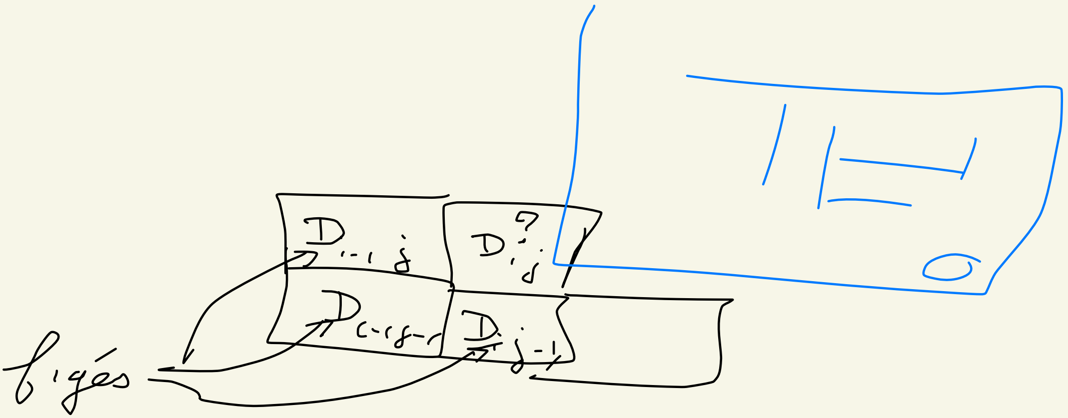
$$\Rightarrow D_{ij} = ?$$

$a = \min(D_{i-1j}, D_{i+1j})$

$b = \min(D_{ij-1}, D_{ij+1})$

$$\left(\frac{D_{ij}-a}{h}\right)^2 + \left(\frac{D_{ij}-b}{h}\right)^2 = \frac{1}{F_{ij}^2}$$

$\Rightarrow D_{ij} = \ldots$

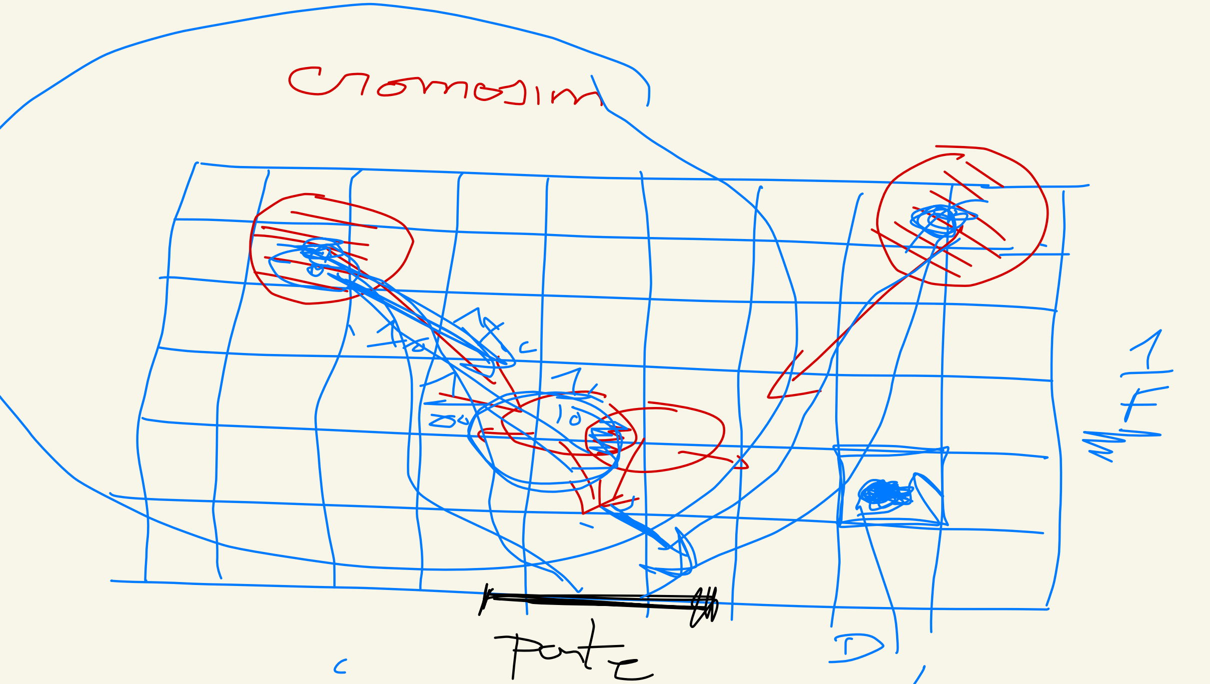


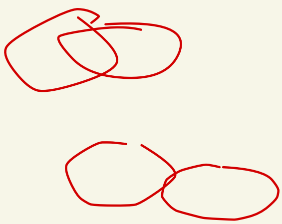
$$a = \min\left(D_{i-1,j},\ \cancel{D_{i+1,j}}\right)$$

je l'oublie
cas + gd

$$= D_{i-1,j}$$

$$b = D_{i,j-1}$$

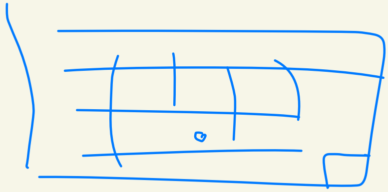




Fps

$$\|\nabla D(x,y)\|^2 \overset{?}{=} \frac{1}{F(D)}$$

$$F(D, x, y, t)$$



numpy image

D

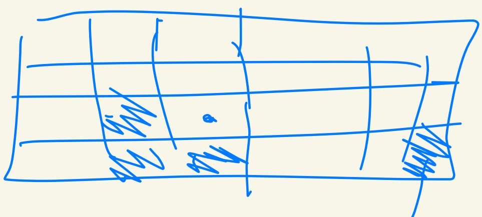
narrow band

3 listes

i

j

D_{ij}



numpy booleen

True / False

10000 figés / non figés

mu (calculés)