# ARCHI'TECH

Reconstruction de l'architecture d'un arbre à partir de photographies numériques 2D

**04-07-2017**

**Présenté par:**
**CHOUENYIB Ali**

# Menu interactif

- ❑ Le CIRAD
- ❑ Le contexte
- ❑ Les objectifs
- ❑ Le Problème
- ❑ La solution proposée
- ❑ Les résultats
- ❑ Conclusion

# Centre de coopération Internationale en Recherche Agronomique pour le Développement

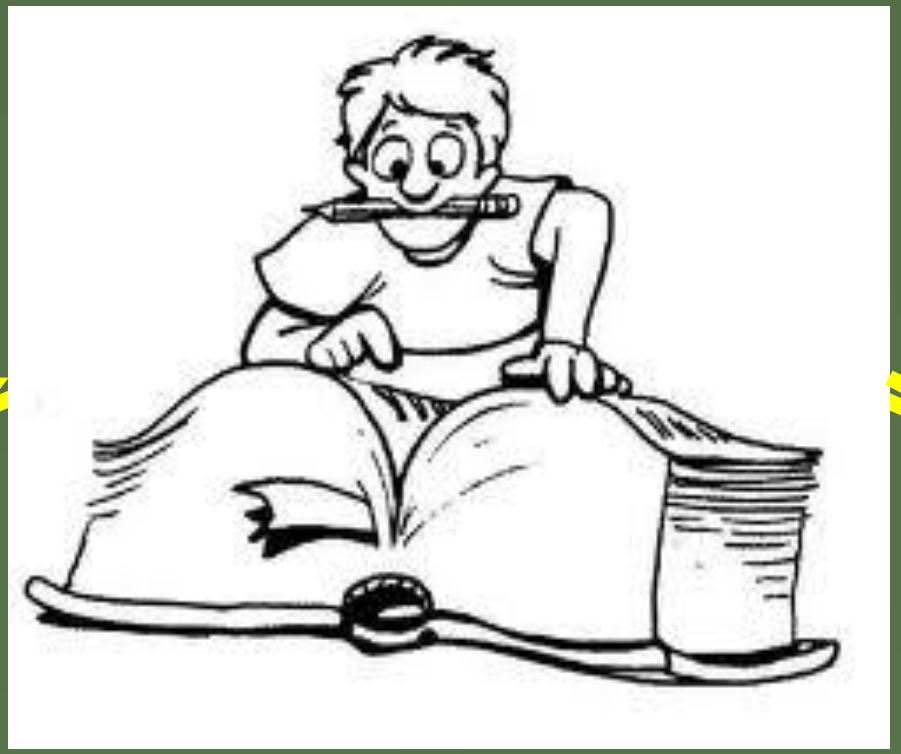
- Le CIRAD est un ÉPIC
- 1650 agents, dont 40% sont des chercheurs
- 3 départements :
  - **Bios**
  - **ES**
  - **Persyst**

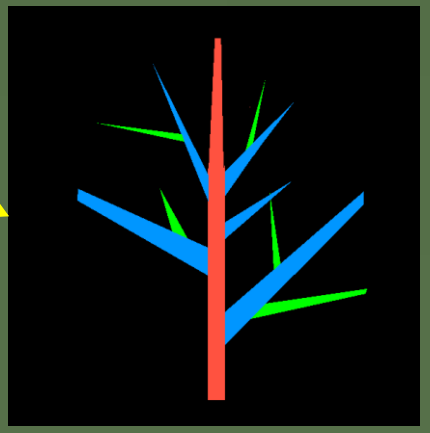
# L'UMR
# botAnique et Modélisation de l'Architecture des Plantes et végétations

- CIRAD
- CNRS
- INRA
- IRD
- UM

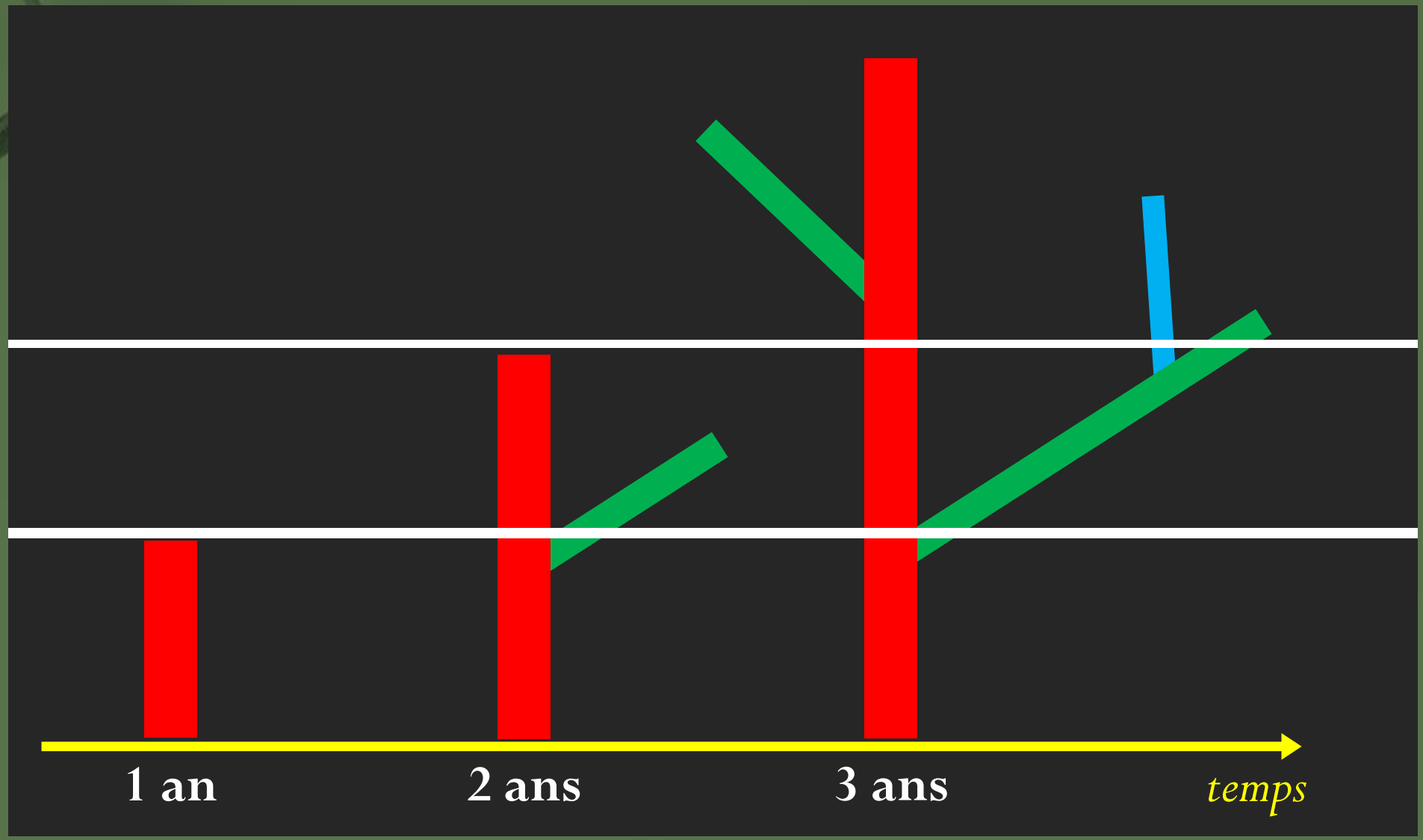
# CONTEXTE DU STAGE

# OBJECTIFS





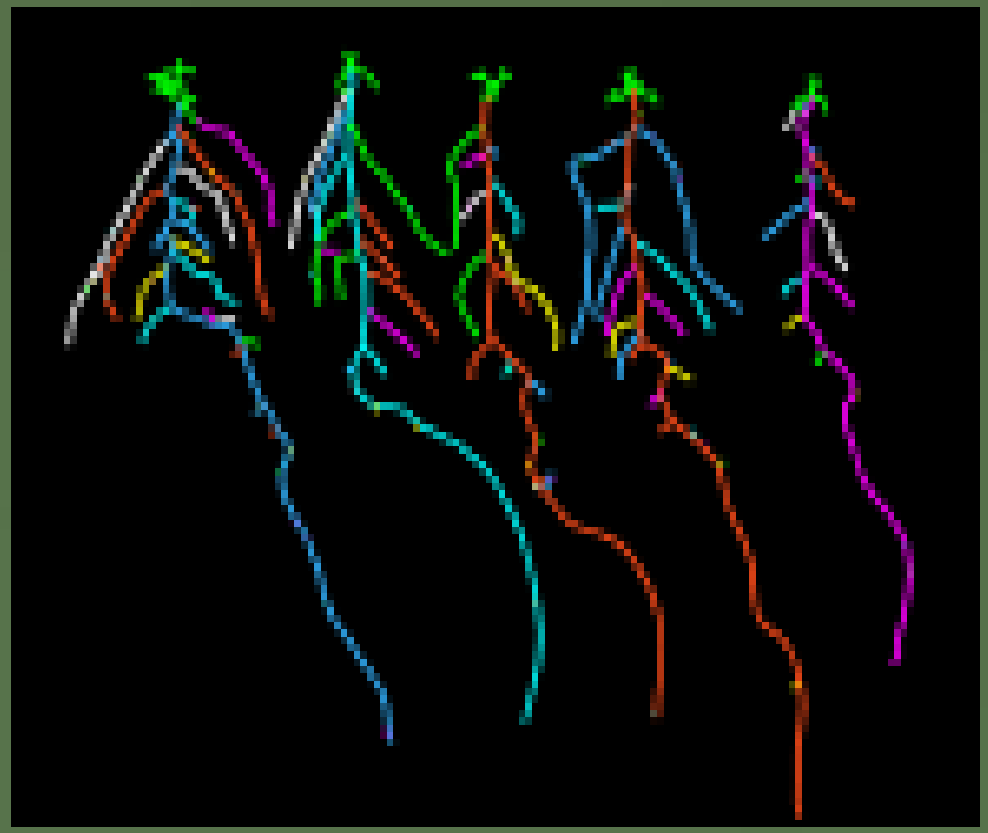
# ARCHITECTURE



# BIBLIOGRAPHIE

- *Zhen Whang et al 2016* : Modélisation
- *Ping Tan et al 2008* : Modélisation

- *Julien Diener et al 2013* : Structure



# Focus sur Diener

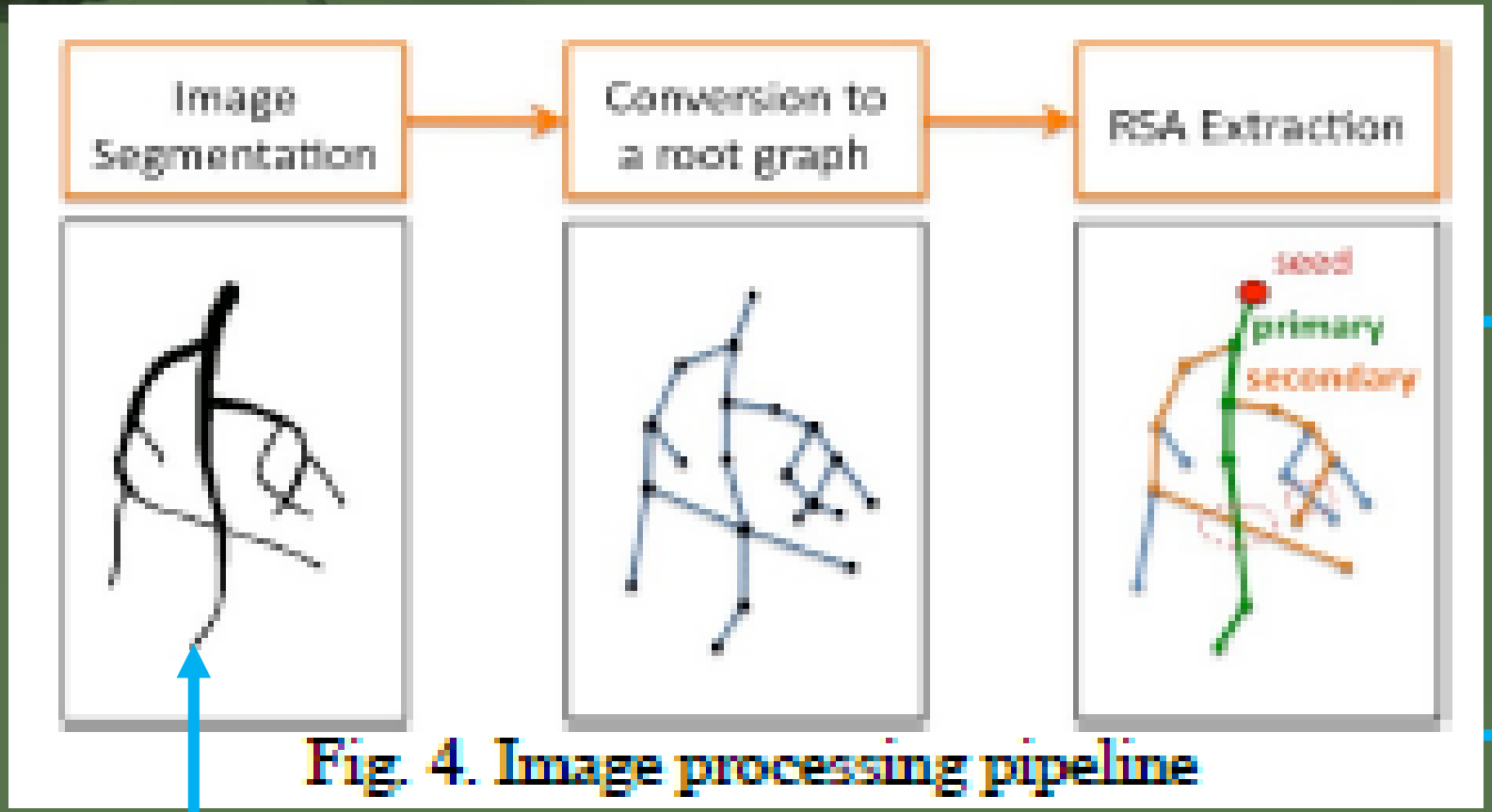



Fig. 4. Image processing pipeline

binaire

# PIPELINE

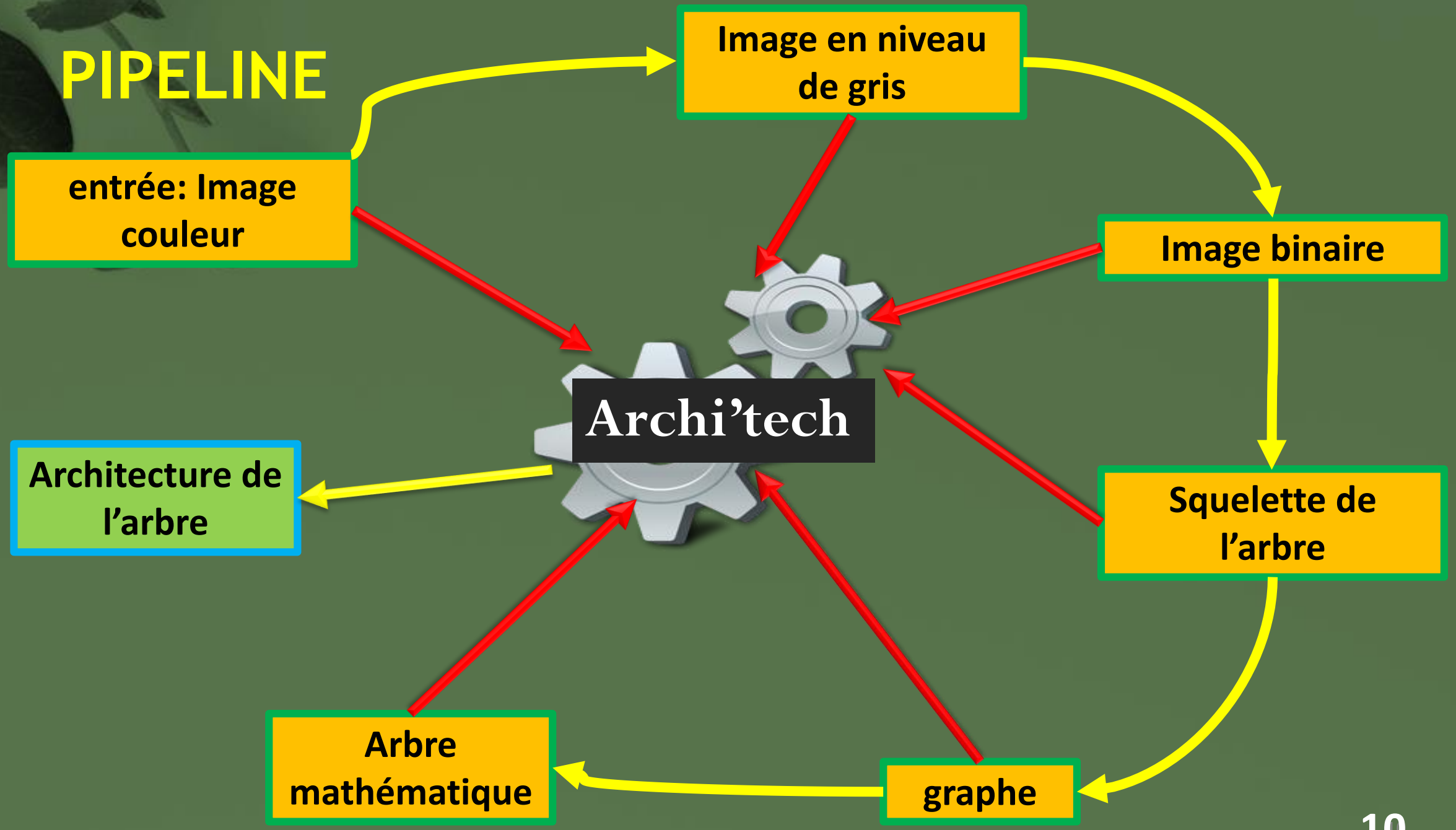


Image en niveau de gris
entrée: Image couleur
Image binaire
Archi'tech
Architecture de l'arbre
Squelette de l'arbre
Arbre mathématique
graphe

# Passage de RVB en niveaux de gris

Rouge



Niveau de gris

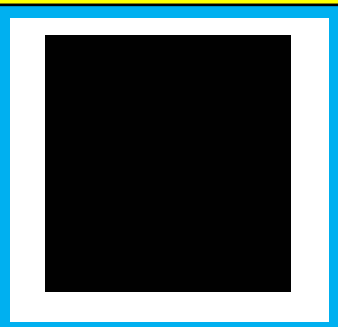
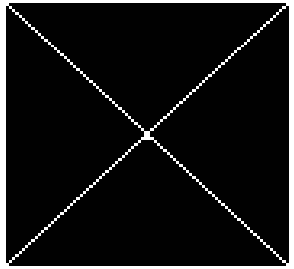
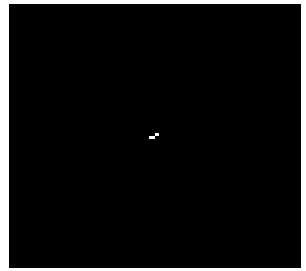
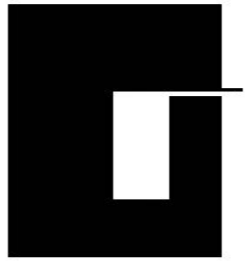
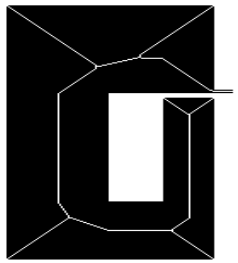
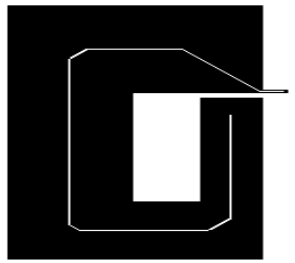
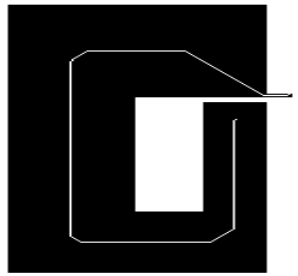
Bleu

Vert

# Segmentation

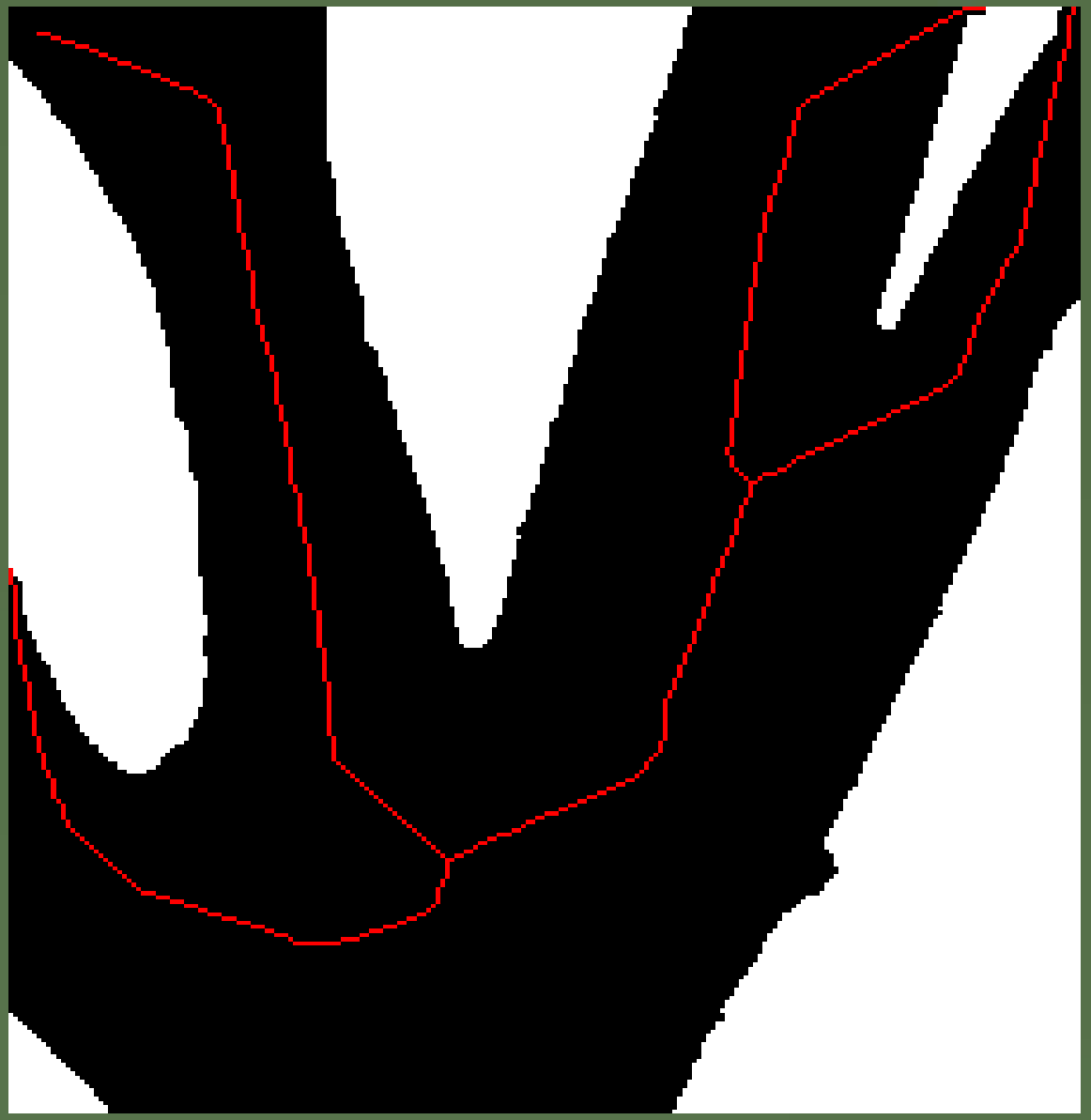
# Squelettisation

# Squelettisation

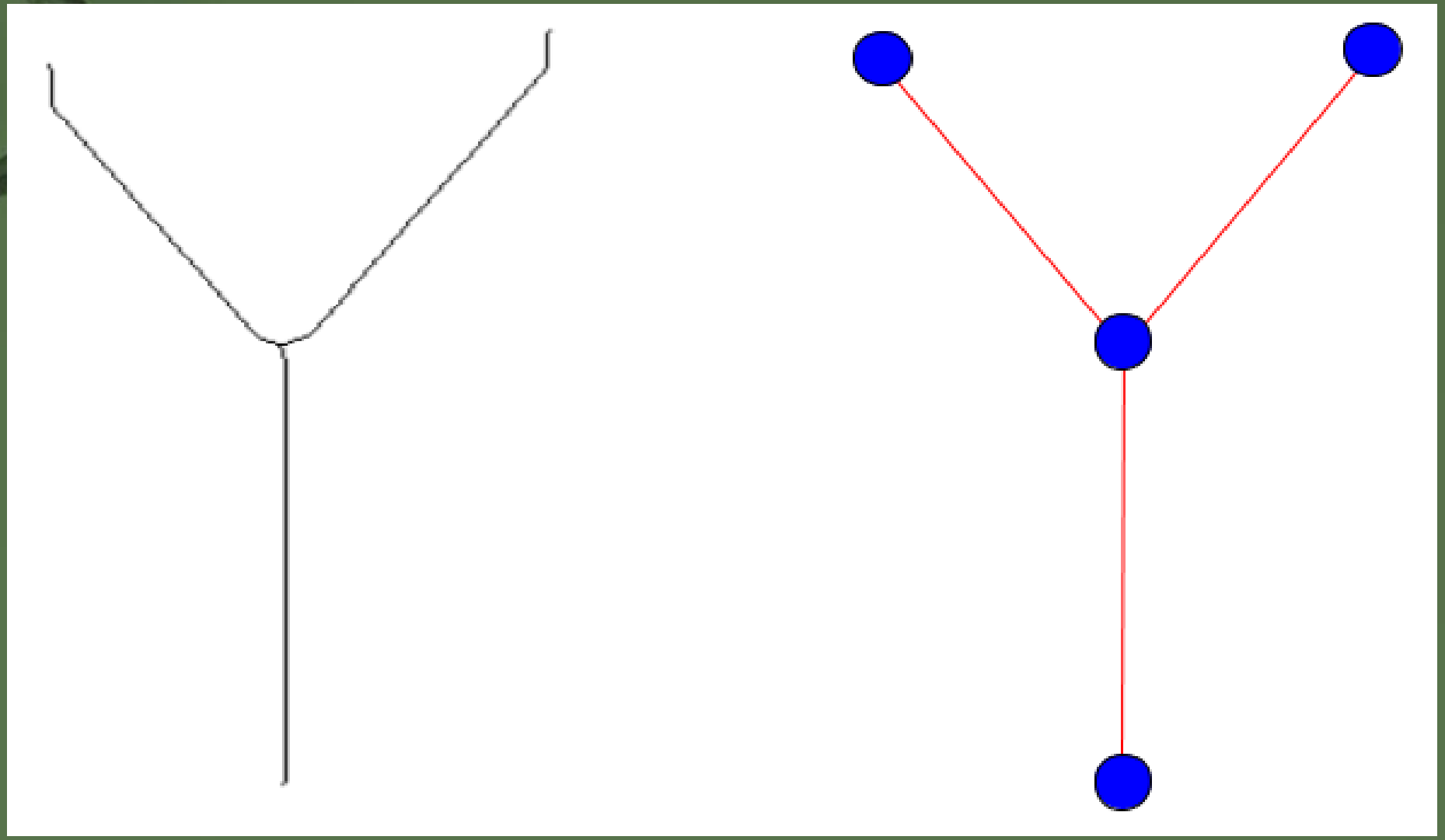
| Image binaire | Zhou | Zhang-Suen | Lee(ImageJ) |
|---|---|---|---|
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

# Le squelette ?

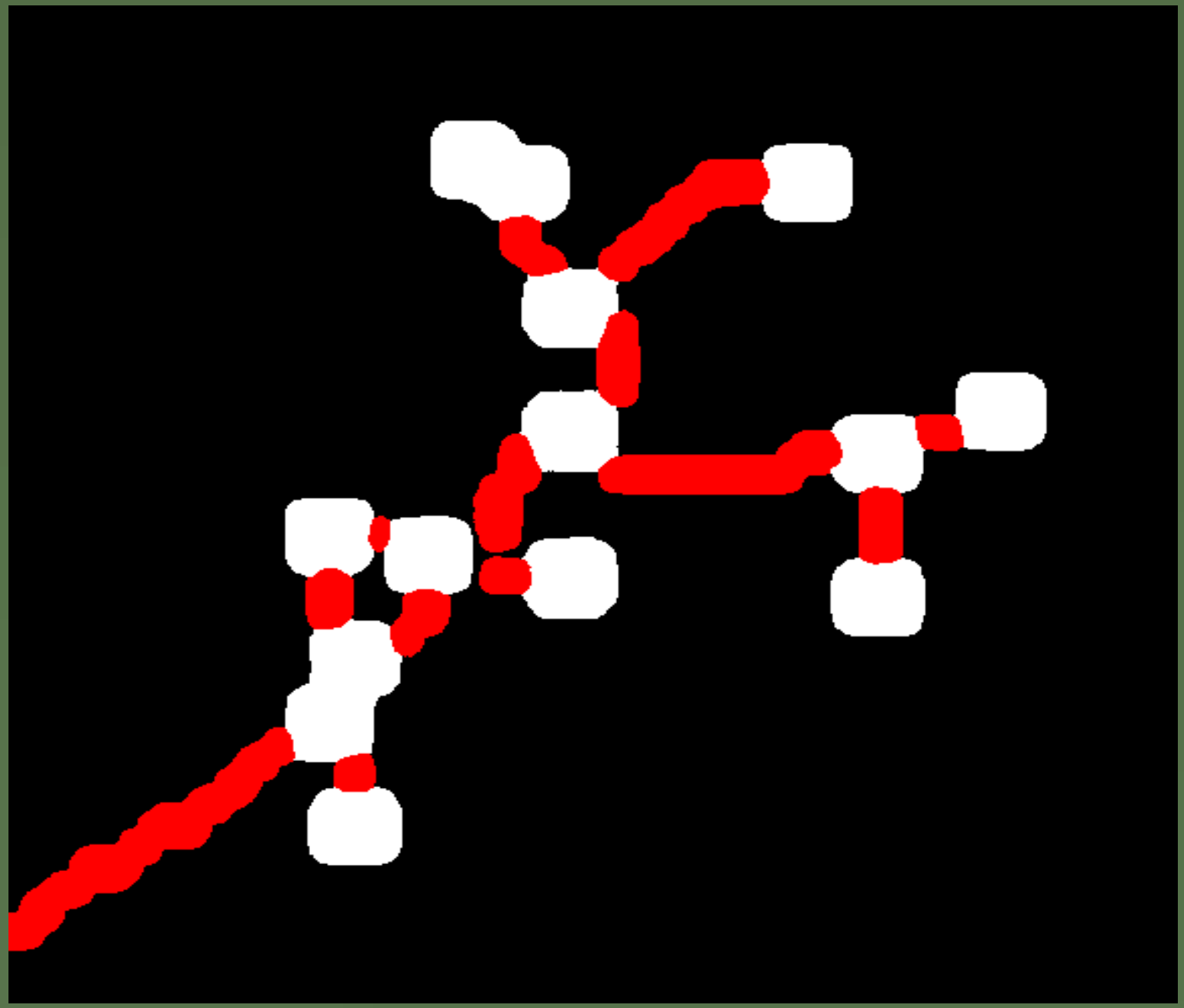
- ses coordonnées (**x,y**)
- sa valeur dans l'image couleur
- sa distance au bord
- son type :
  - *extrémité*
  - *arête*
  - *amas*



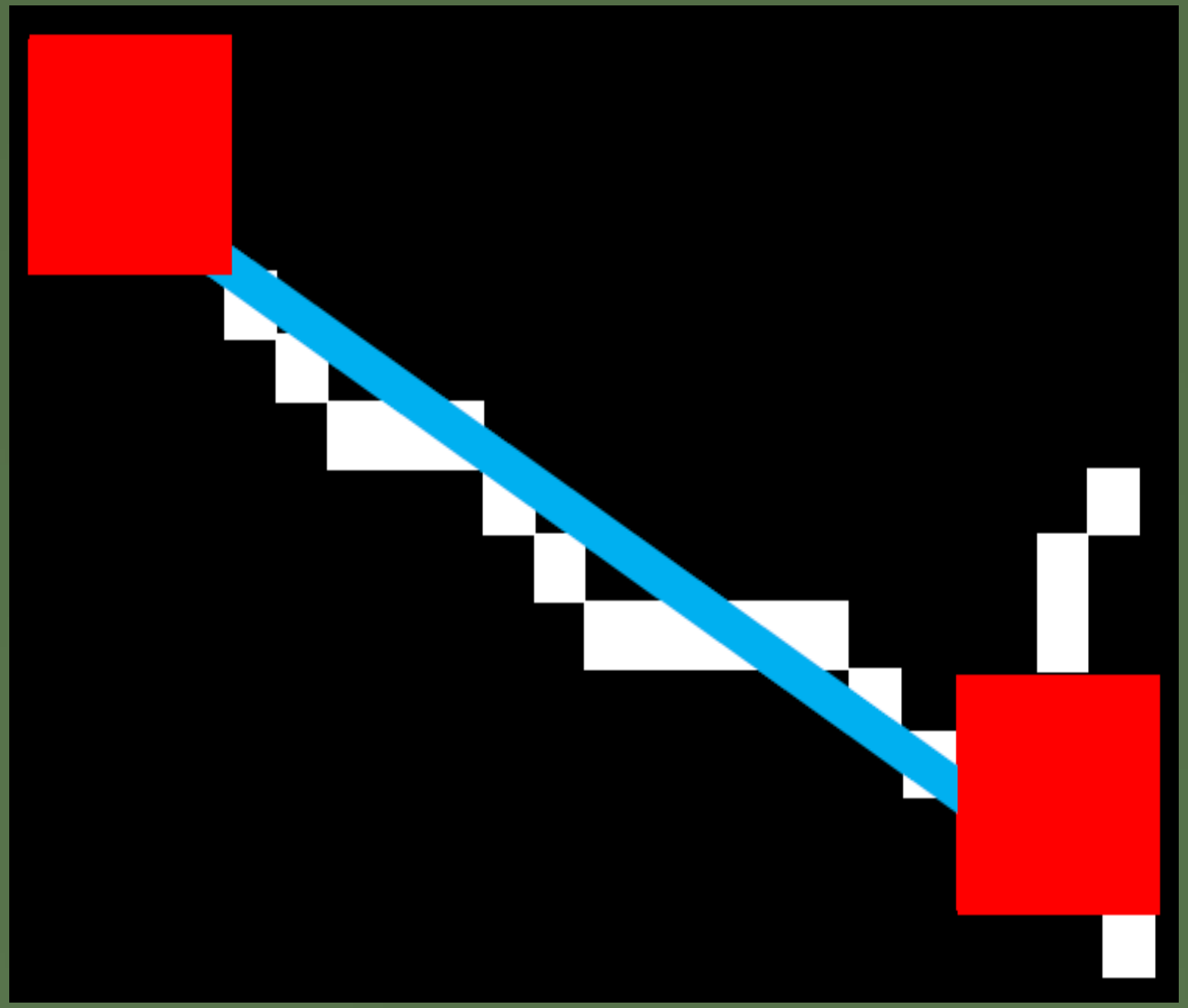
# Passage du squelette au graphe



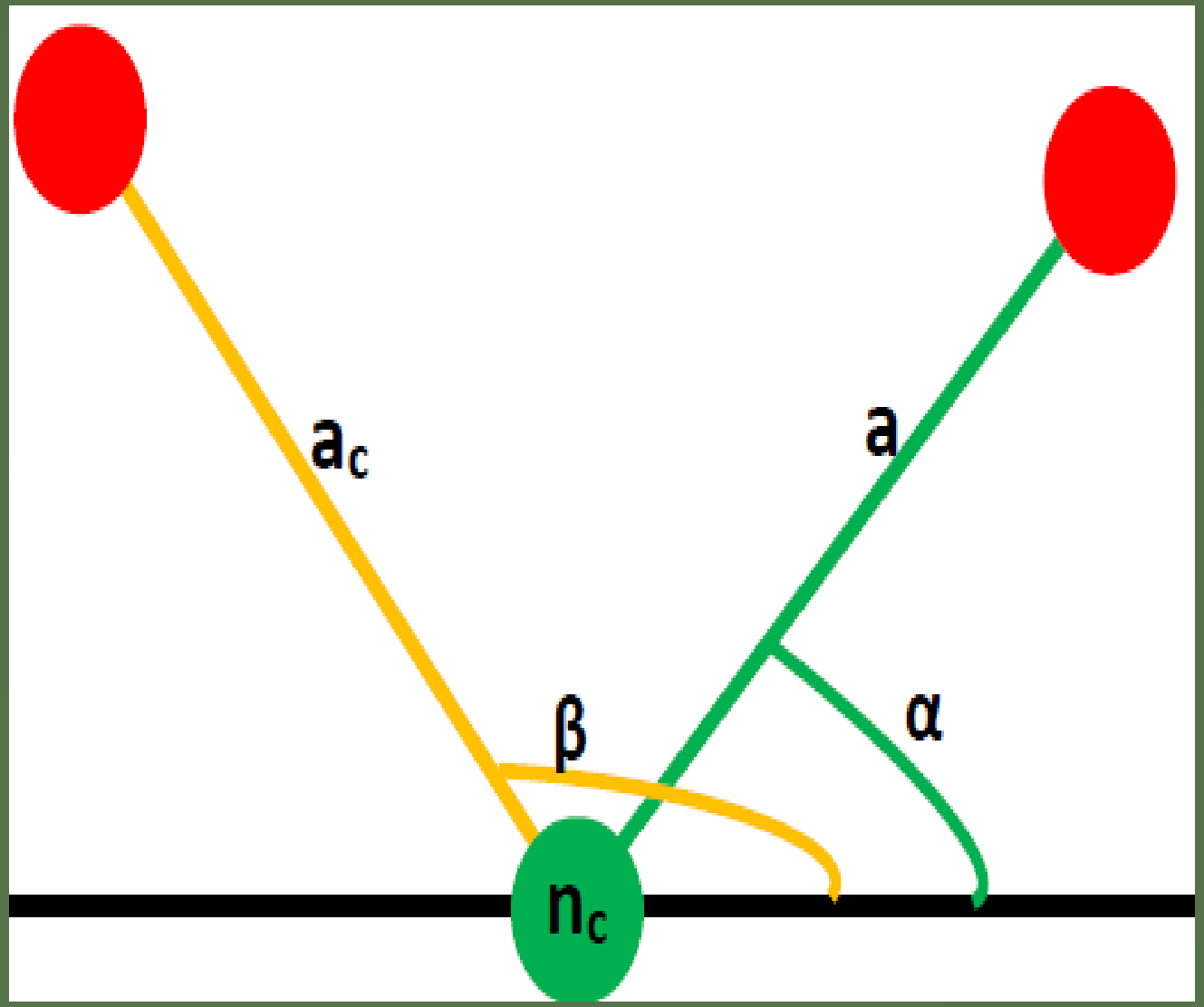
# Les nœuds du graphe



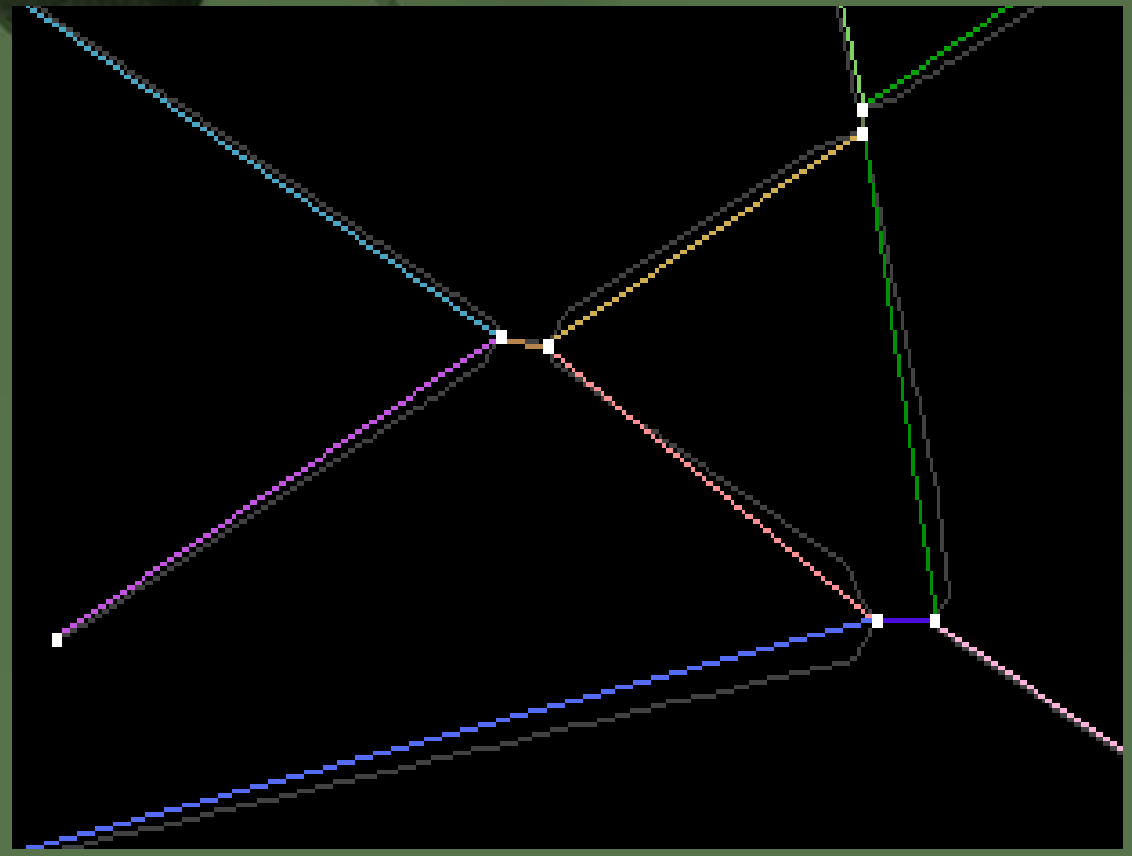
# Les arêtes du graphe

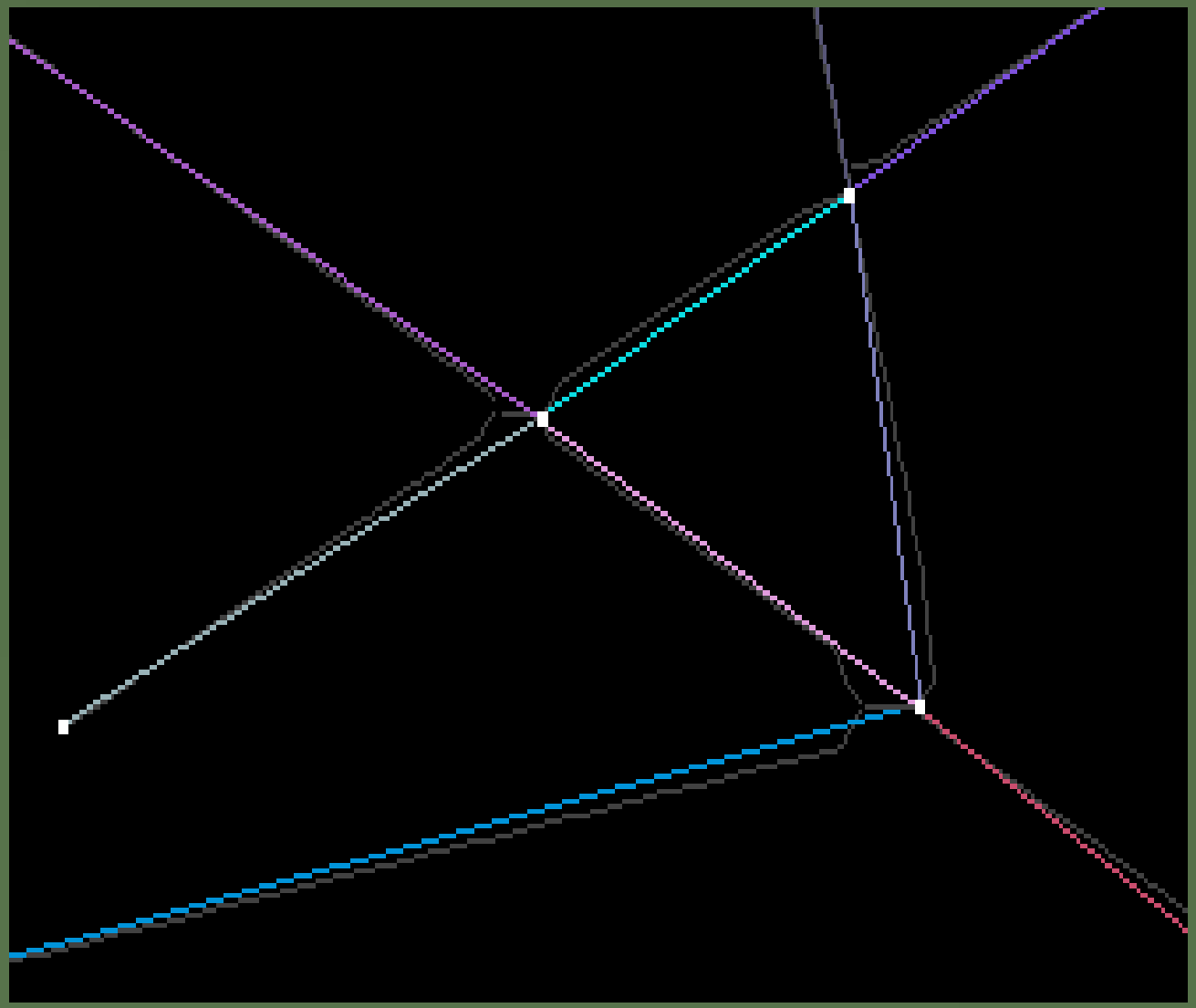


# Ajout d’une arête dans la liste d’un nœud

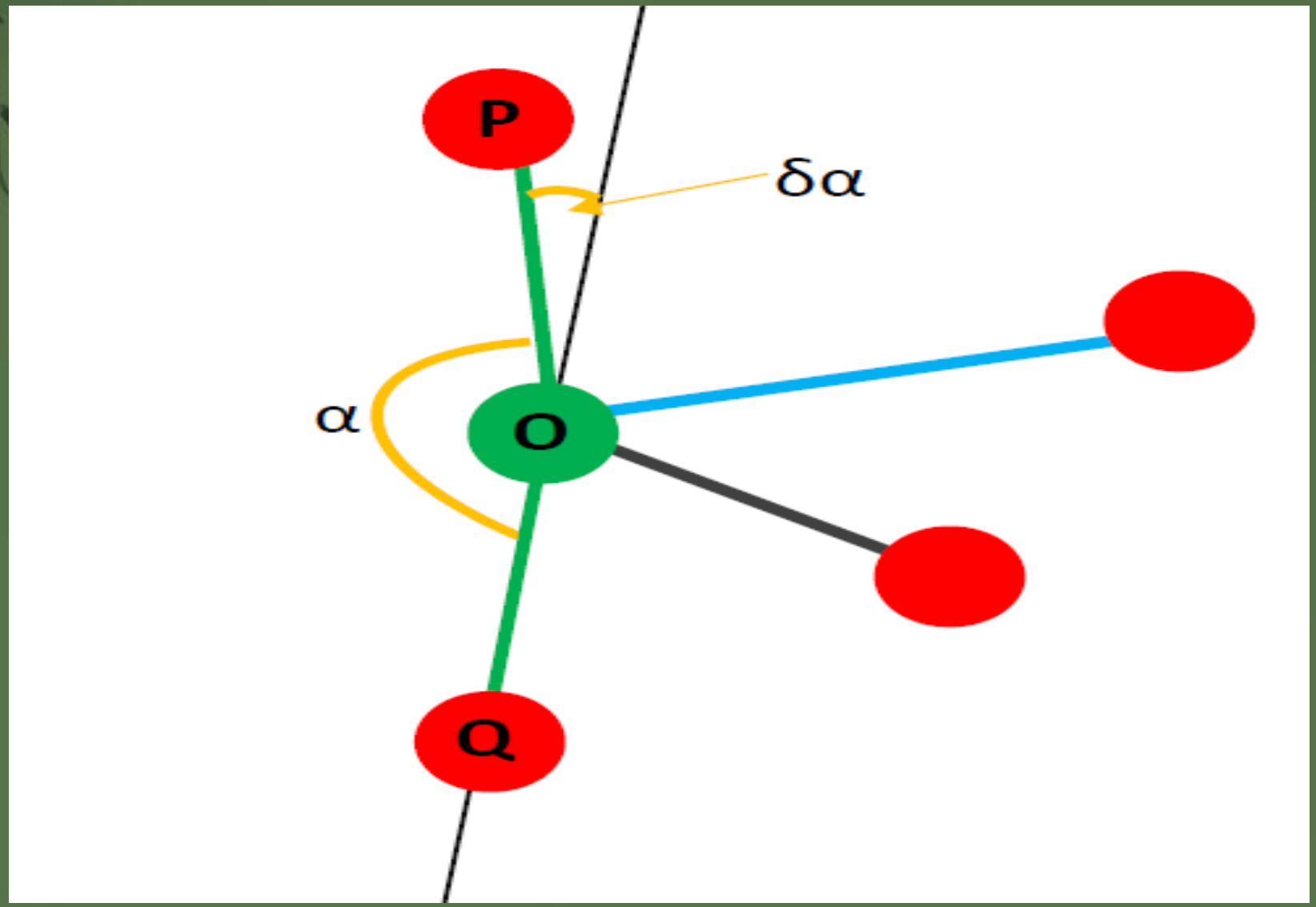


# Nettoyage du graphe

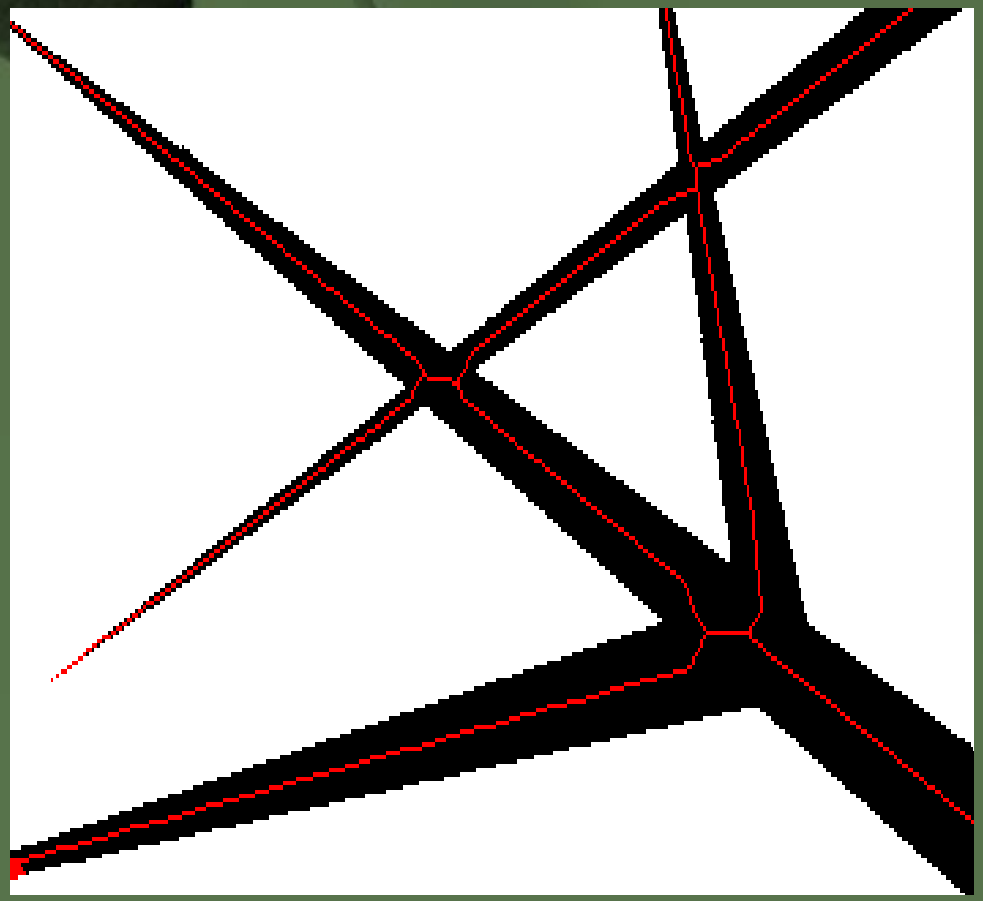


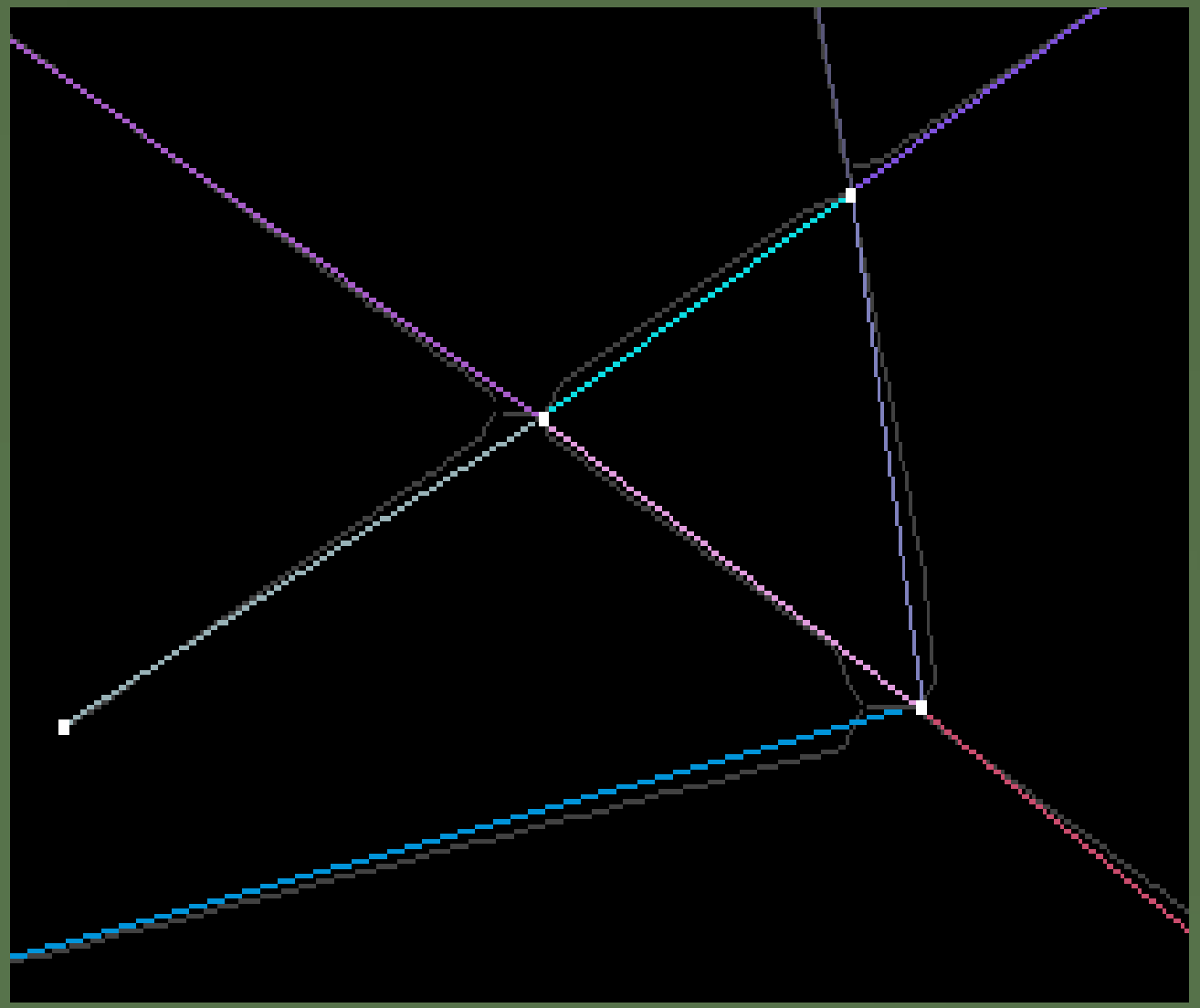


# Création des axes

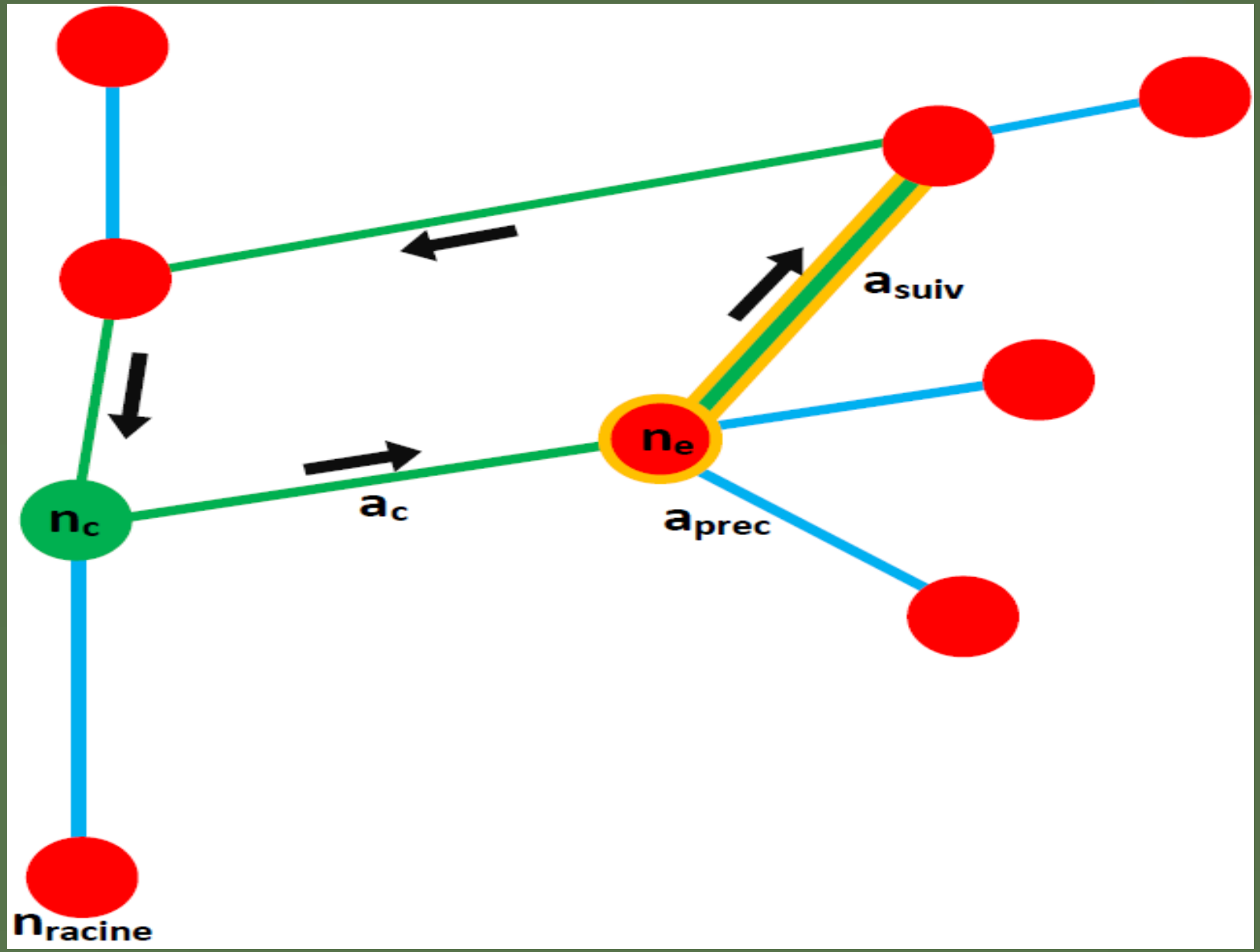


# Passage du graphe à un arbre$_{\text{math}}$



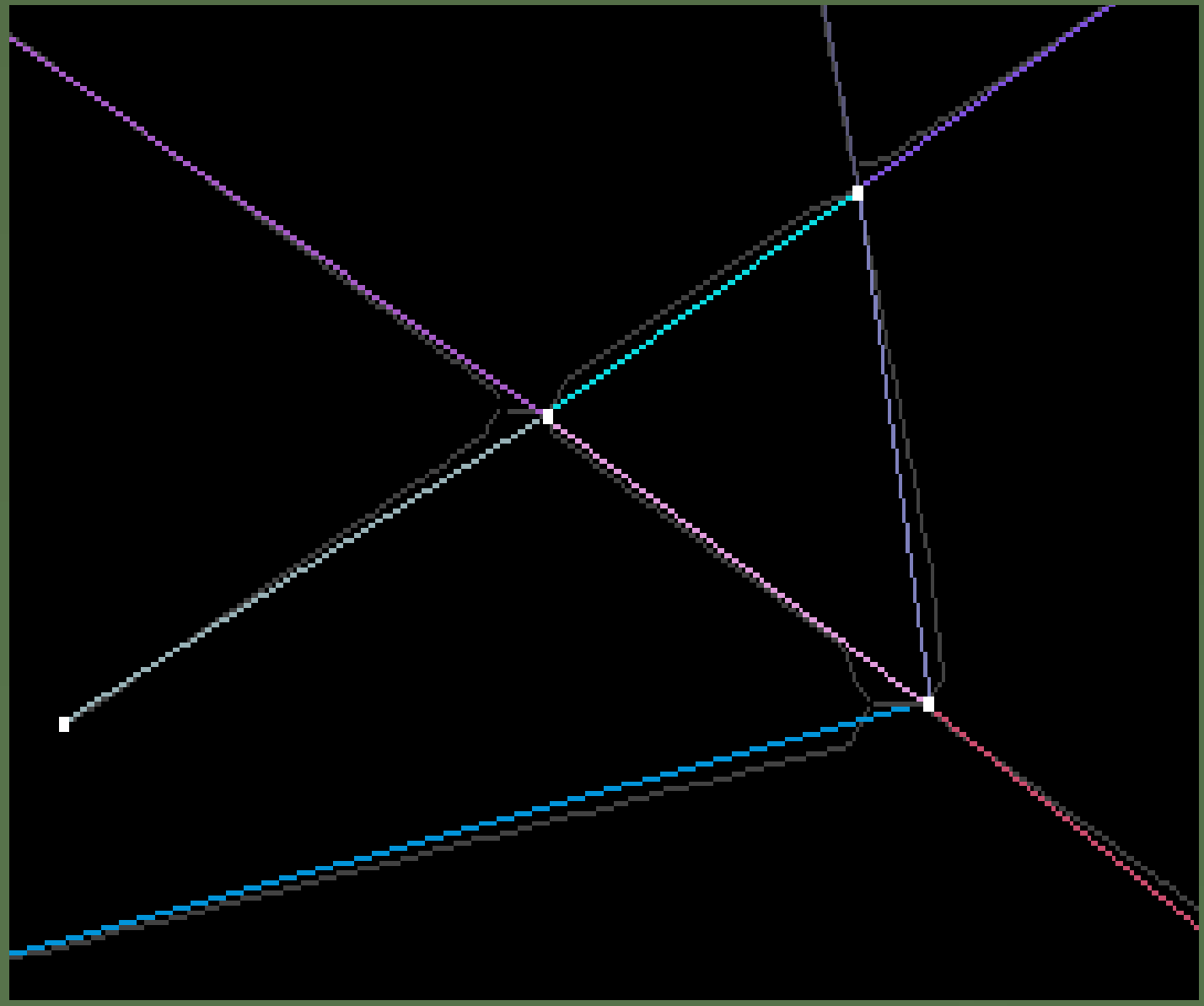


# La recherche des cycles



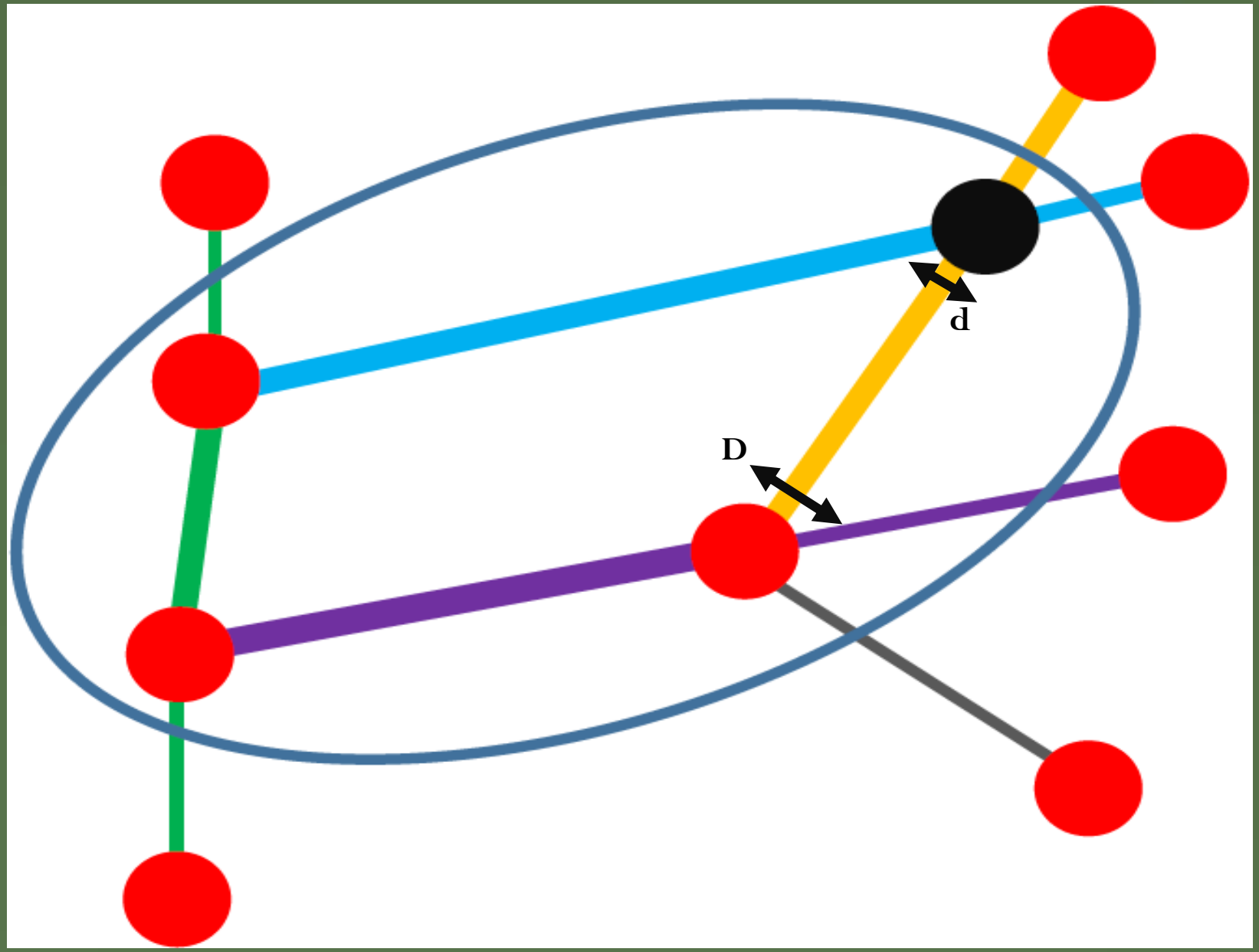
# Critères

- Les axes
- Le diamètre
- La longueur
- L’aléatoire

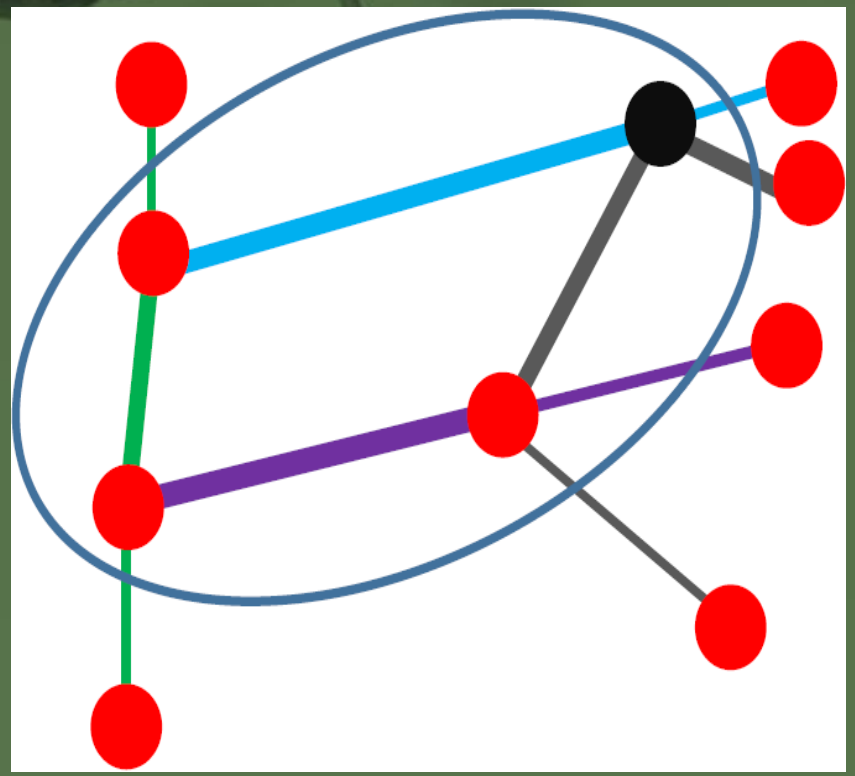


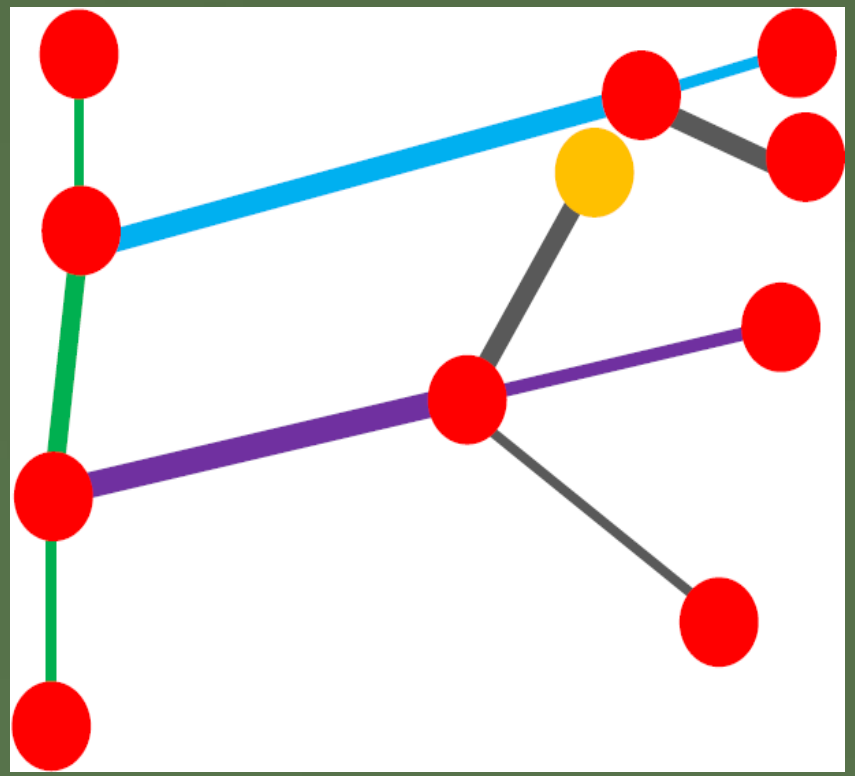
# Nœud à ouvrir

- le diamètre aux extrémités
- le nœud avec moins d'arêtes

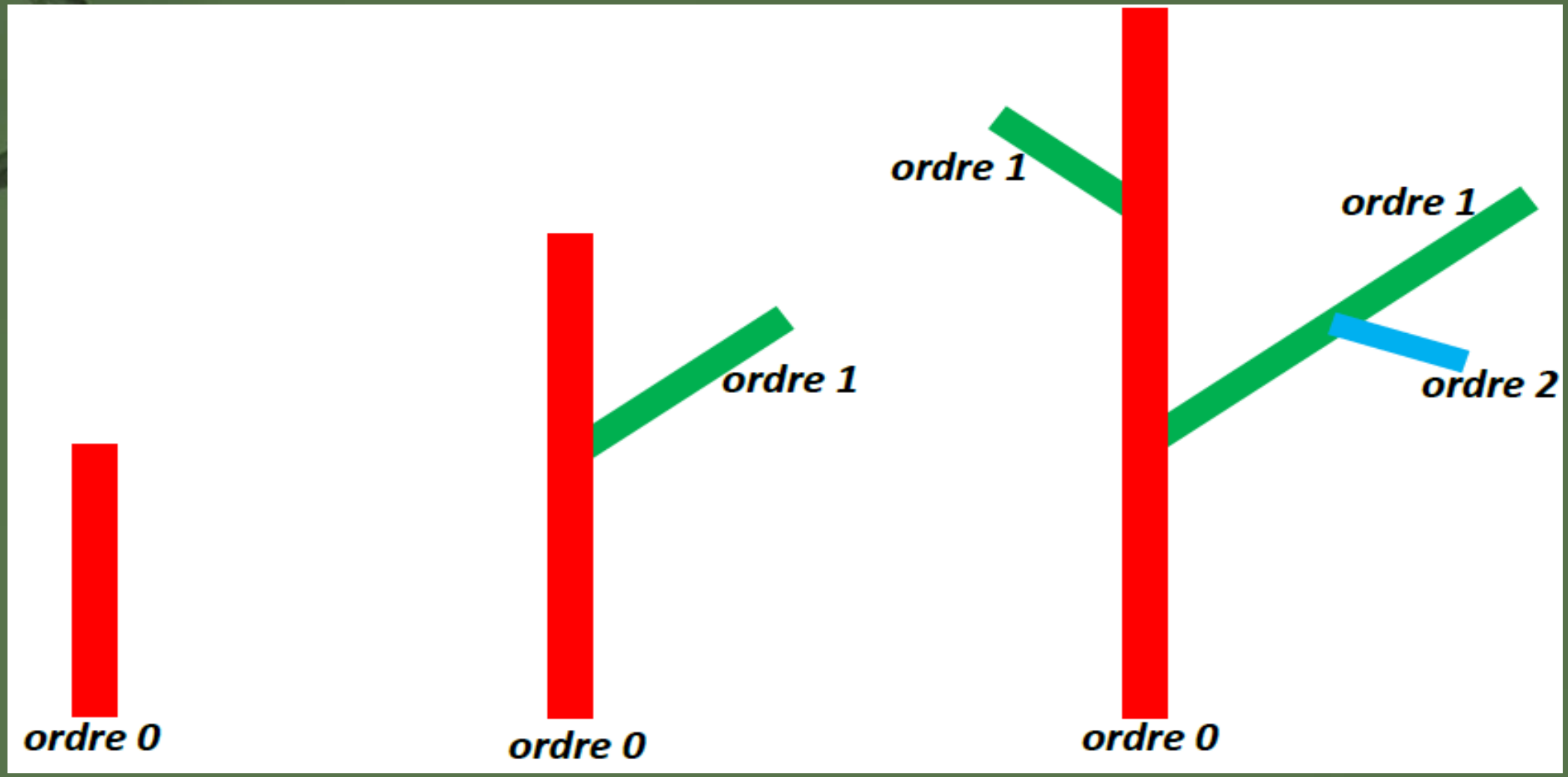


# Ouvrir le nœud sélectionné

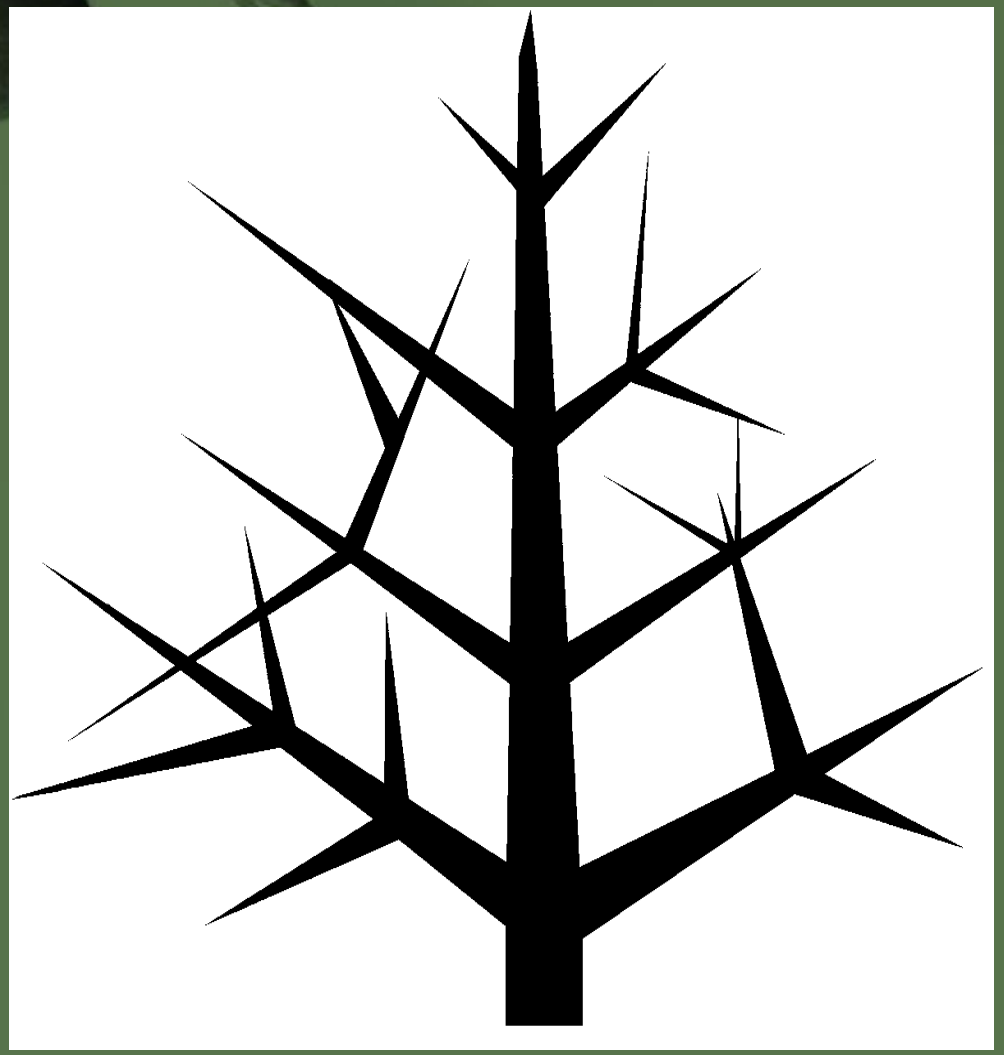


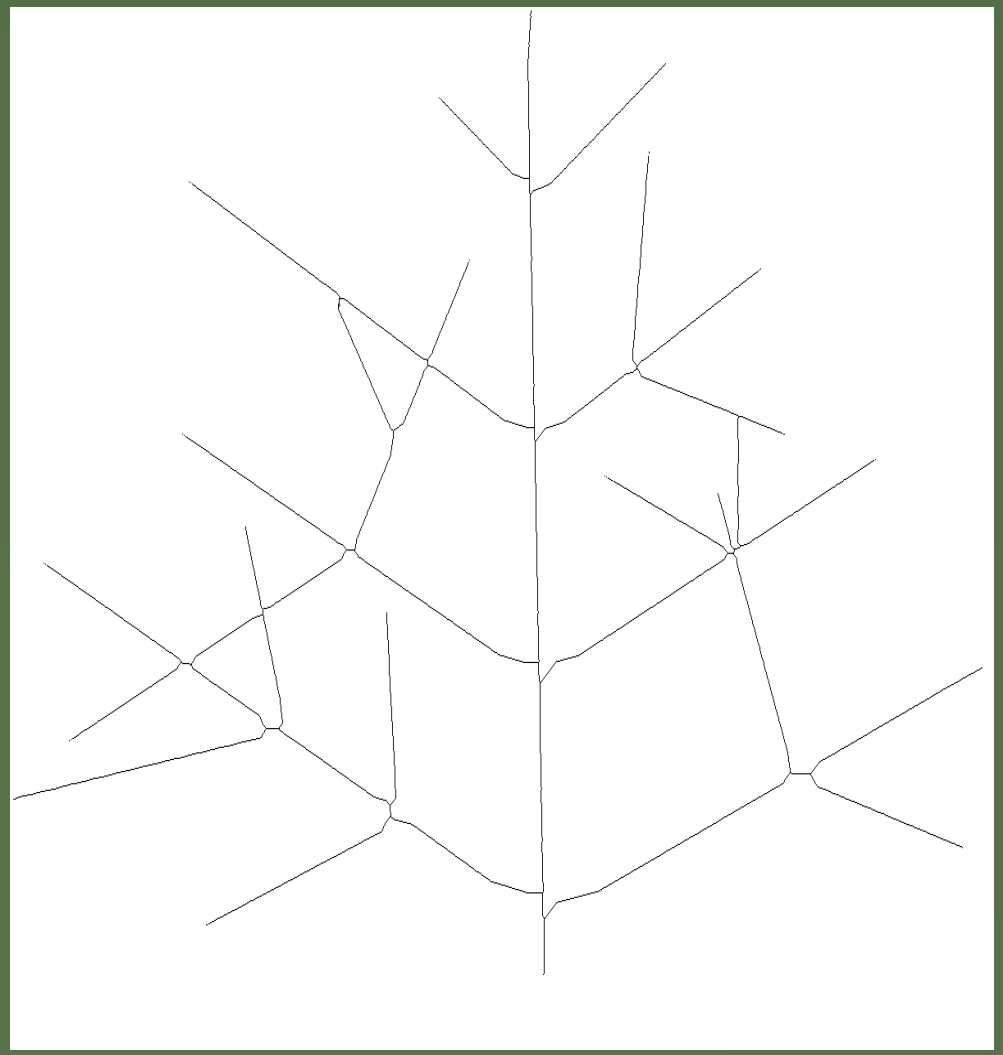


# Construction de l’architceture

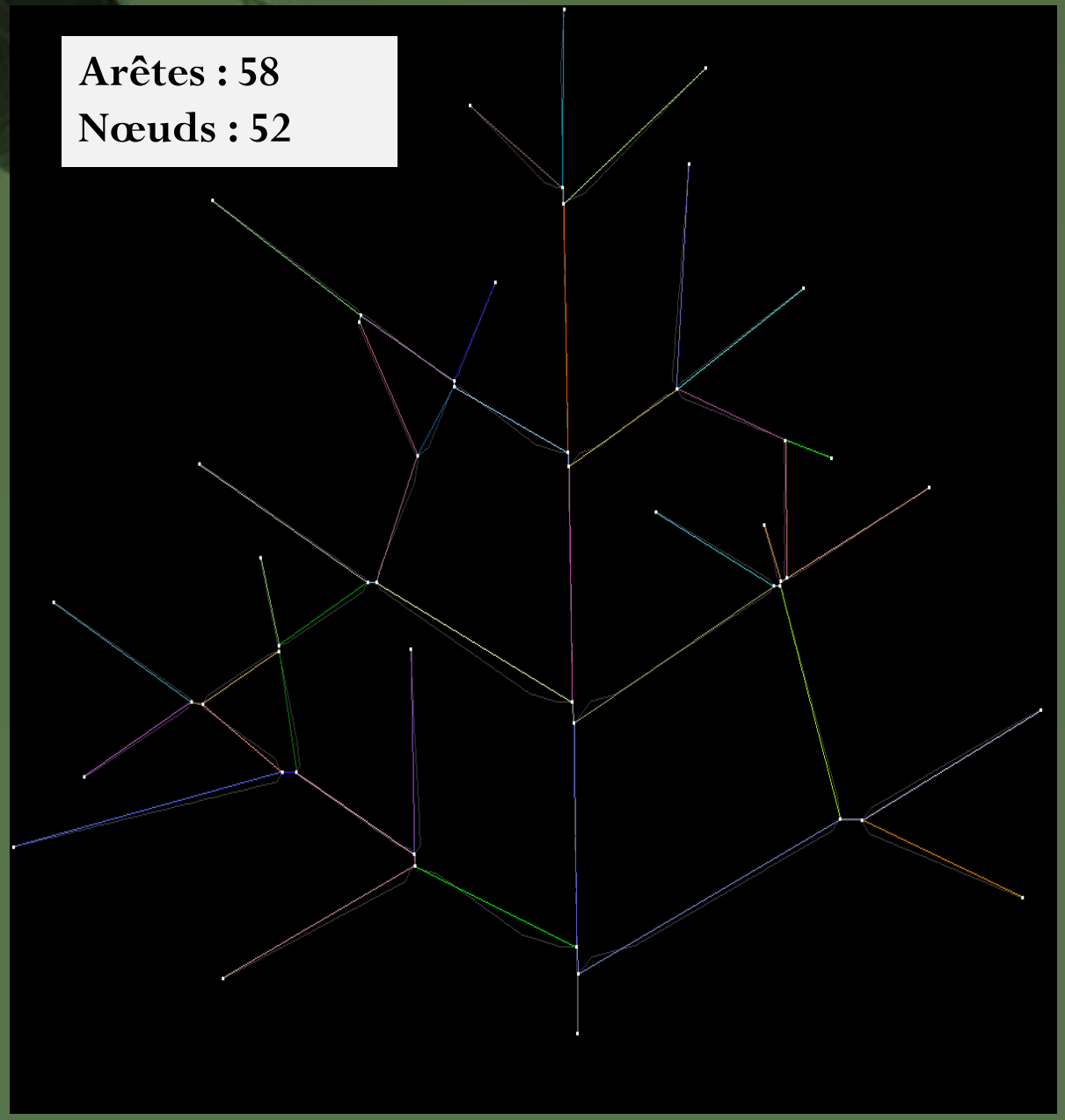


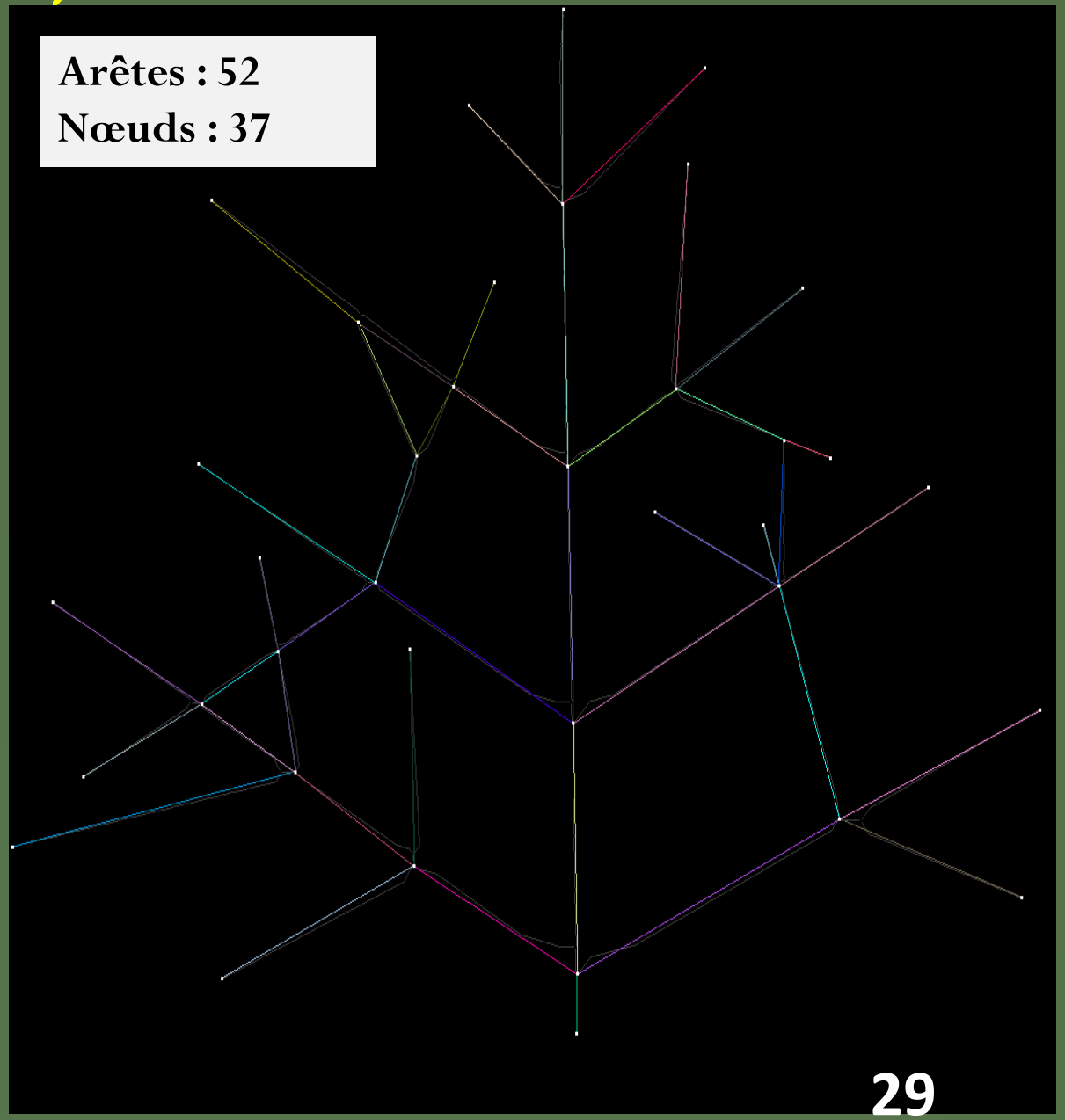
# Tests (1)



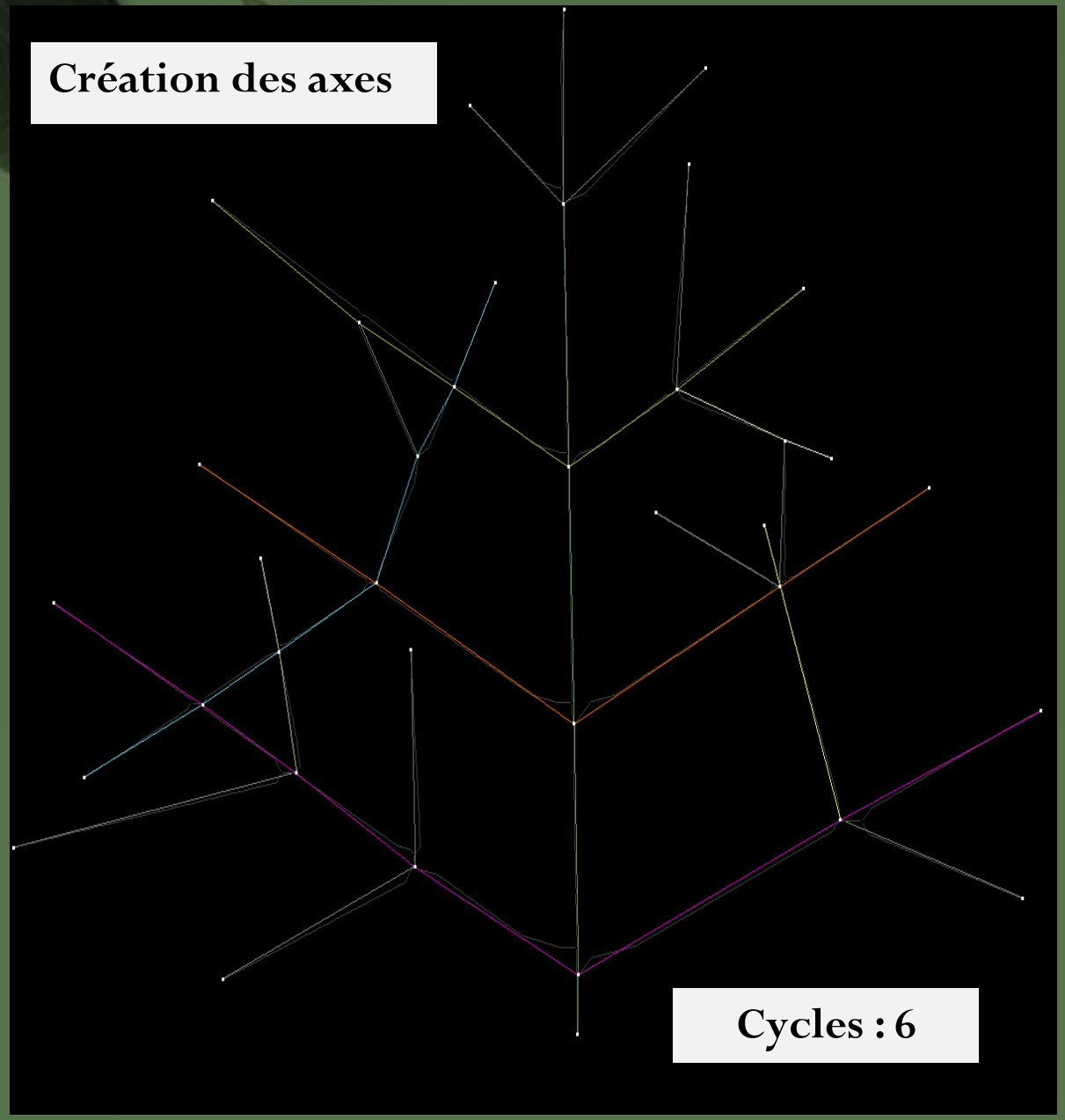


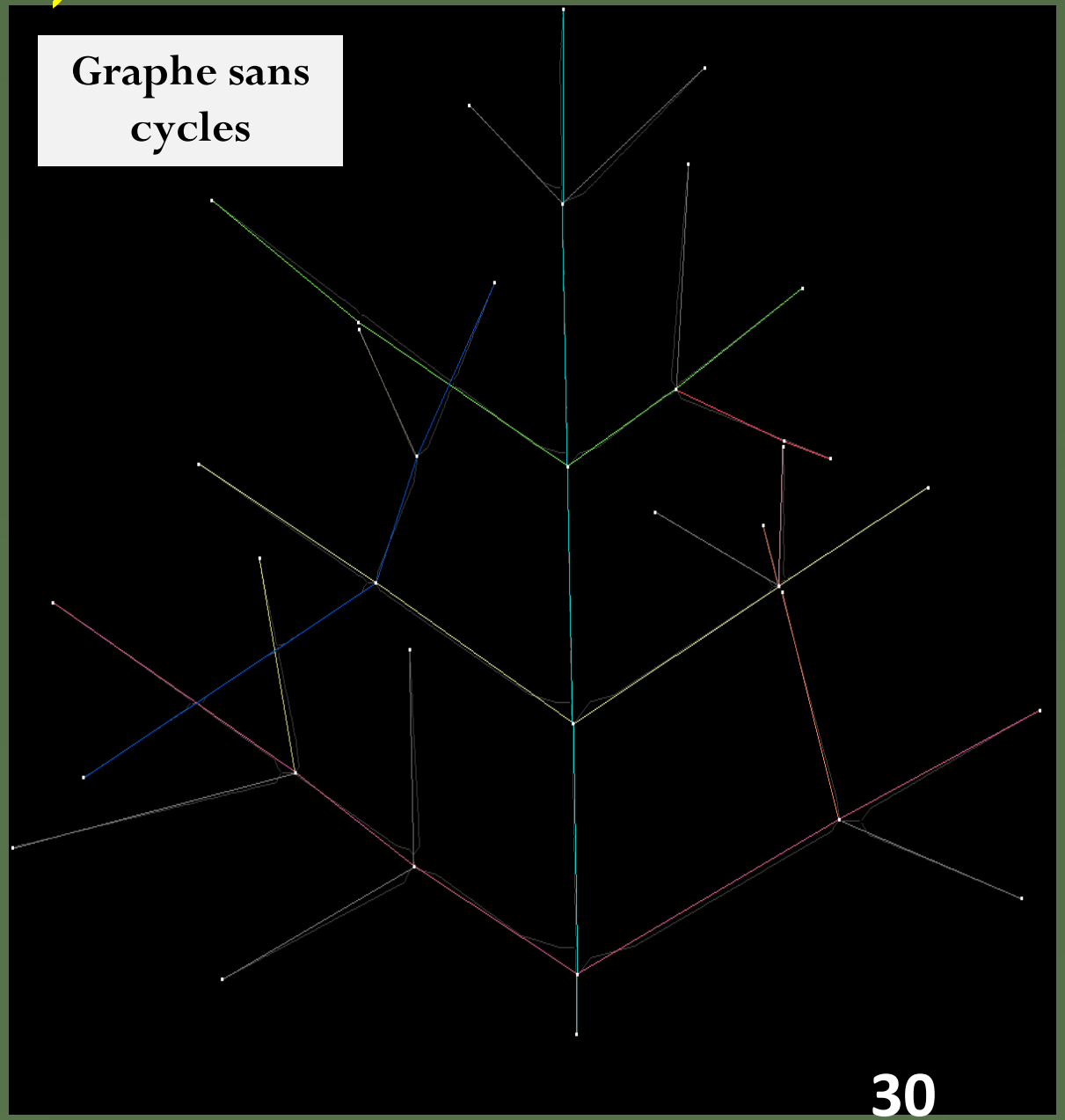
# Tests (1)



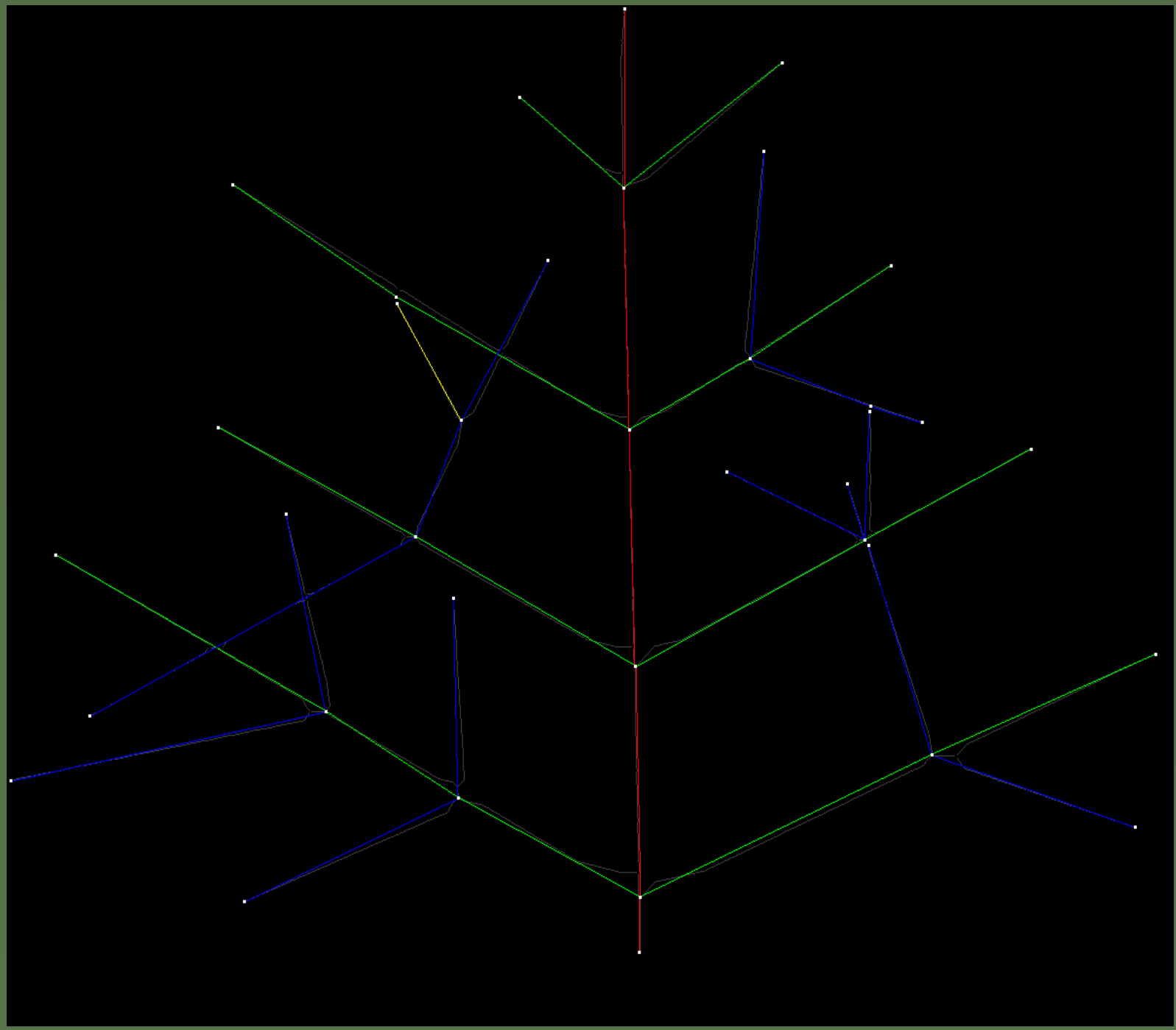
# Tests (1)



# Résultat (1)

Reconstruction de l'architecture



# Tests (2)

*Graphe initial :*
Arêtes : 2956
Nœuds : 2235

*Graphe initial:*
Arêtes : 1590
Nœuds : 1224

Cycles : 428

# Résultat (2)

Reconstruction
de l'architecture

# conclusion

# Merci pour votre attention