

NANOPERANDO

Groupement de recherche CNRS



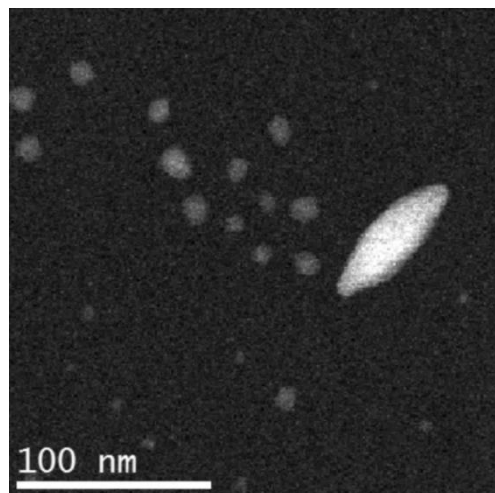
Atelier traitement d'image, plateforme plug im!

M. Moreaud, PhD, HDR, R&I project leader

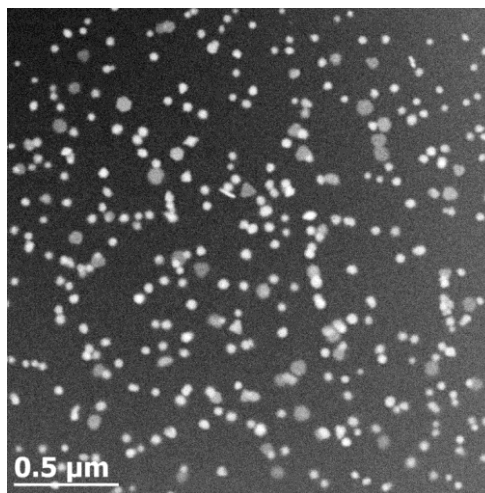
maxime.moreaud@ifpen.fr



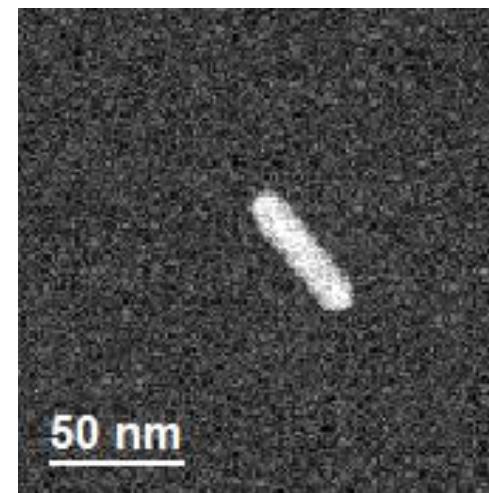
Data : image sequence from video



Au serie¹, 952x954, 63 images



Np serie², 744x744, 24 images



vid serie³, 173x173, 180 images

Objective : track each objects of interest, compute morphological characterization

1 K. Aliyah et al., submitted in revision Nature Chemistry

2 D. Alloyeau et al. Nano Letters 15 2574-2581

3 D. Alloyeau et al., in preparation

First, get sample data and plug im!

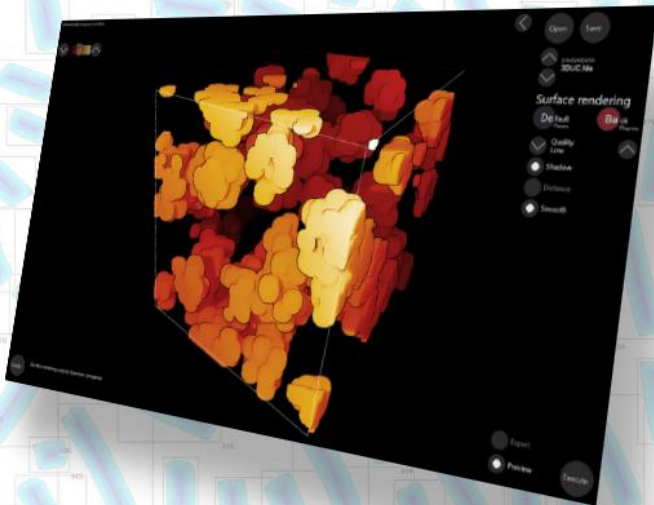
www.plugim.fr

plugim! Login

HOME PLUGINS CONTACT

Signal and image processing

[Download](#) [Plugins](#)



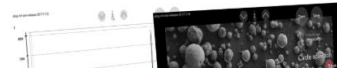
IFPEN provides its internal signal and image processing platform for those who want the most advanced features combined with a



plug im!

Author: **Scientific Division - Digital Science and Technology Division** - Affiliation : **IFP Energies nouvelles**

Signal, Image



Popular plugins

3D Histogram automatic segmentation
275 Downloads

o go to the plugin section and give a title, author's name and affiliation, description, illustration (jpg, png or gif image); upload the plugin as a zip file containing the module folder with exe file and xml file; and optionally mention a hyperlink and/or add a pdf file related to the plugin.

Your plugin, after validation, will be made available under plugins section of the website.

Updates :

20191119 : added csv file format support (loading and saving) and fix collision issue with awr format.
20191014 : fixed Matlab Jet color map and added a developer feature to manage color map from plugins.

plug im! portable is also available in download. It requires the dotnet 4 framework, and visual studio 2008 and 2017 redistribution libraries installed to work properly.

Portable version

Plugins section

Download

310 Downloads

Comments

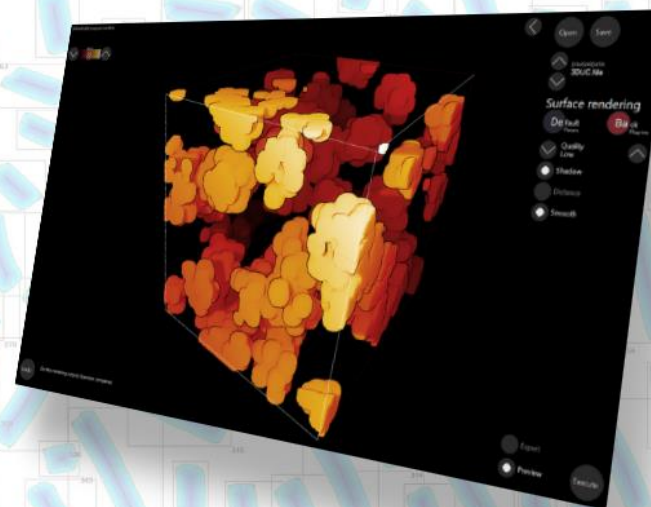
You must be [logged in](#) to post a comment.



Signal and image processing

Download

Plugins



IFPEN provides its internal signal and image processing platform for those who want the most advanced features combined with a

Official plugins are provided by IFPEN and academic / industrial partners

Other plugins are provided with no verification

Developers, create **your own plugin** for plug im ! Developer corner



Workshop GdR NanOperando 2019

A workshop dedicating to the potential of plug im! platform to extend quantitative information on plasma in situ experiments, therefore "dynamic" by nature! Includes a package with a set of plug im! modules, working data files, and pdf slides to guide users.

🕒 2019-11-22 15:00:21 📄 0 Downloads / 💬 0 Comments
 Author : Maxime Moreaud Affiliation : IFP Energies nouvelles
 Input-data : 8bits image

Luminosity drift correction by morphological approach

Luminosity drift correction by TopHat operation combined with smoothing filter and / or LIP substraction.

🕒 2019-11-21 15:17:20 📄 2 Downloads / 💬 0 Comments
 Author : Maxime Moreaud Affiliation : IFP Energies nouvelles
 Input-data : 8bits image

Criterion opening

Latest release

Download latest plug im ! release basic package

[Download](#)

Popular plugins

3D Histogram automatic segmentation
📄 276 Downloads

Flowing bilateral filter 3D
📄 253 Downloads

Compare
📄 253 Downloads

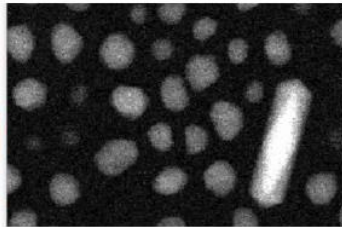
Latest plugins

Workshop GdR NanOperando 2019
🕒 2019/11/22

Workshop GdR NanOperando 2019

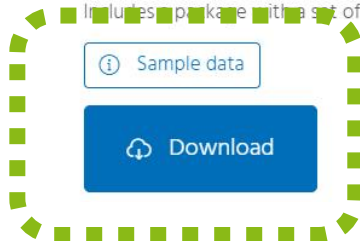
Author: **Maxime Moreaud** - Affiliation : IFP Energies nouvelles

Other plugins



A workshop dedicating to the potential of plug im! platform to extract quantitative information from data from in situ experiments, therefore "dynamic" by nature!

Includes package with a set of plug im! modules, working data files, and pdf slides to guide users.



Popular plugins

3D Histogram automatic segmentation

📄 276 Downloads

Flowing bilateral filter 3D

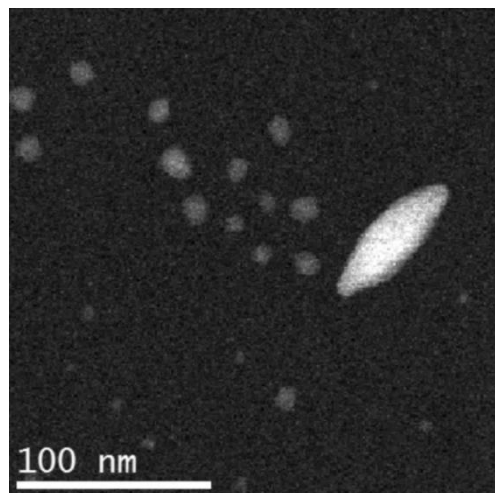
📄 253 Downloads

Compare

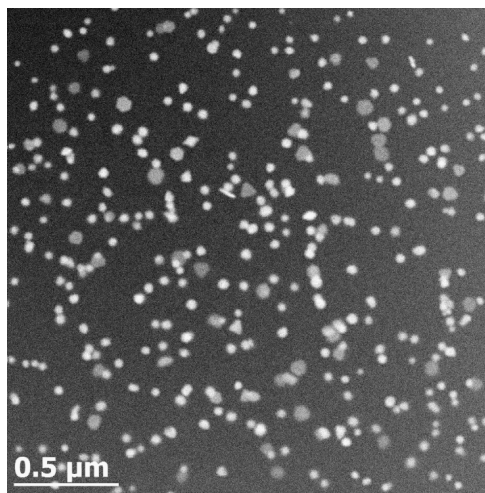
📄 253 Downloads

Latest plugins

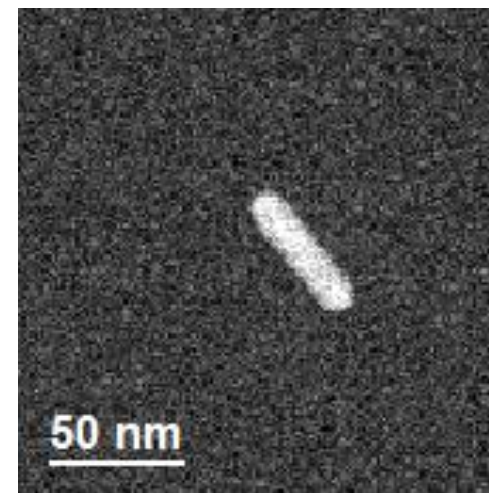
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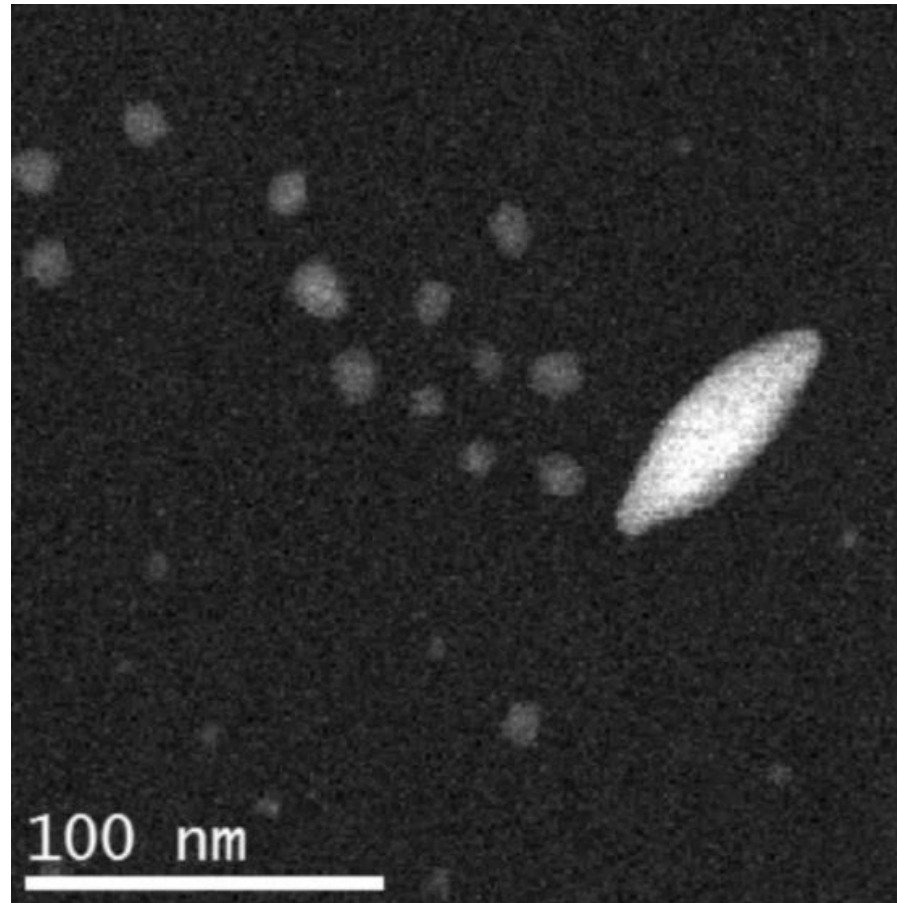
Objective : track each objects of interest, compute morphological characterization

1 K. Aliyah et al., submitted in revision Nature Chemistry

2 D. Alloyeau et al. Nano Letters 15 2574-2581

3 D. Alloyeau et al., in preparation

Au serie



K. Aliyah et al., submitted in revision Nature Chemistry

Methodology :

Segmentation in two classes (case specific)

Volume creation

Tracking and morphological measurements

Plugin

- Ba tch Processing
MM IFPEN 2017
- Co mpare
IFPEN 2017
- 4 Mo rpho Maths
IFP/NT21 2012 MM FI
- Bo rder kill
IFPEN MM 2013
- 3 Ho le filling
IFPEN MM 2013
- Lu minosity drift correction
IFPEN 2011
- 2 3D from list
IFPEN 2017 MM
- Cr iterion opening
IFPEN 2011-13 MM
- Bi nary Separation
IFPEN 2013 MM
- 1 Hi stogram segmentation
IFPEN 2013/19 MM/ME

Histogram segm ...

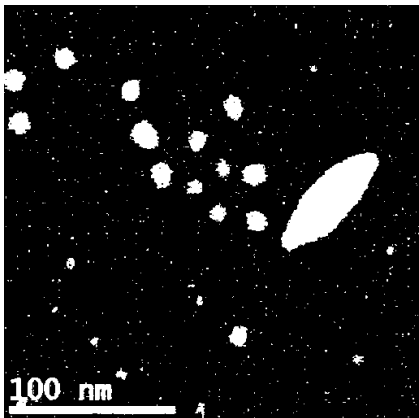
De fault Param. Ba ck Plug-ins

Criteria Manual

Nb thr. 1

Threshold 1 55

1



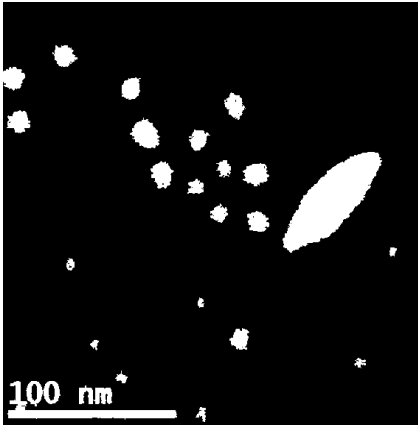
Criterion opening

De fault Param. Ba ck Plug-ins

Criteria Length

Min value 20

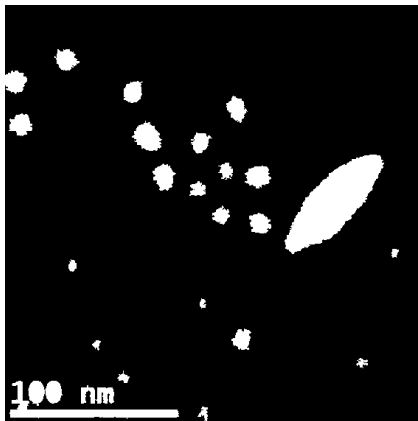
2



Hole filling

De fault Param. Ba ck Plug-ins

3



Morpho Maths

De fault Param. Ba ck Plug-ins

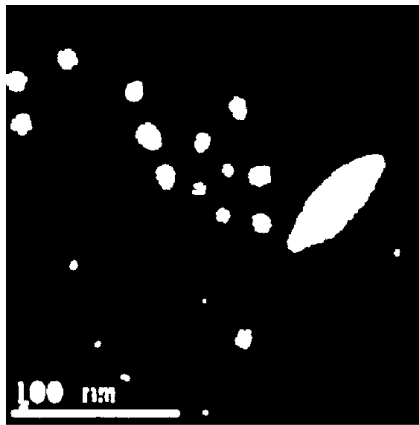
CUDA

Operator Opening


Structuring element Disk

Size 5

4



14 | © 2019 IFPEN

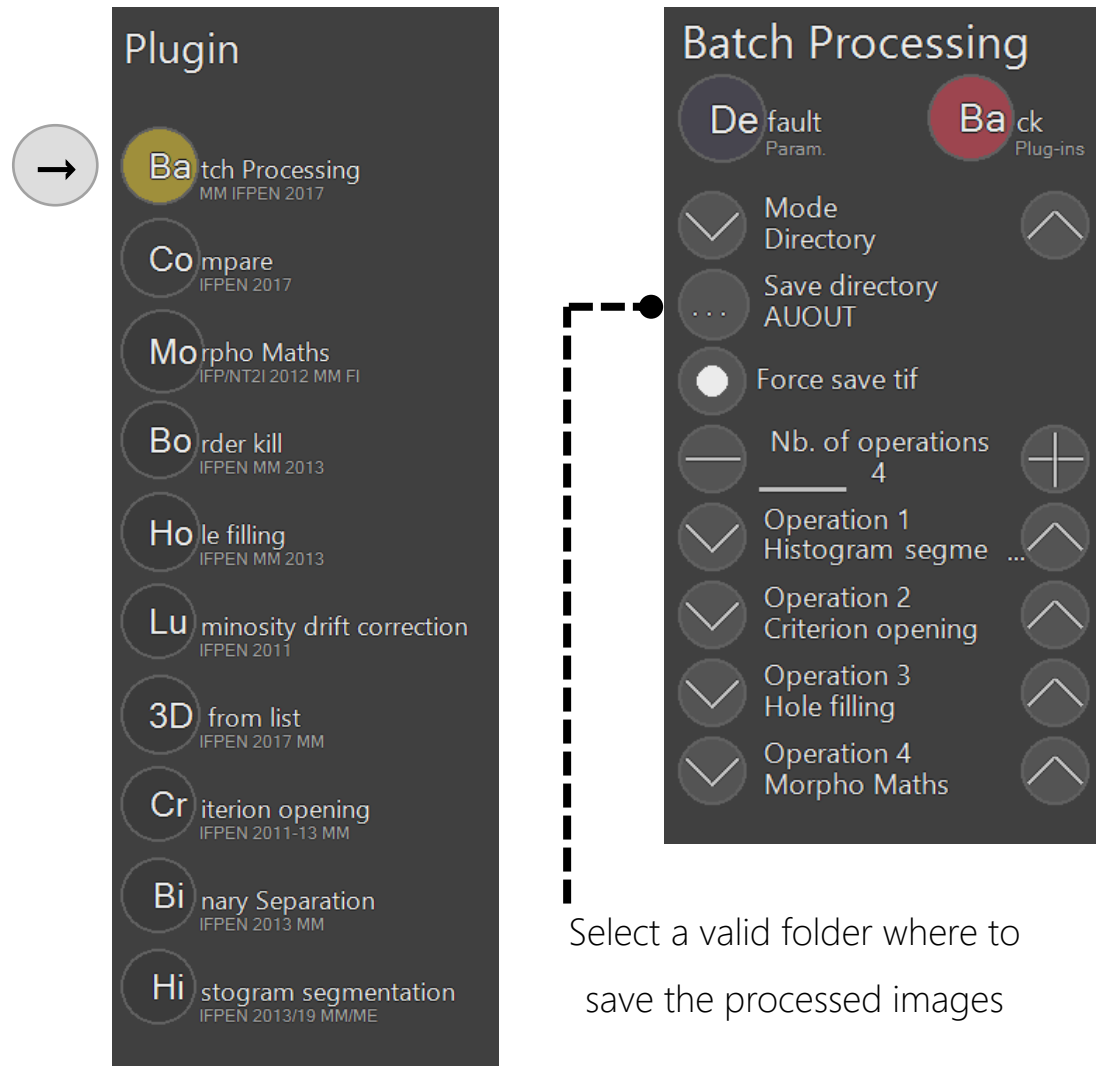


Load one image of the directory to process (any image whatsoever)

The image shows two screenshots from a software interface. The left screenshot is a vertical menu titled 'Plugin' with several options: 'Batch Processing' (highlighted in yellow), 'Compare', 'Morpho Maths', 'Border kill', 'Hole filling', 'Luminosity drift correction', '3D from list', 'Criterion opening', 'Binary Separation', and 'Histogram segmentation'. An arrow points from the 'Batch Processing' option to the right screenshot. The right screenshot is titled 'Batch Processing' and shows configuration options: 'Default Param.' (with a 'Back Plug-ins' button), 'Mode Directory', 'Save directory AUOUT' (with a dropdown menu), 'Force save tif', 'Nb. of operations 4' (with a plus button), and four operations: 'Operation 1 Histogram segme...', 'Operation 2 Criterion opening', 'Operation 3 Hole filling', and 'Operation 4 Morpho Maths'. A dashed line points from the 'Save directory AUOUT' option to the text below.

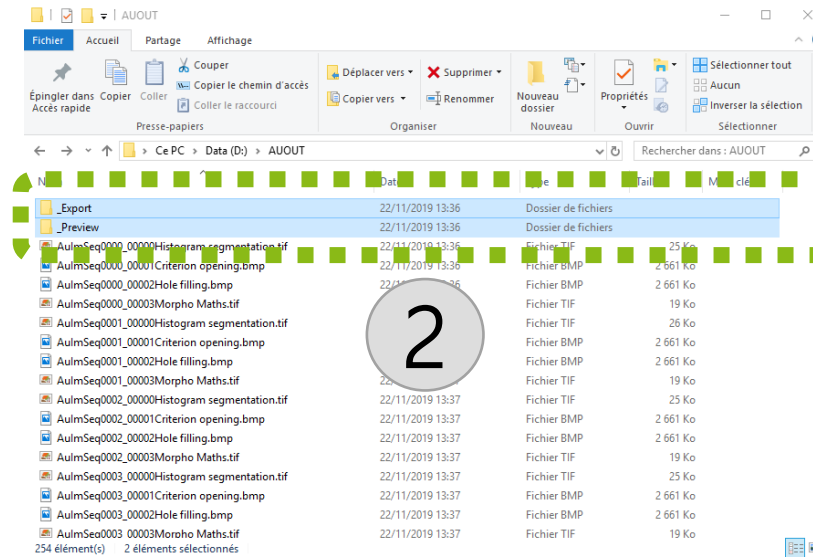
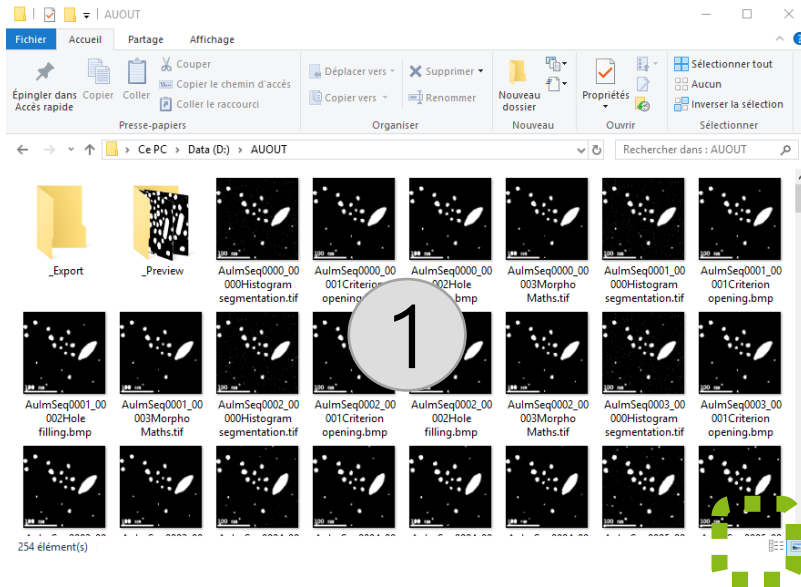
Select a valid folder where to save the processed images

Load one image of the directory to process (any image whatsoever)

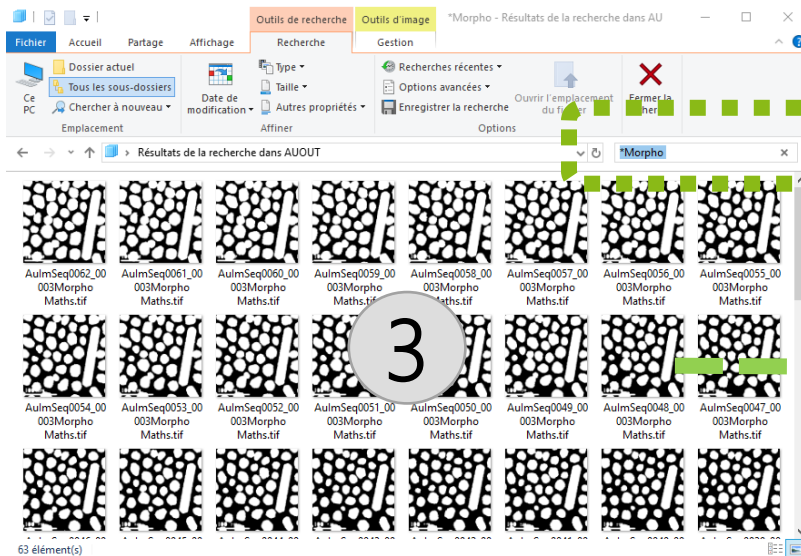


Select a valid folder where to save the processed images

plug^{im!} Au serie, segmentation automation



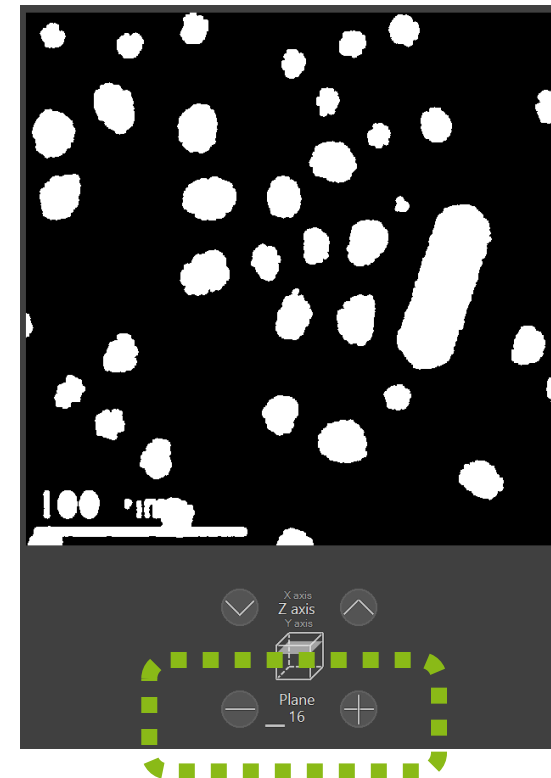
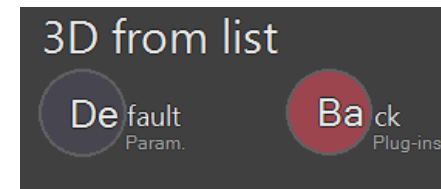
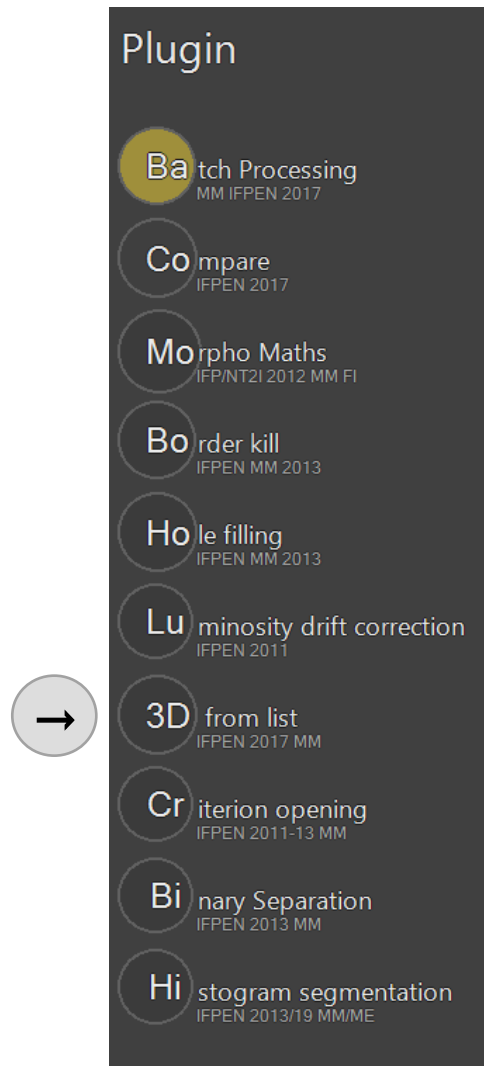
Delete folders



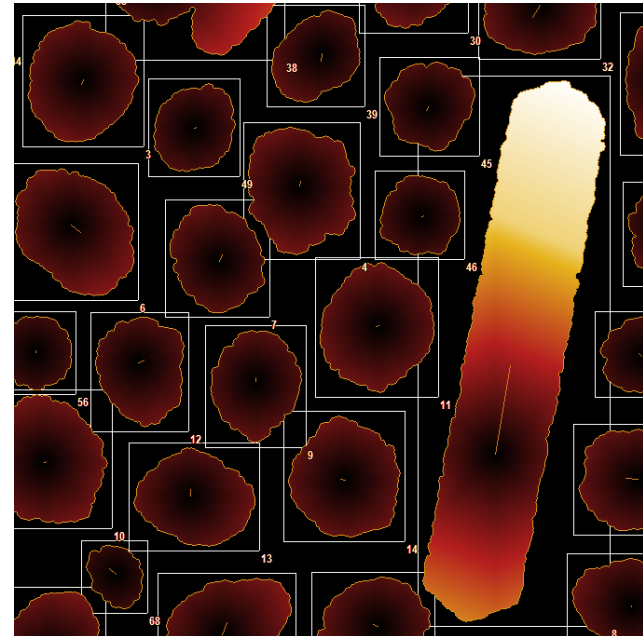
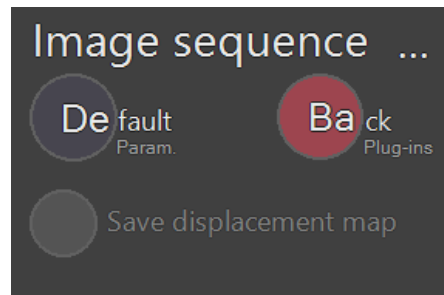
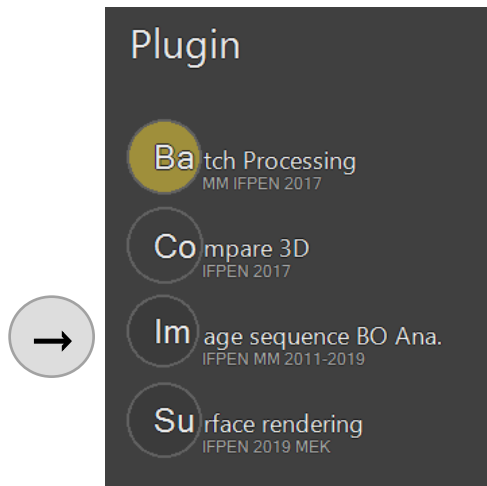
*Morpho

Select all (63 files) and copy to a new folder

Load one segmented image of the new folder (any image whatsoever)

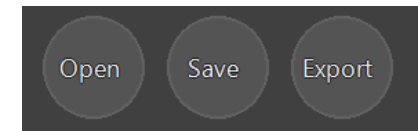


You can navigate through the image sequence



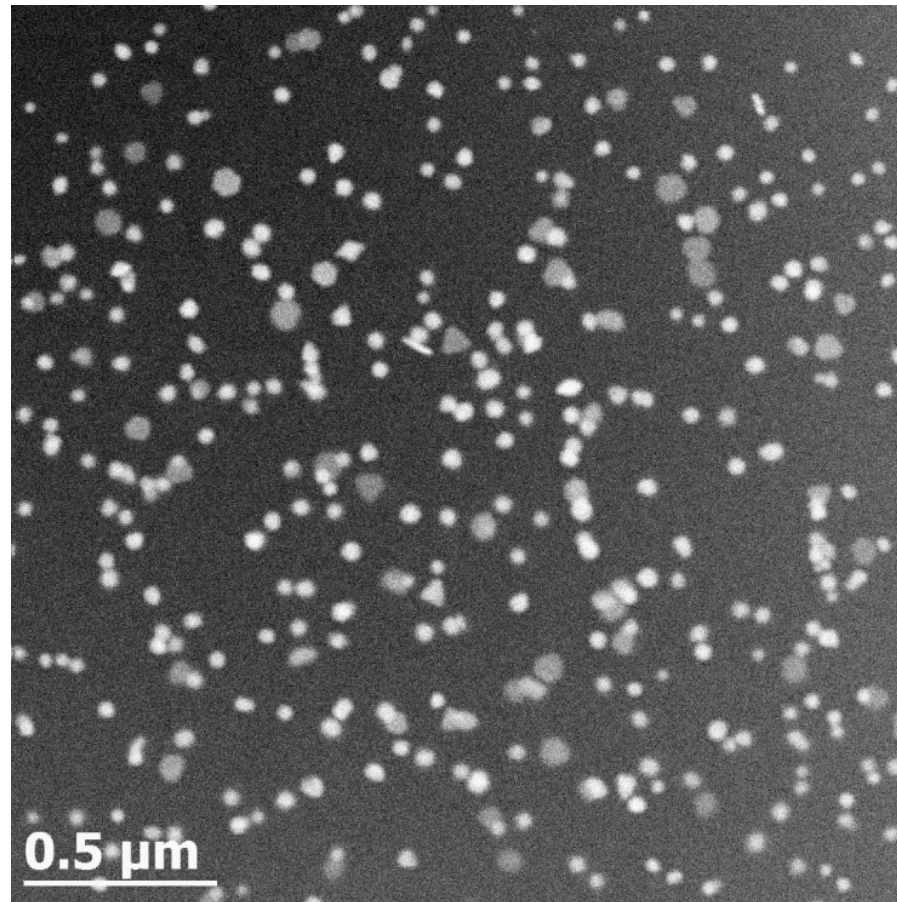
Validate

Save in fda
or tiff format



Export the result

Np serie



D. Alloyeau et al. Nano Letters 15 2574-2581

Np serie, segmentation in 6 steps (1/2)

Plugin

- 1** **Batch Processing**
MM IFPEN 2017
- 2** **Morpho Maths**
IFP/NT2I 2012 MM FI
- 3** **Histogram segmentation**
IFPEN 2013/19 MM/ME

Morpho Maths

Default Param. **Back** Plug-ins

CUDA

Operator Opening then clos ...

Structuring element Disk

Size 1

Luminosity drift ...

Default Param. **Back** Plug-ins

Dark objects

Strength 40

Smooth factor 9.50

Dynamic correction

LIP processing

Histogram segm ...

Default Param. **Back** Plug-ins

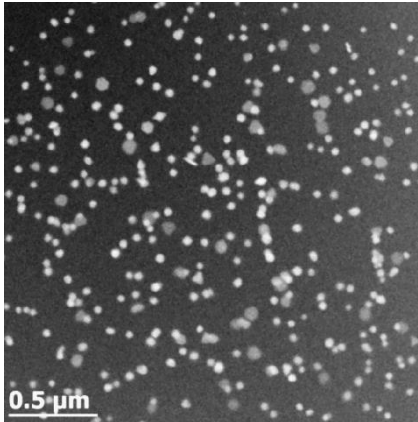
Criteria MIV

Method Classical

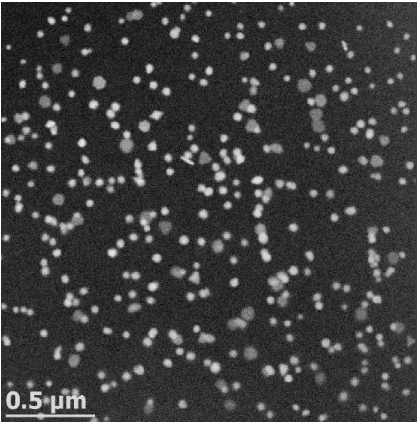
Nb classes 2

Auto nb classes

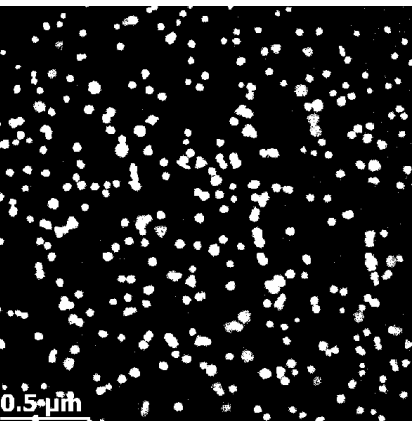
1



2



3



Plugin

- Batch Processing MM IFPEN 2017
- Compare IFPEN 2017
- Morpho Maths IFP/NT2I 2012 MM FI
- Border kill IFPEN MM 2013
- Hole filling IFPEN MM 2013
- Luminosity drift correction IFPEN 2011
- 3D from list IFPEN 2017 MM
- Criterion opening IFPEN 2011-13 MM
- Binary Separation IFPEN 2013 MM
- Histogram segmentation IFPEN 2013/19 MM/ME

5

4

6

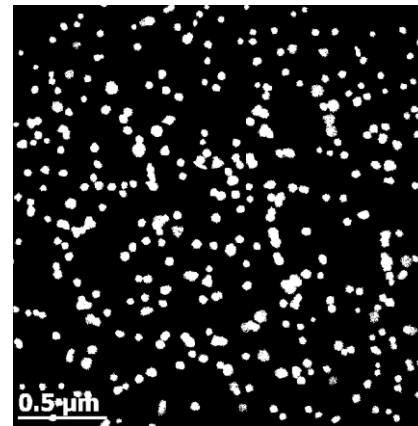
Criterion opening

Default Param. **Back** Plug-ins

Criterion Length

Min value 5

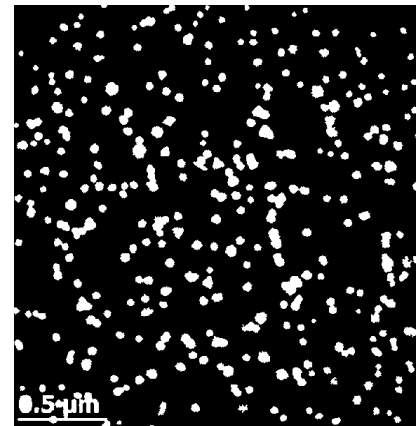
4



Hole filling

Default Param. **Back** Plug-ins

5

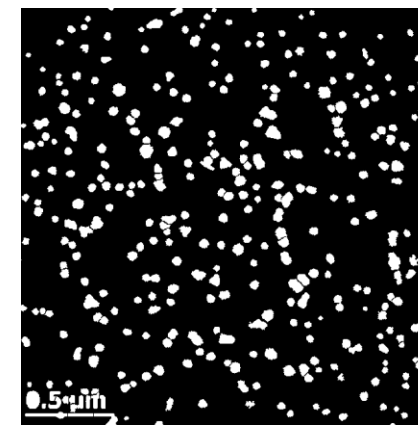


Binary Separation

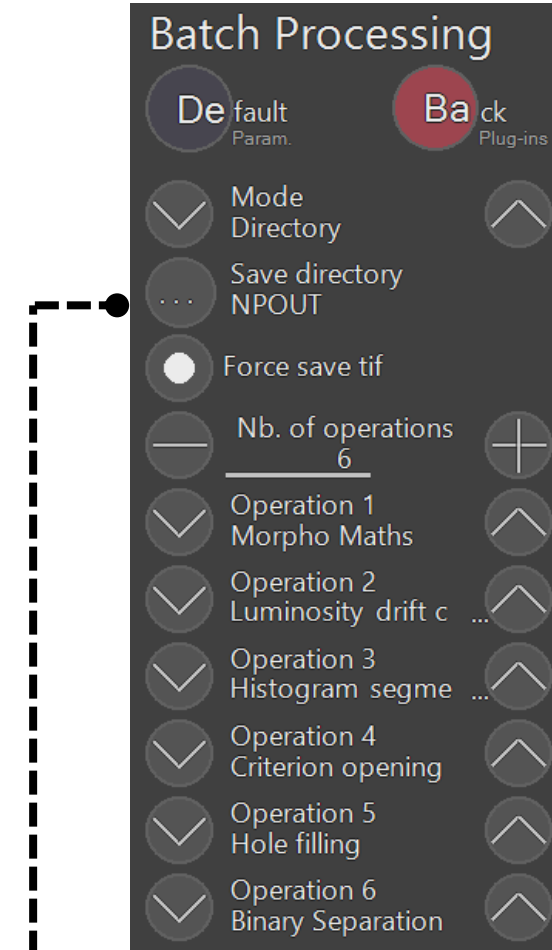
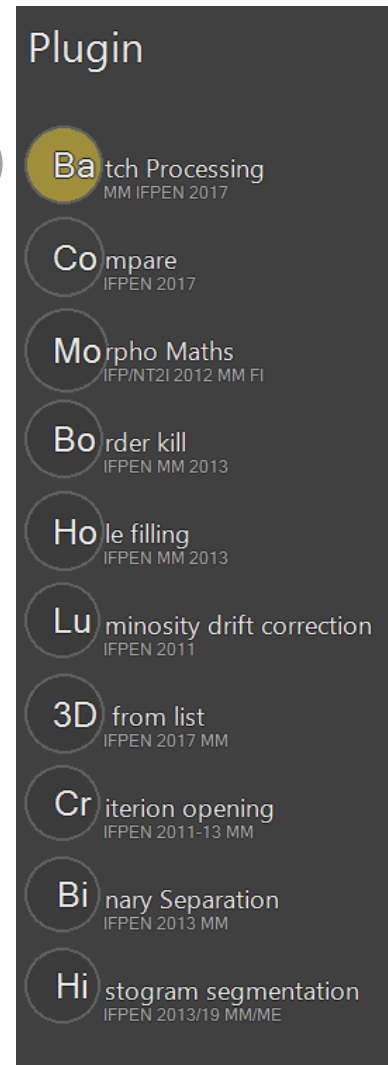
Default Param. **Back** Plug-ins

Size 1

6



Load one image of the directory to process (any image whatsoever)

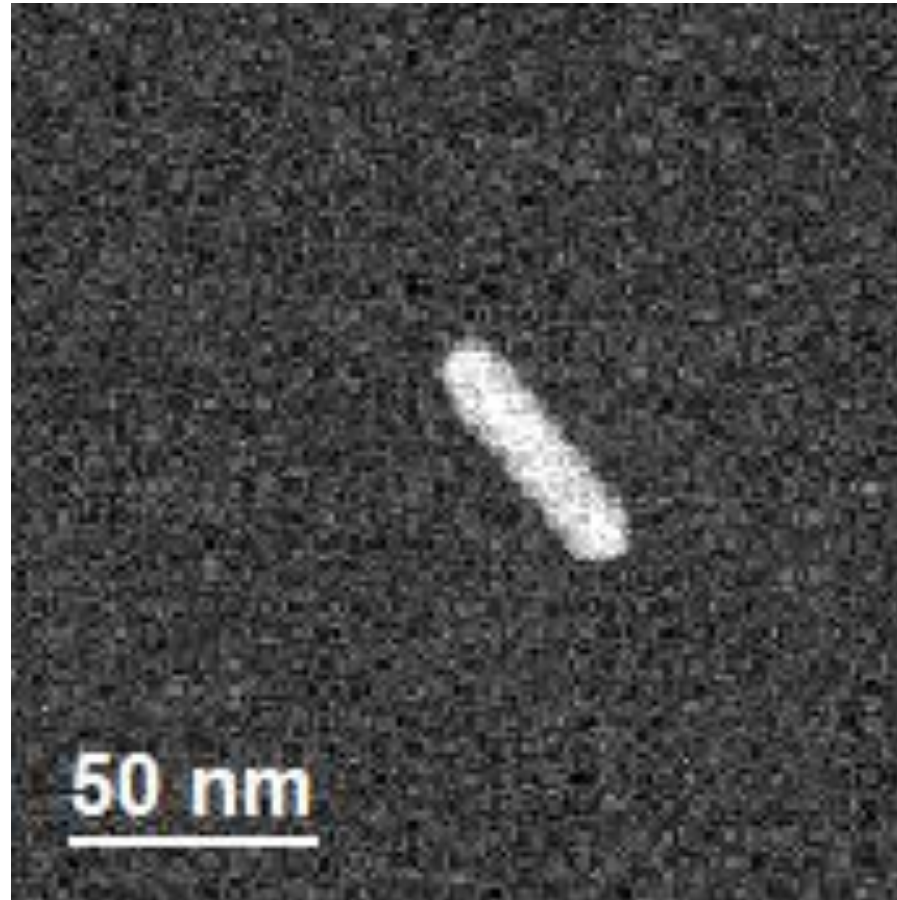


Select a valid folder where to save the processed images

then, same procedure as for Au serie

Volume creation and
tracking and morphological measurements :
same procedure as Au serie

vid serie



D. Alloyau et al., in preparation

1

2

3

Plugin

- Batch Processing MM IFPEN 2017
- Compare IFPEN 2017
- Morpho Maths IFP/NT2I 2012 MM FI
- Border kill IFPEN MM 2013
- Hole filling IFPEN MM 2013
- Luminosity drift correction IFPEN 2011
- 3D from list IFPEN 2017 MM
- Criterion opening IFPEN 2011-13 MM
- Binary Separation IFPEN 2013 MM
- Histogram segmentation IFPEN 2013/19 MM/ME

Morpho Maths

Default Param. Back Plug-ins

CUDA

Operator Opening then clos ...

Structuring element Disk

Size 2

Histogram segm ...

Default Param. Back Plug-ins

Criteria Manual

Nb thr. 1

Threshold 1 150

Criterion opening

Default Param. Back Plug-ins

Criterion Area

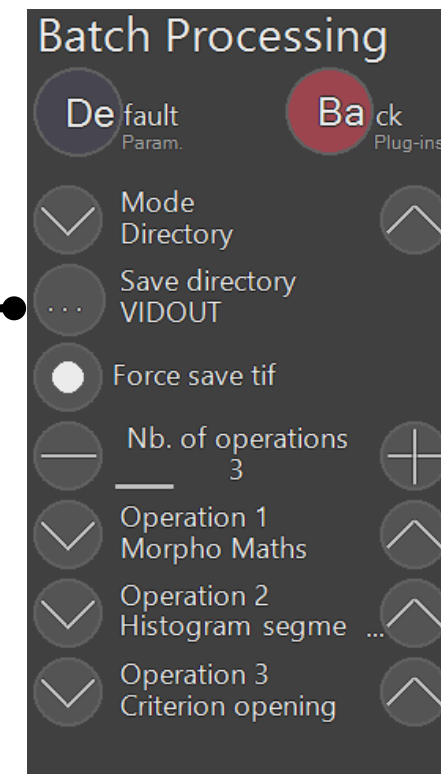
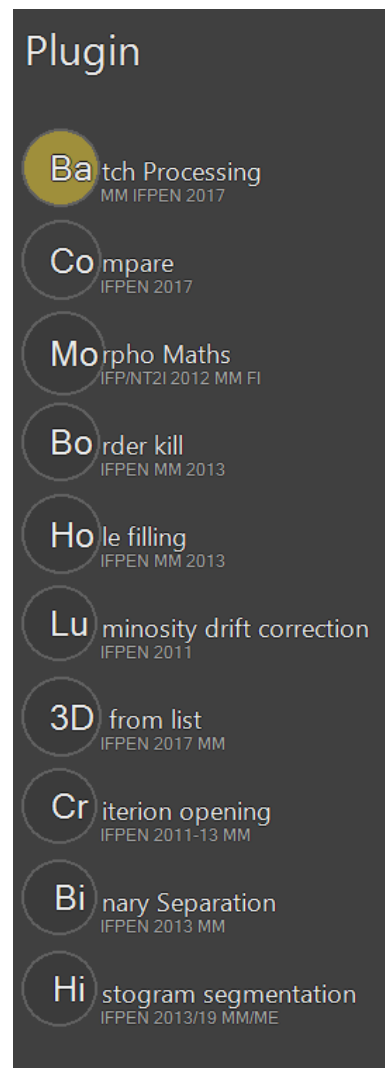
Min value 30

1

2

3

Load one image of the directory to process (any image whatsoever)



Select a valid folder where to save the processed images

then, same procedure as for Au serie

Connected components labelling

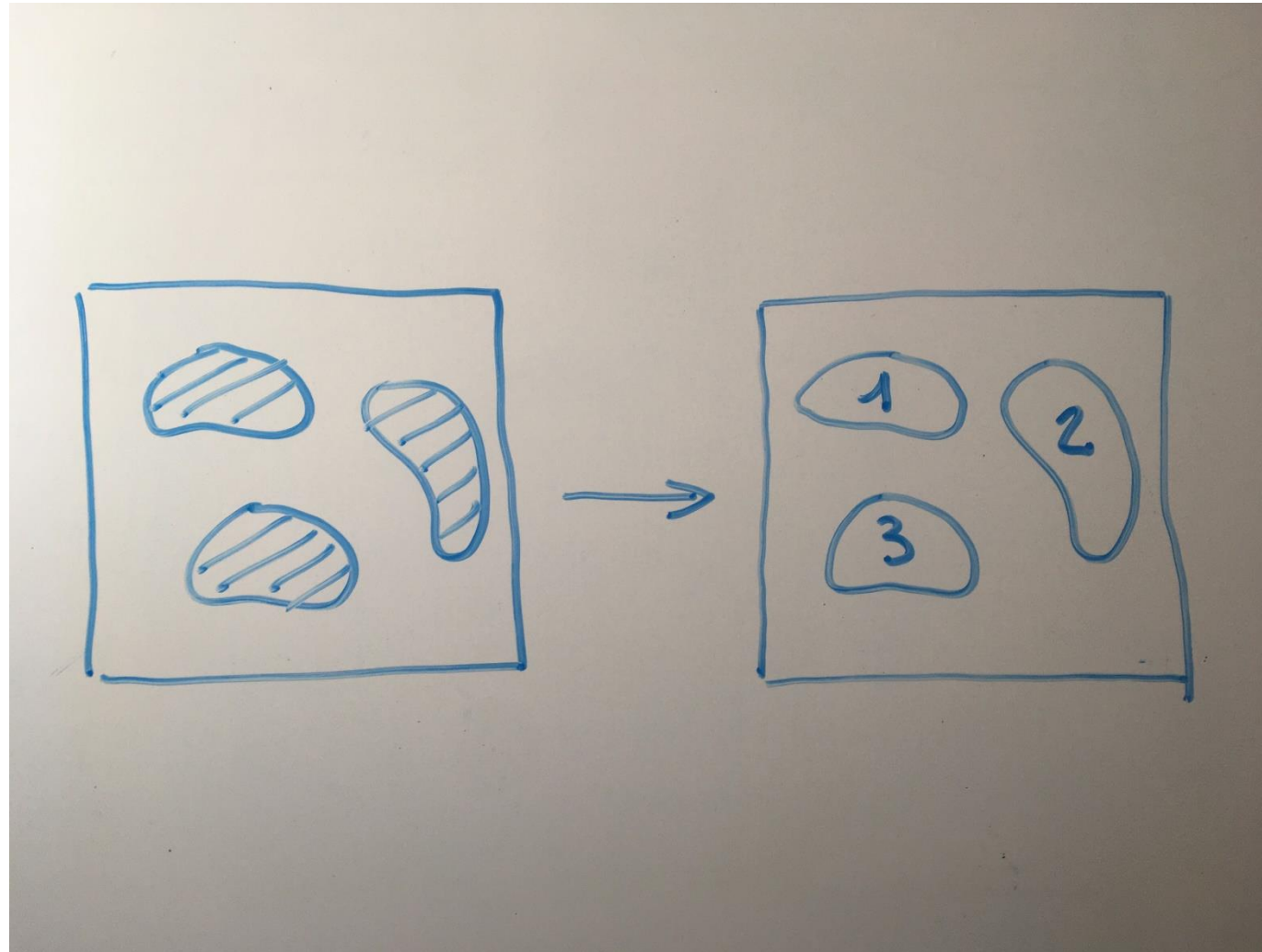
Distance map calculation

Morphological measurements



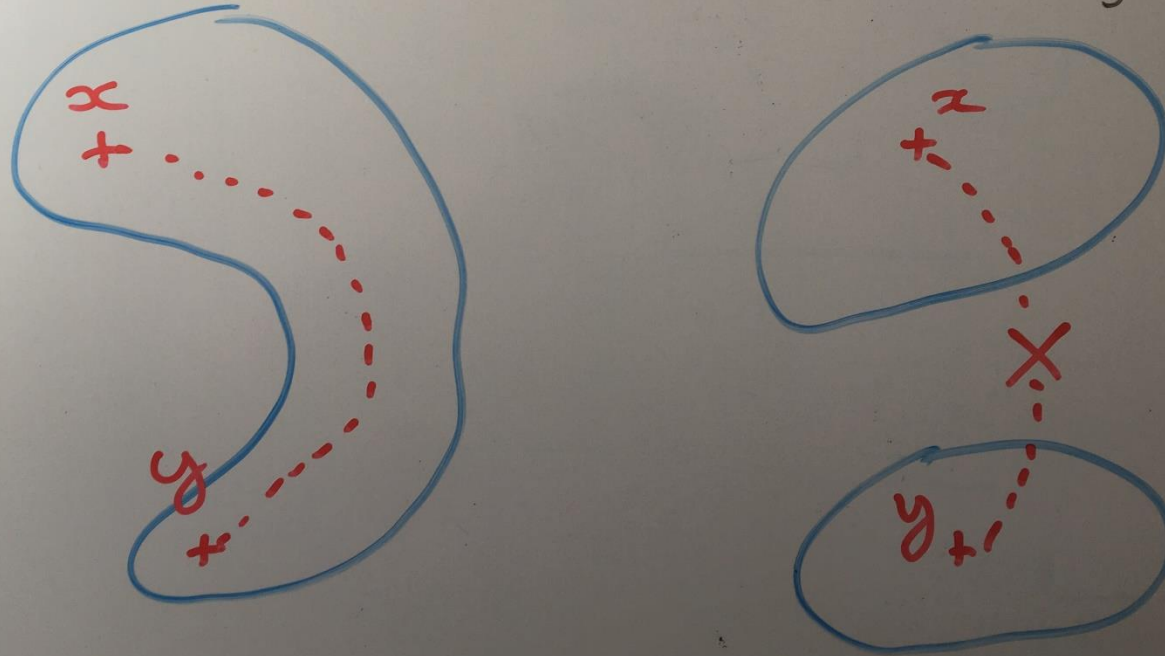
Discussion

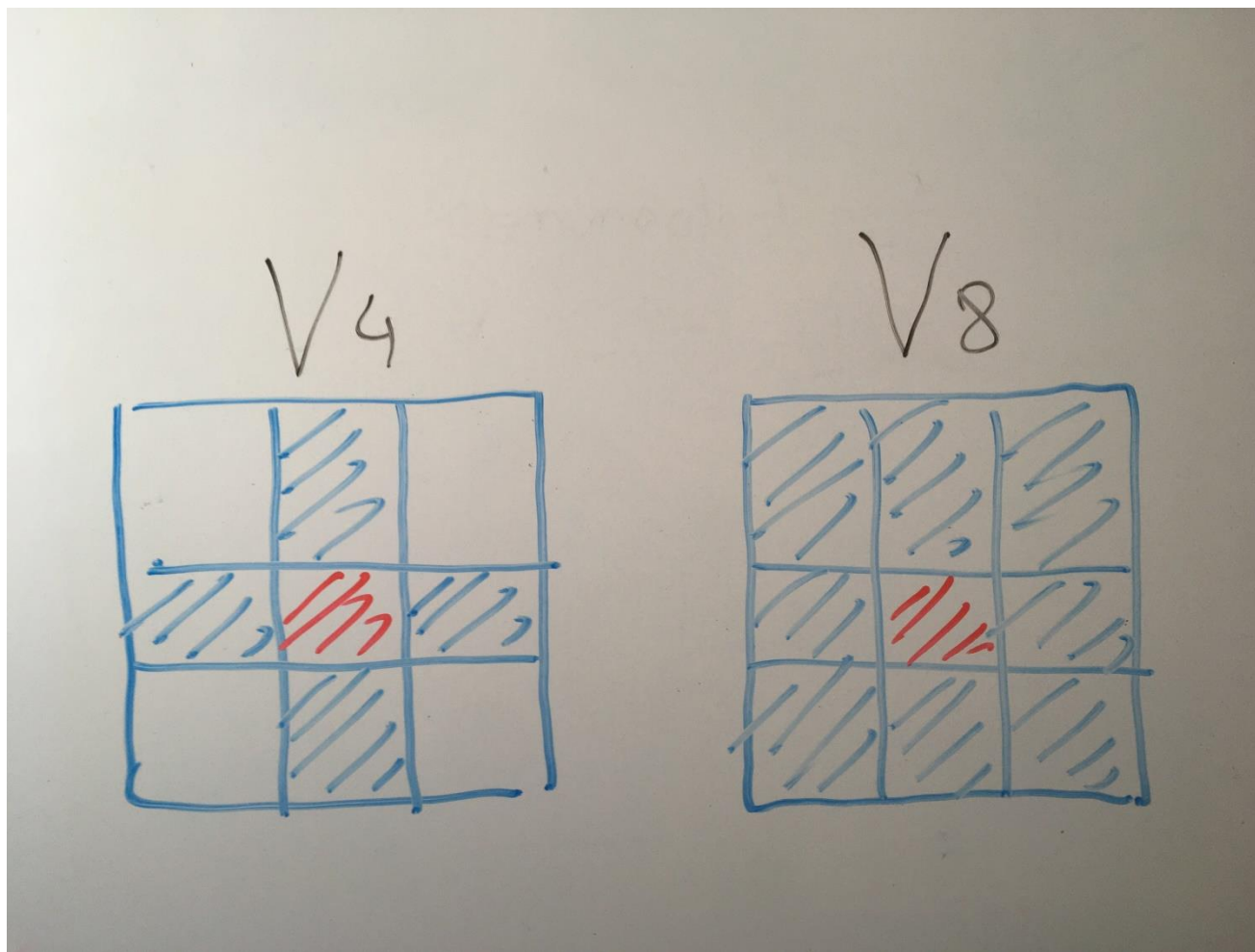
Connected components labelling



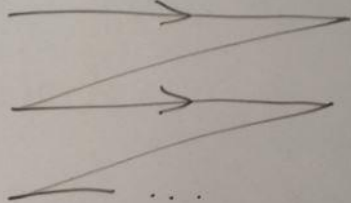
A is a connected set:

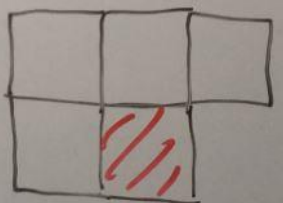
$$\forall x \in A, \forall y \in A, \exists \text{tr}(x, y)$$





Algorithm:

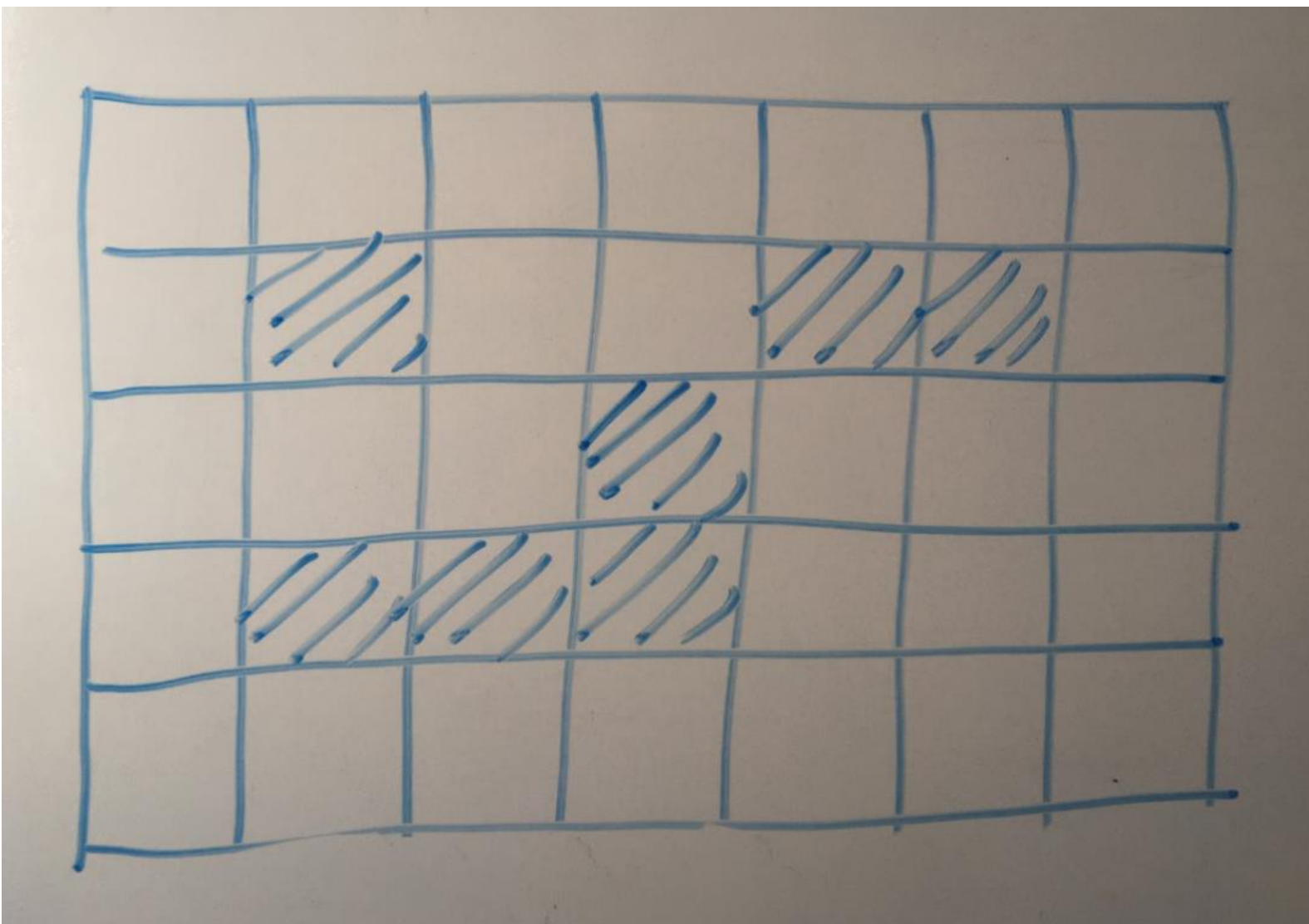
running direction: 

neighbourhood: 

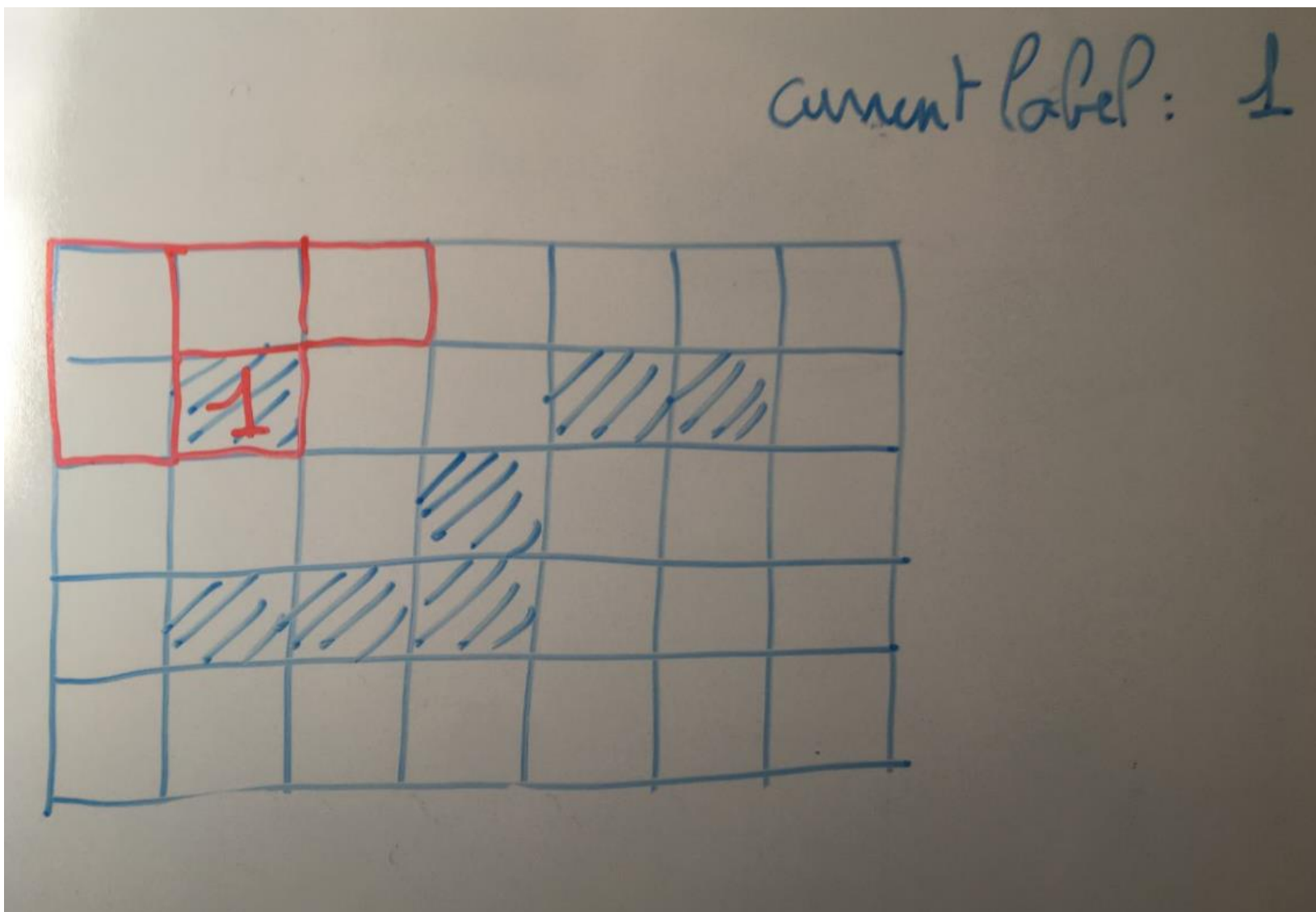
equivalency table:

Label old	0	1	2	3
Label new	↓	↓	↓	↓

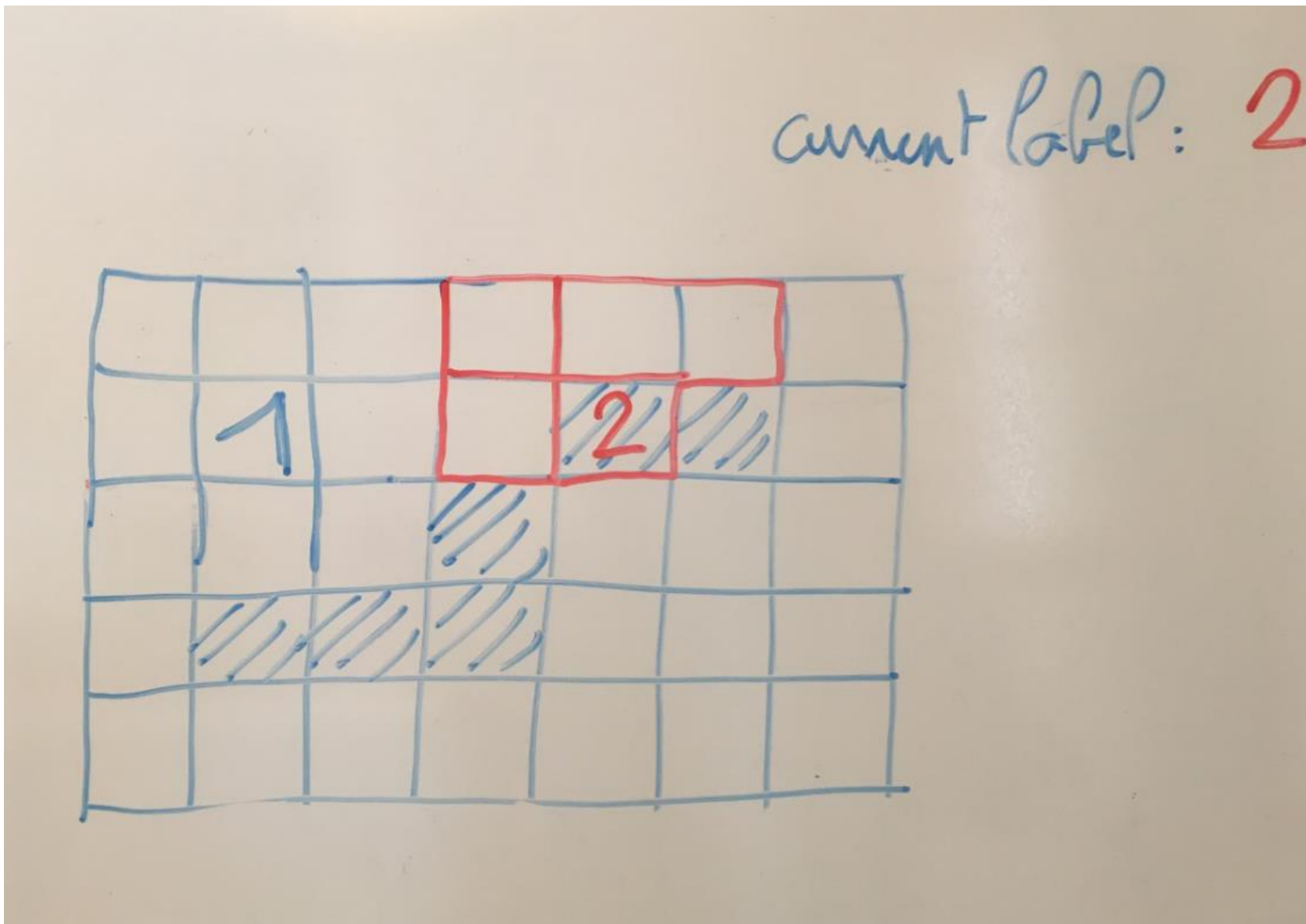
Connected component labelling



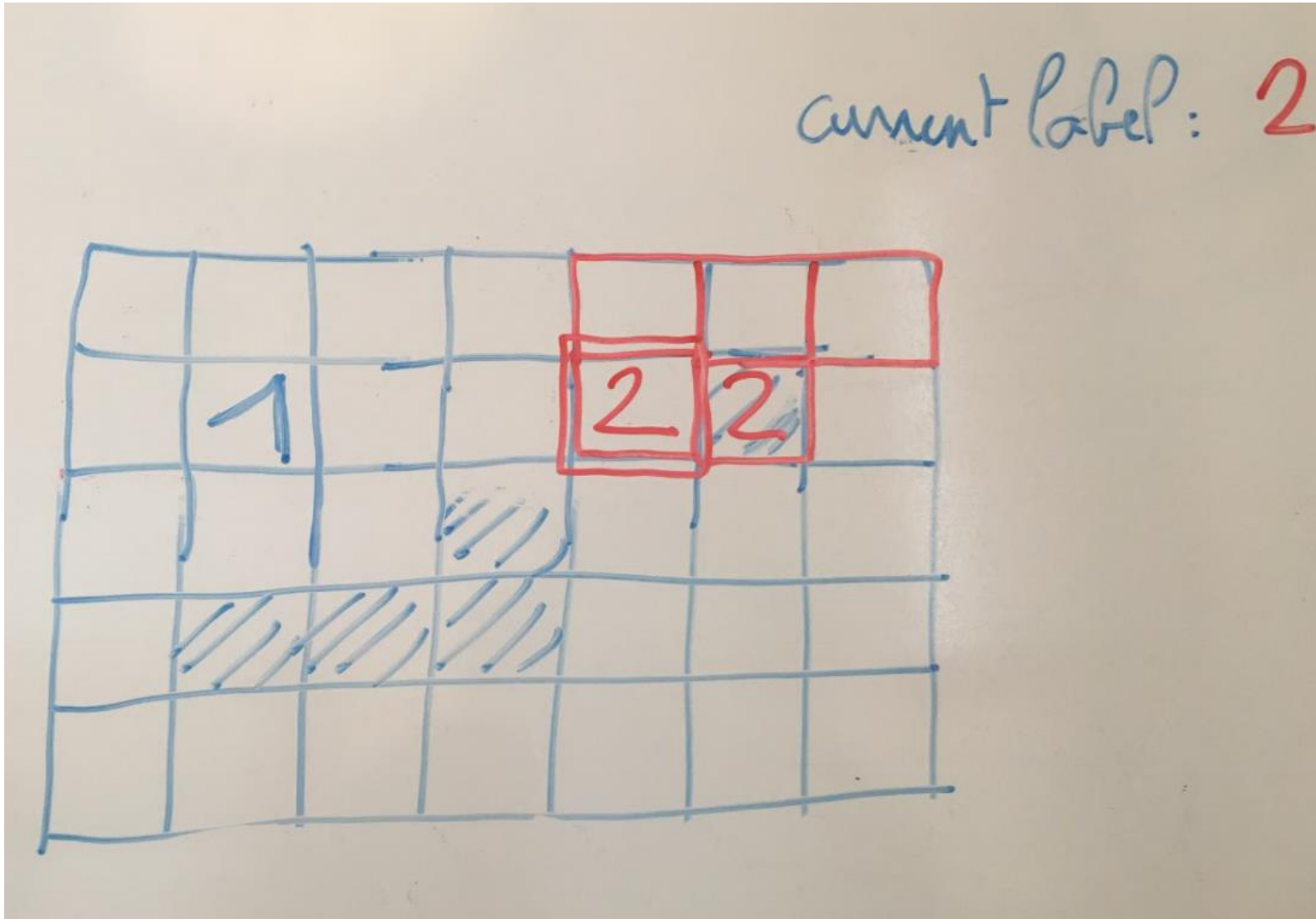
Connected component labelling

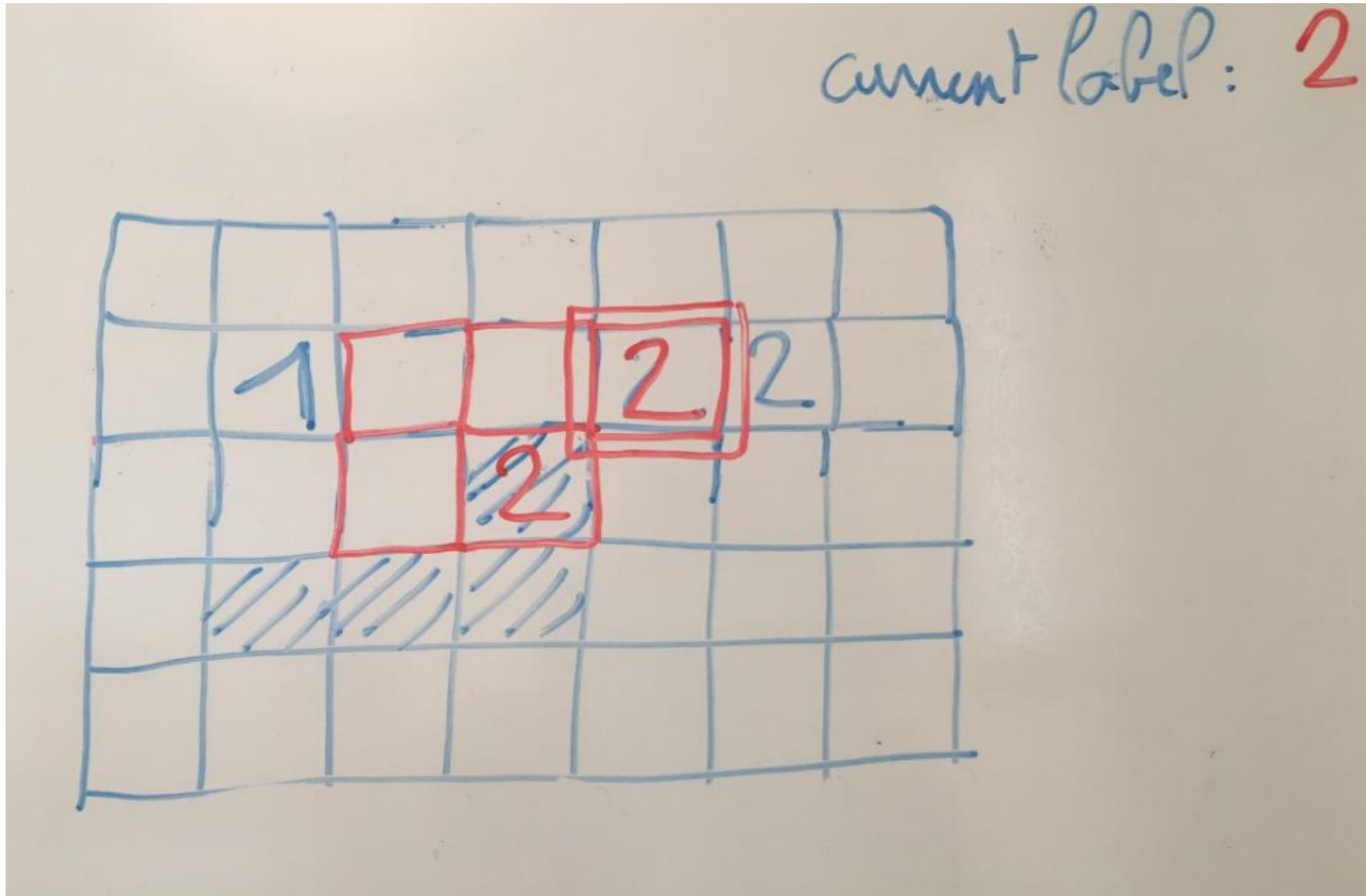


Connected component labelling

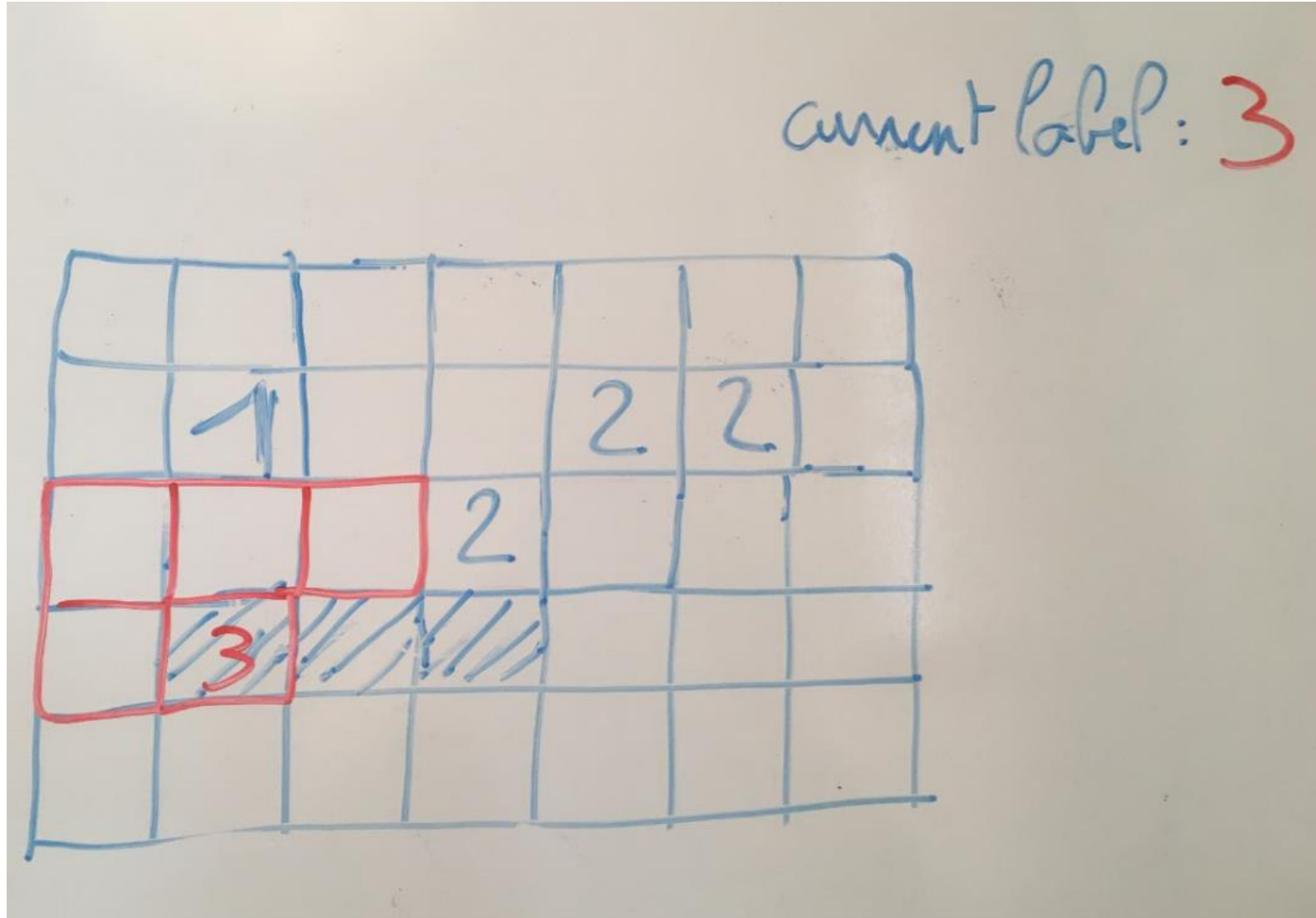


Connected component labelling

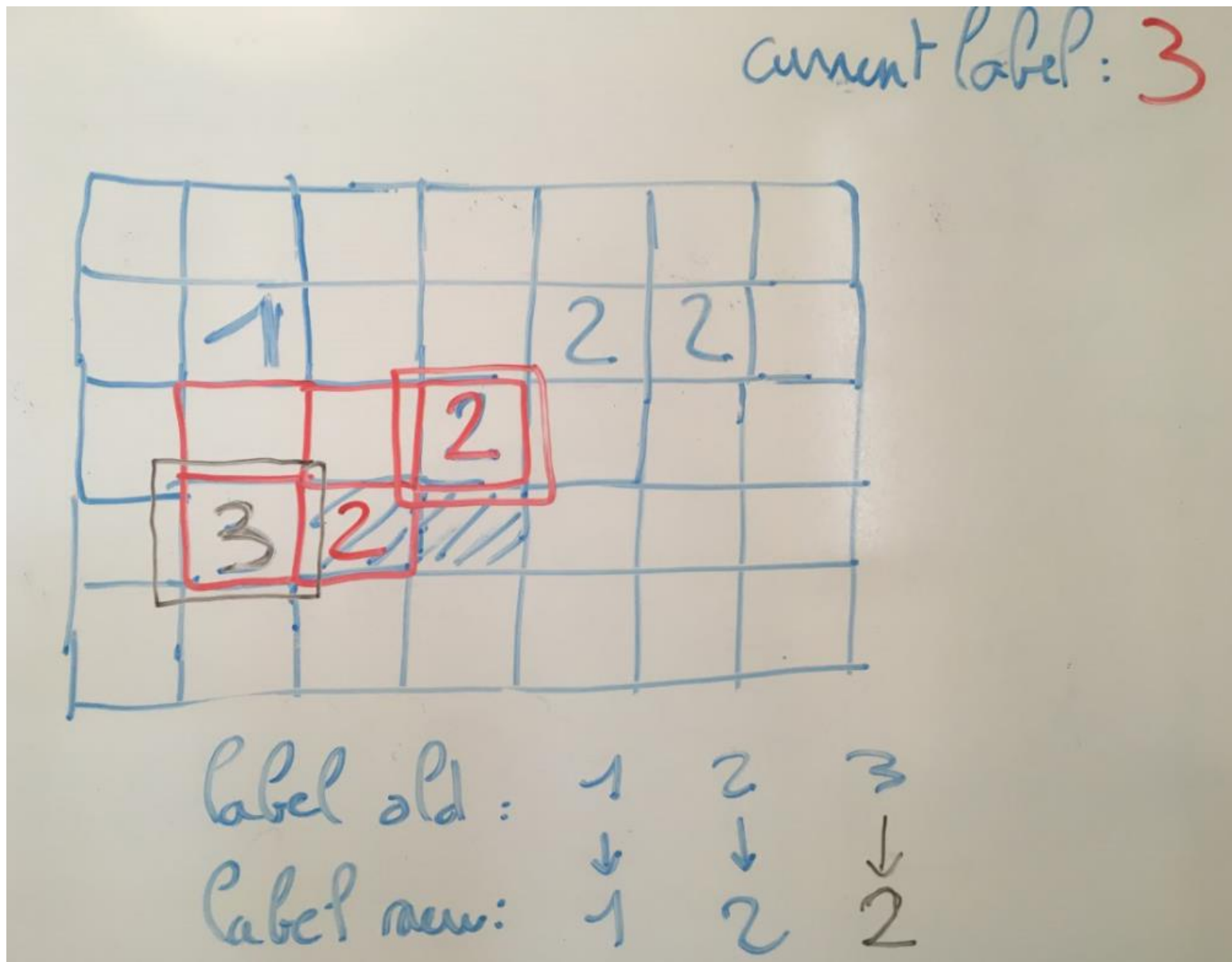


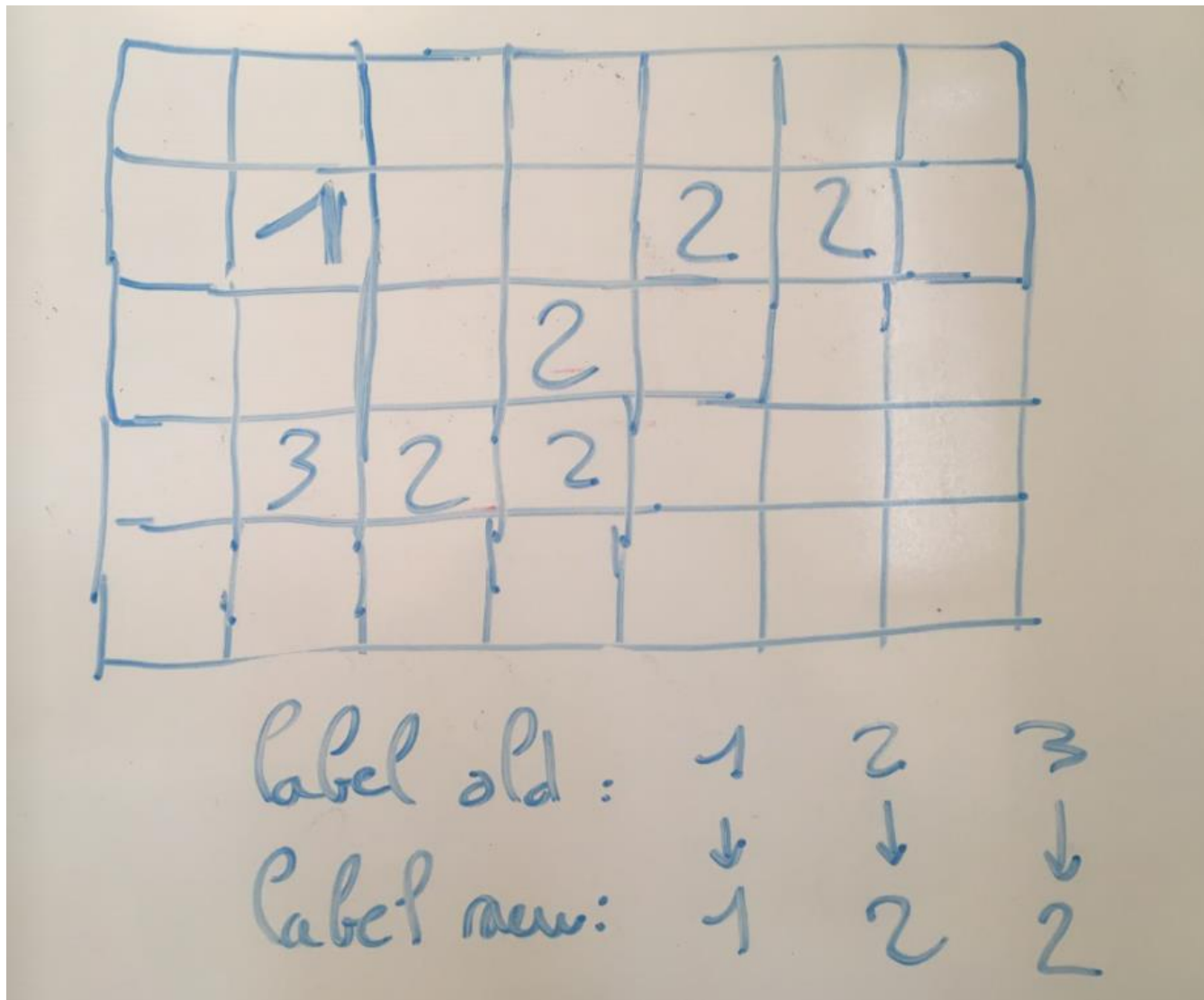


Connected component labelling

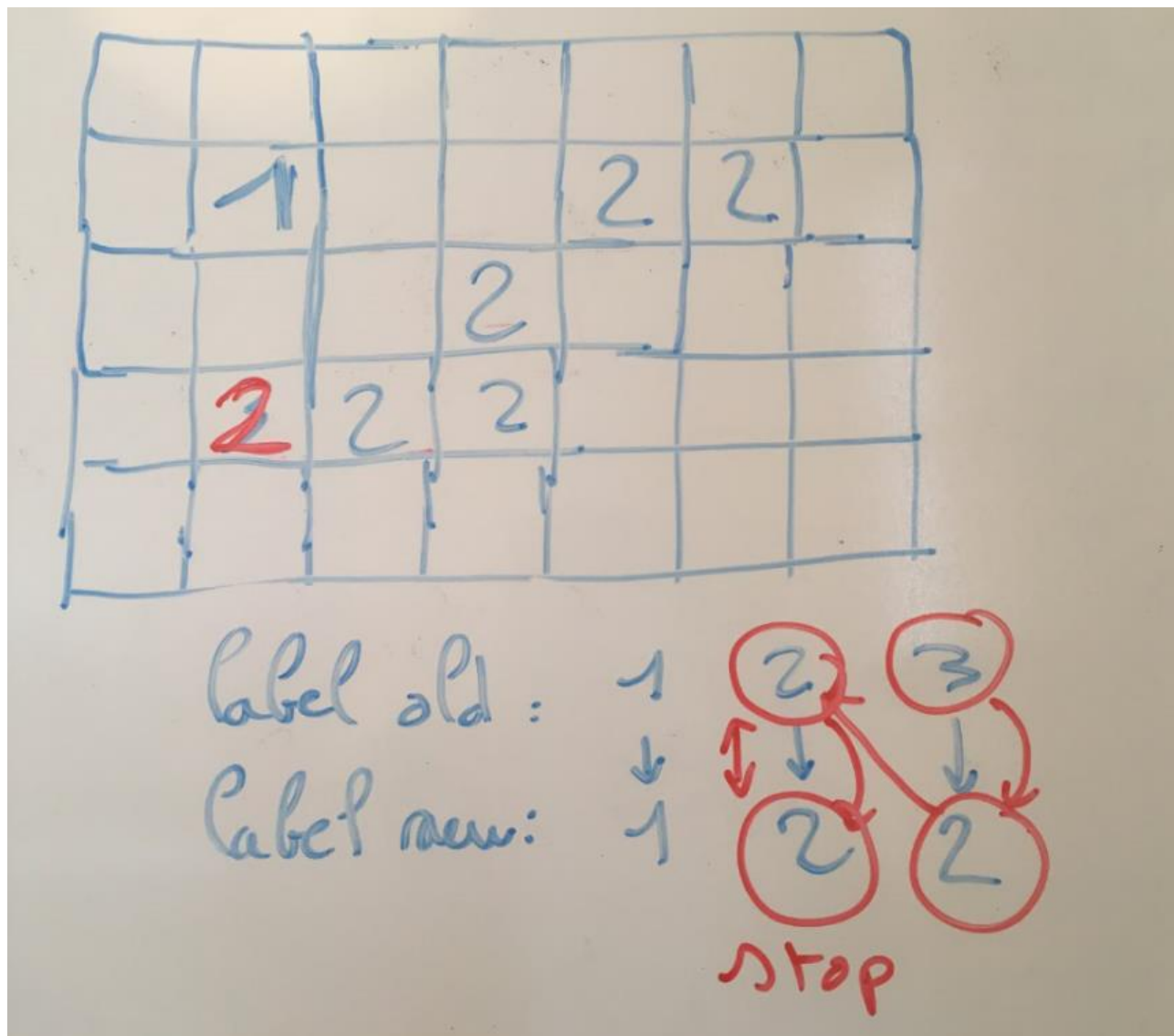


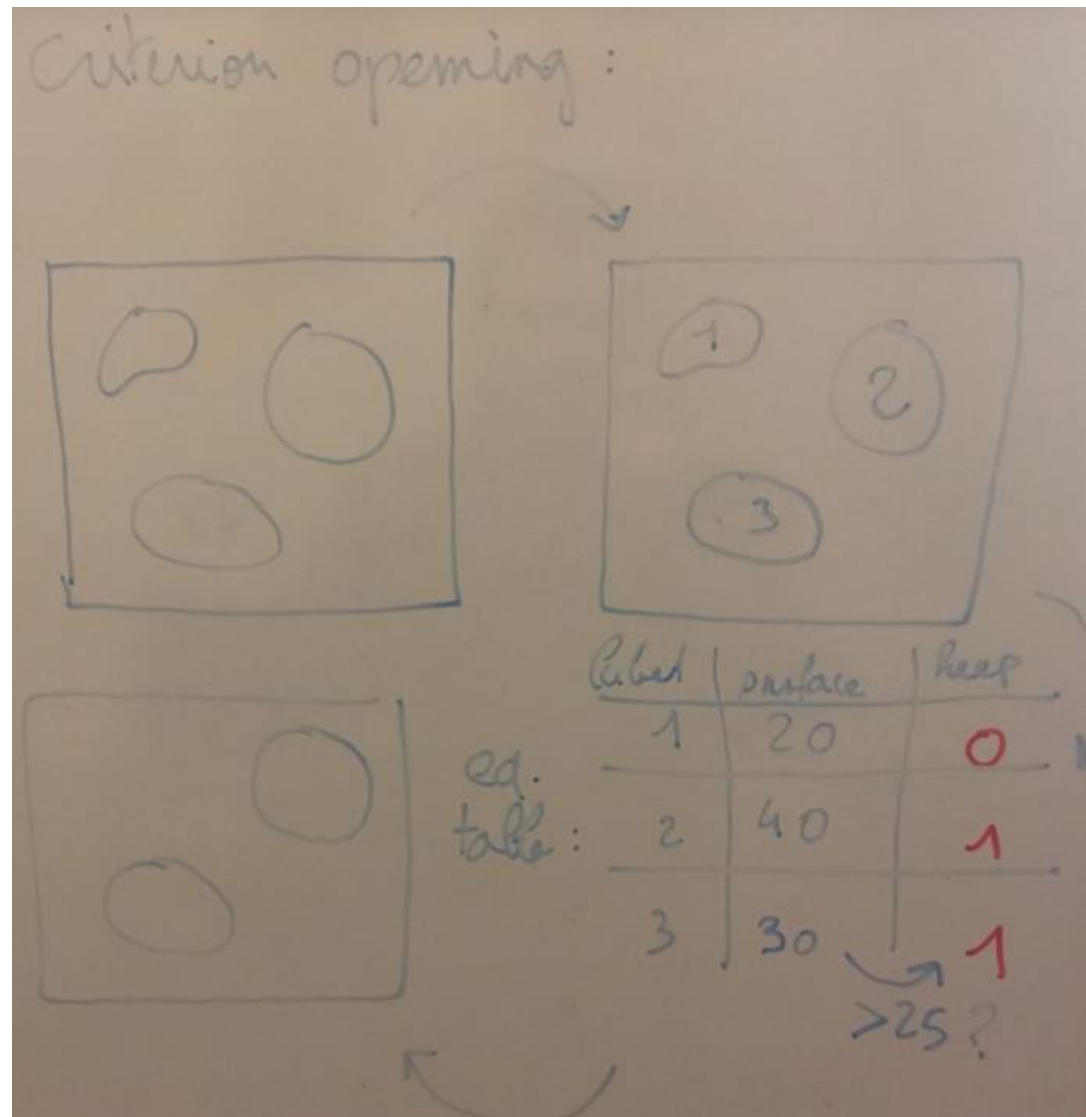
Connected component labelling

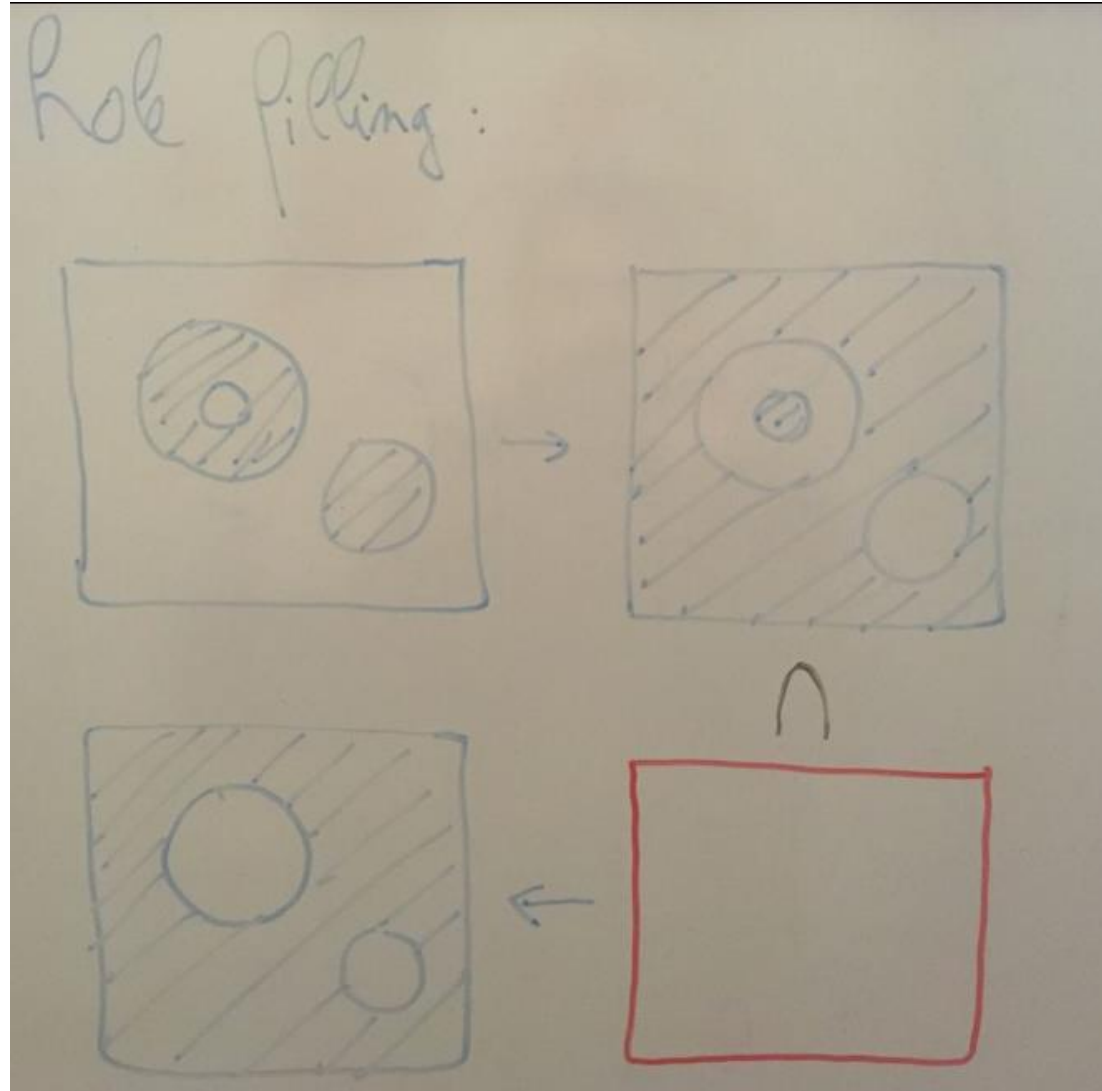




Connected component labelling







Distance map calculation

geodesic distance map :

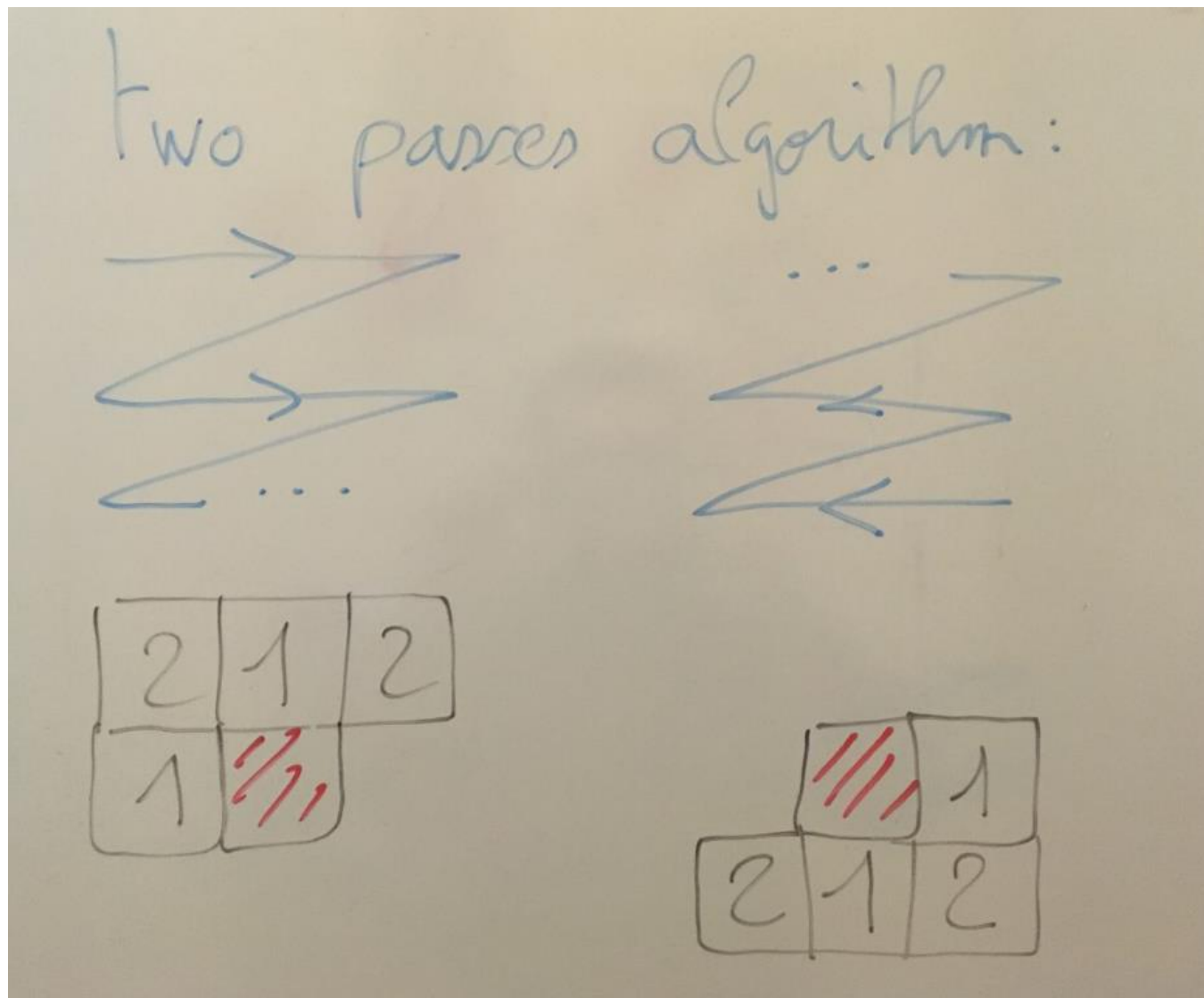
support set \rightarrow x

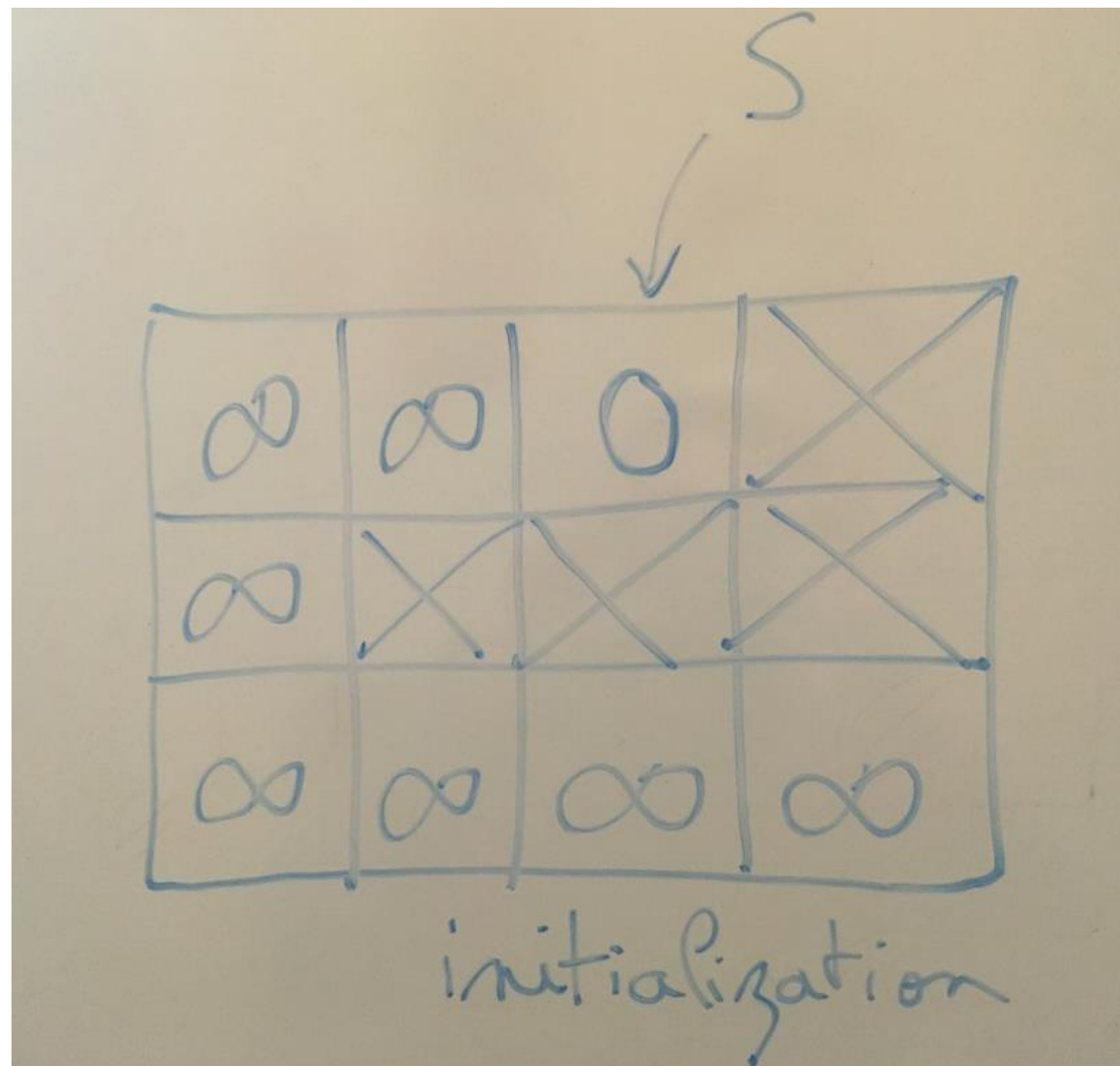
$$d_s(x) = \min L(t(x, s))$$

source \uparrow

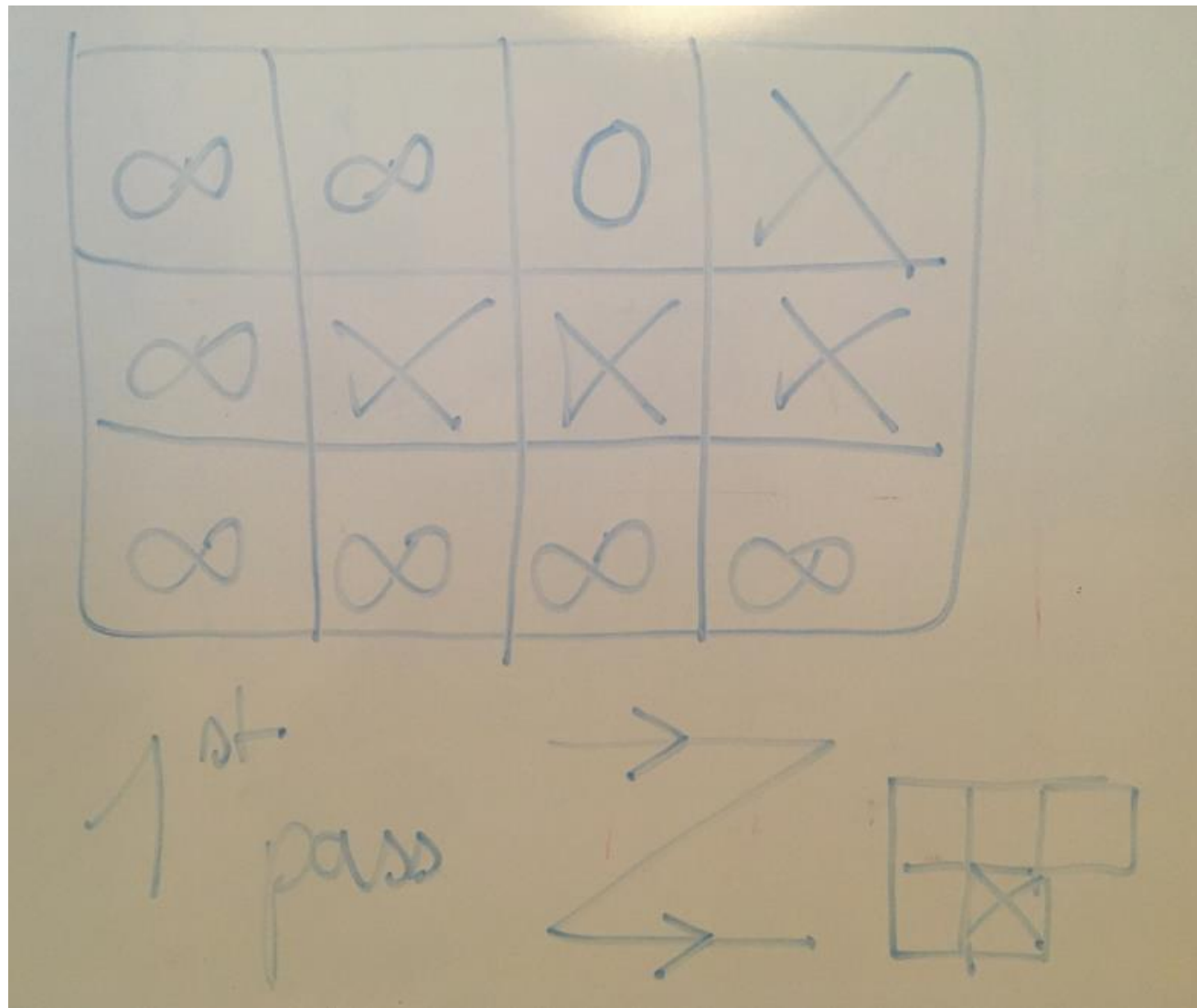
length \uparrow

The image shows a handwritten mathematical formula on a piece of paper. The formula is $d_s(x) = \min L(t(x, s))$. There are several annotations: 'support set' with an arrow pointing to 'x', 'source' with an arrow pointing to 's', and 'length' with an arrow pointing to 'L'. The word 'geodesic distance map :' is written above the formula.

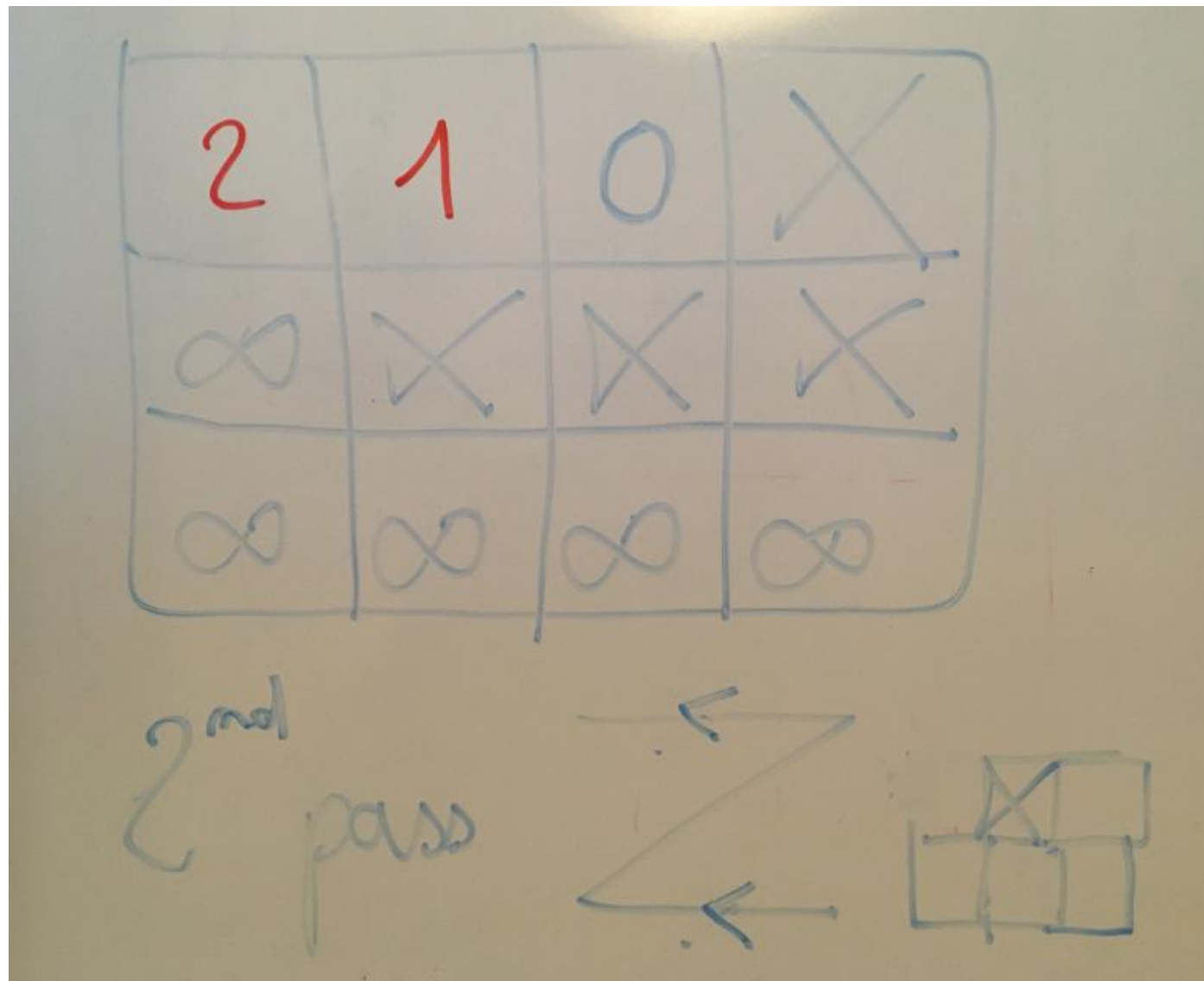




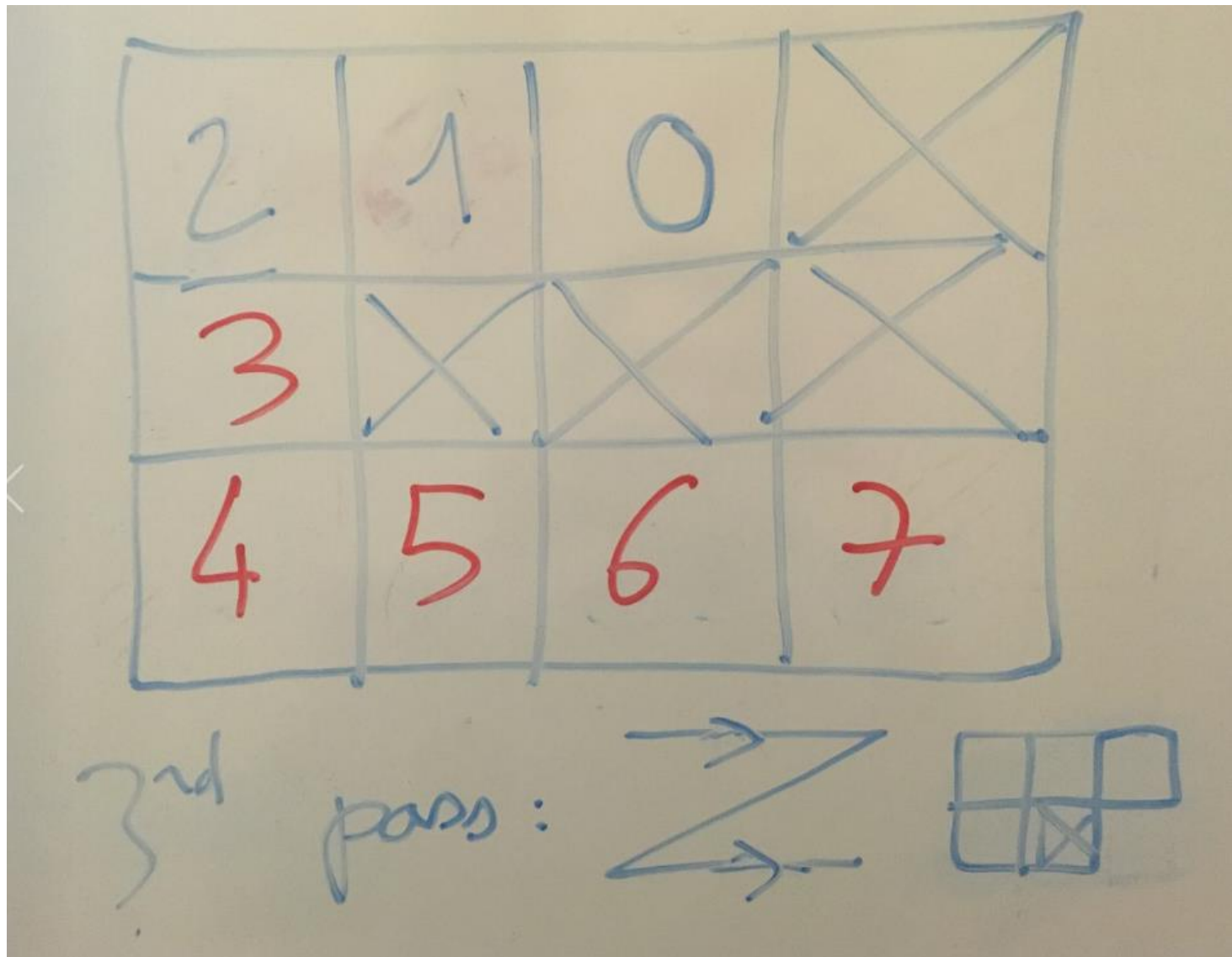
Geodesic distance map



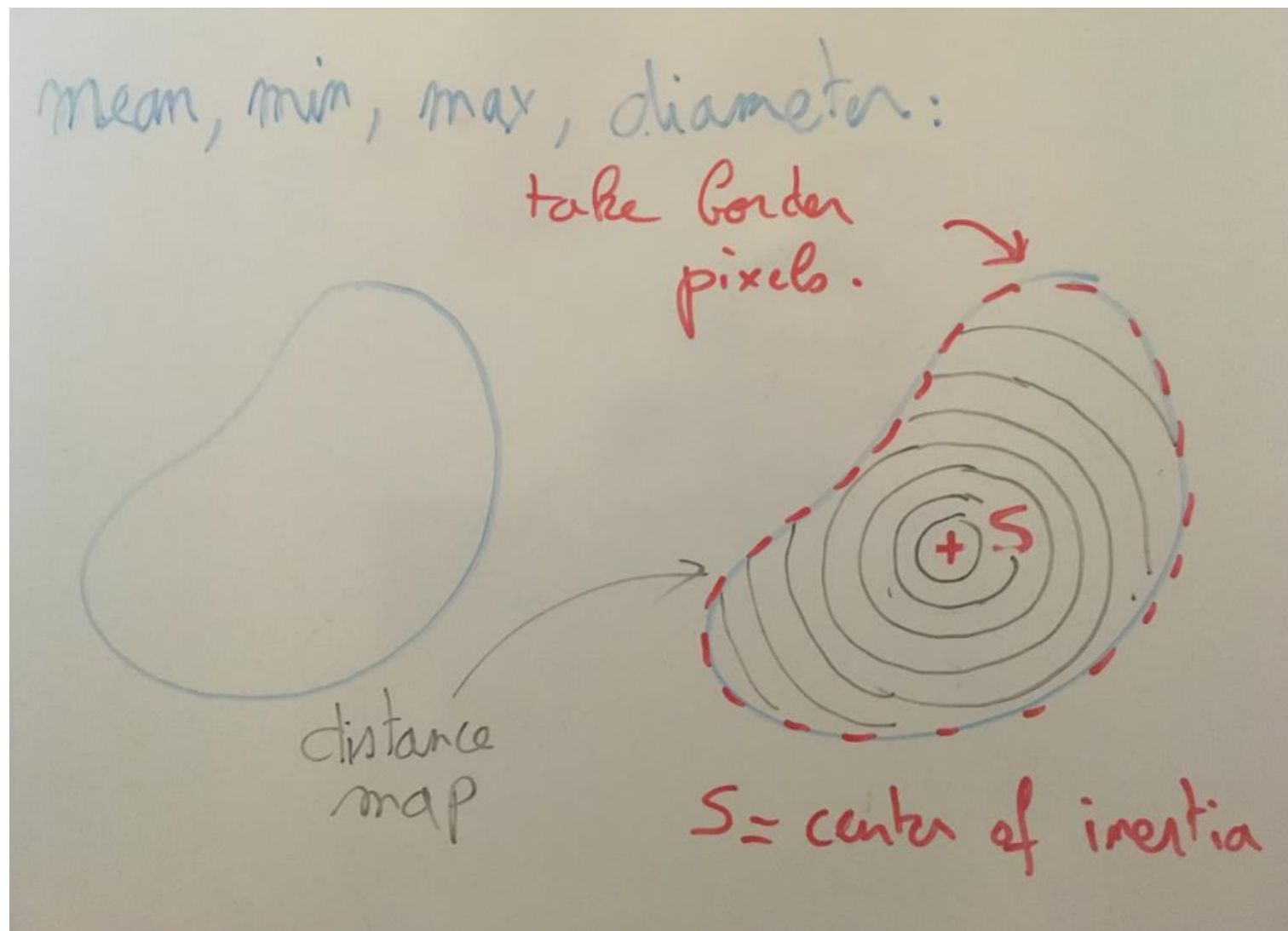
Geodesic distance map

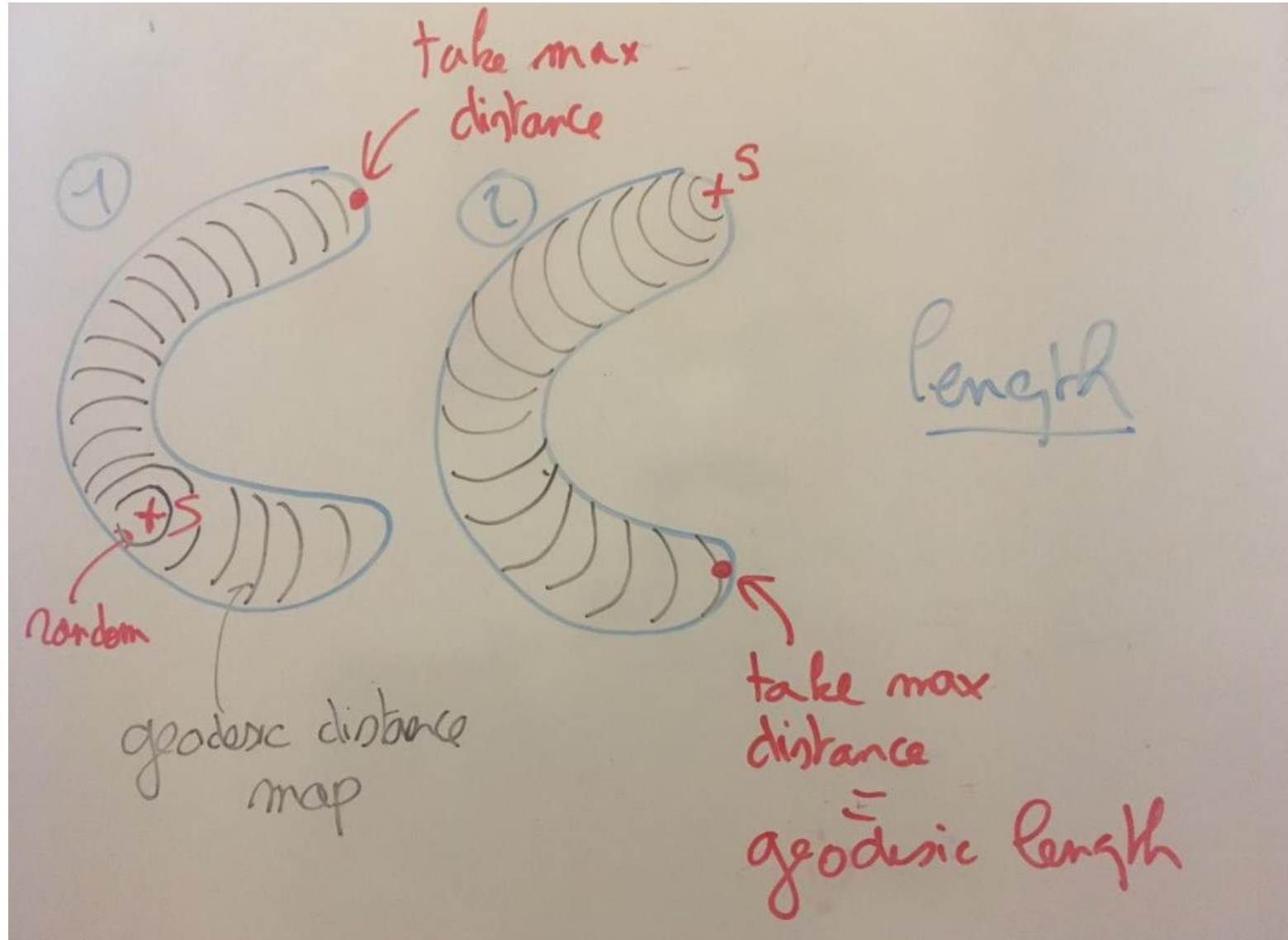


Geodesic distance map

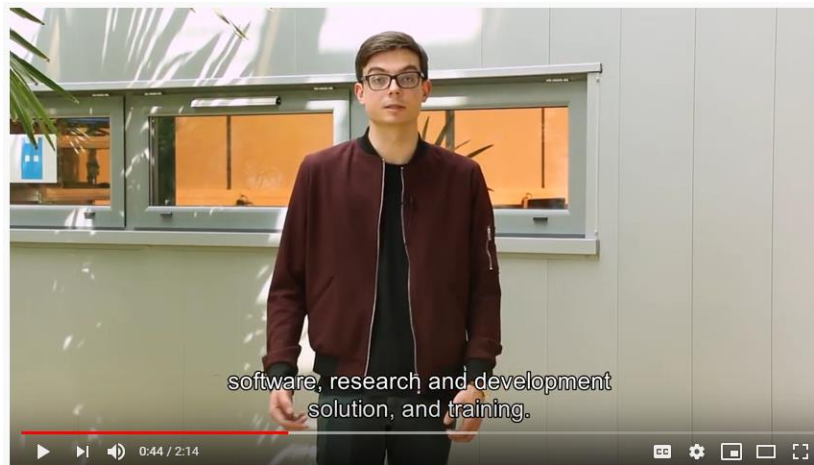


Morphological measurements





User testimonials to be viewed under IFPEN Youtube channel



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