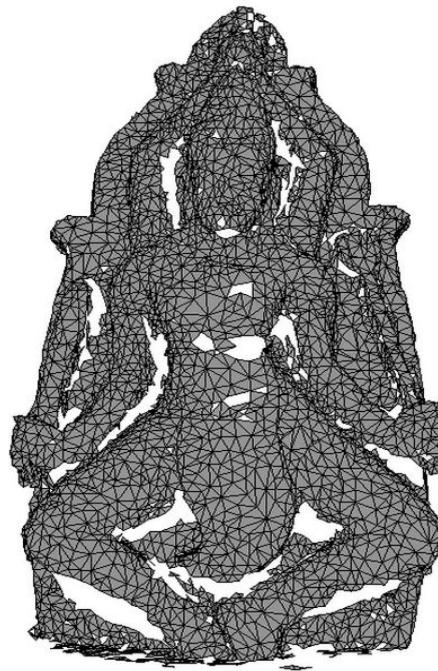


Segmentation 3D par la méthode du Livewire

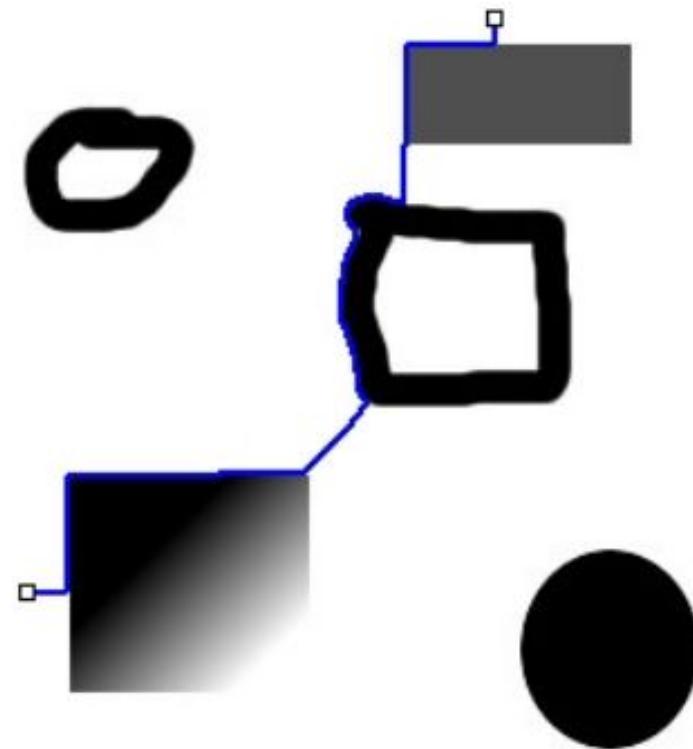
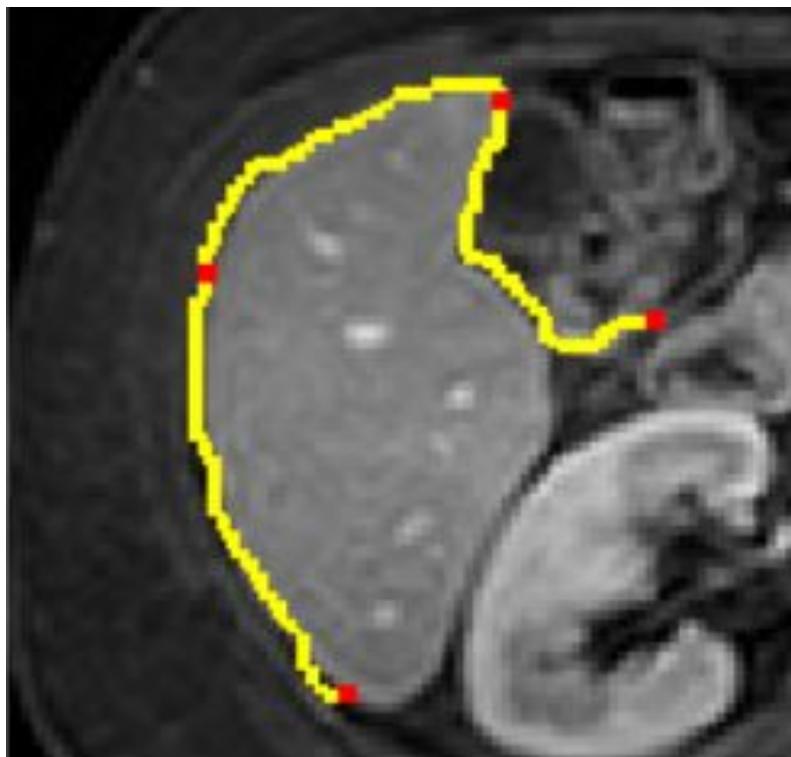
Introduction

- Segmentation 3D
- Méthode du Livewire

Introduction

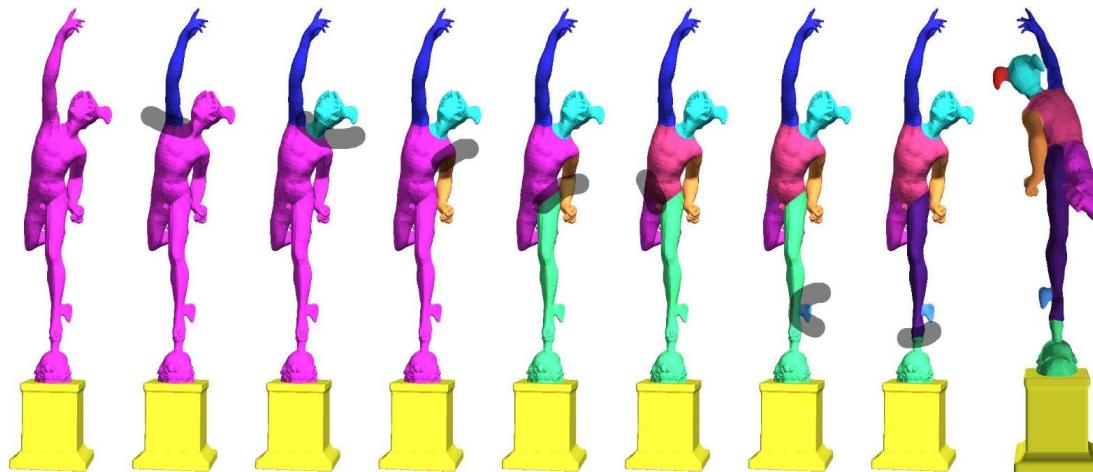


Livewire 2D

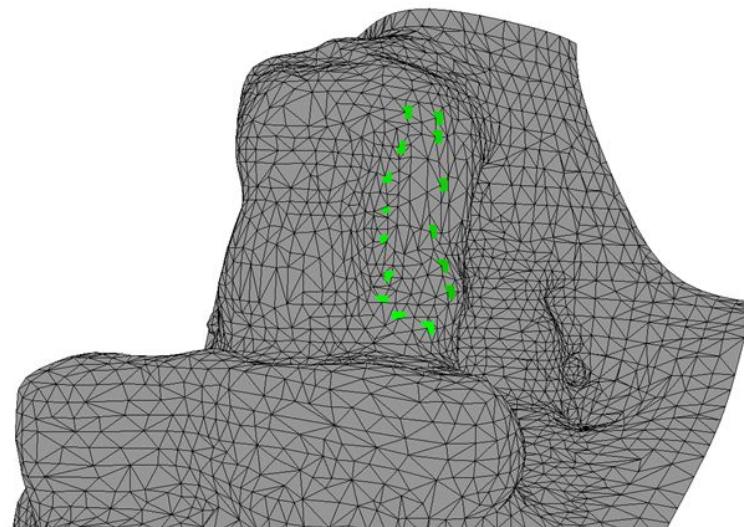
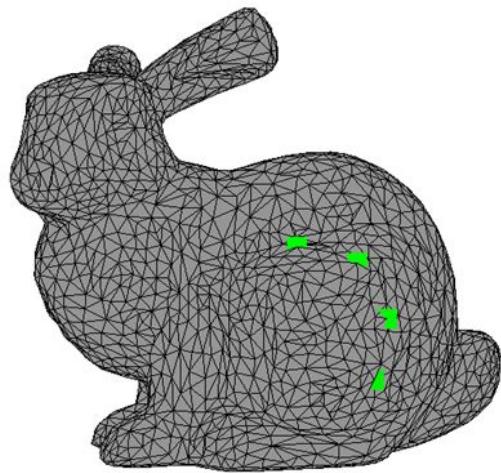


Livewire 3D

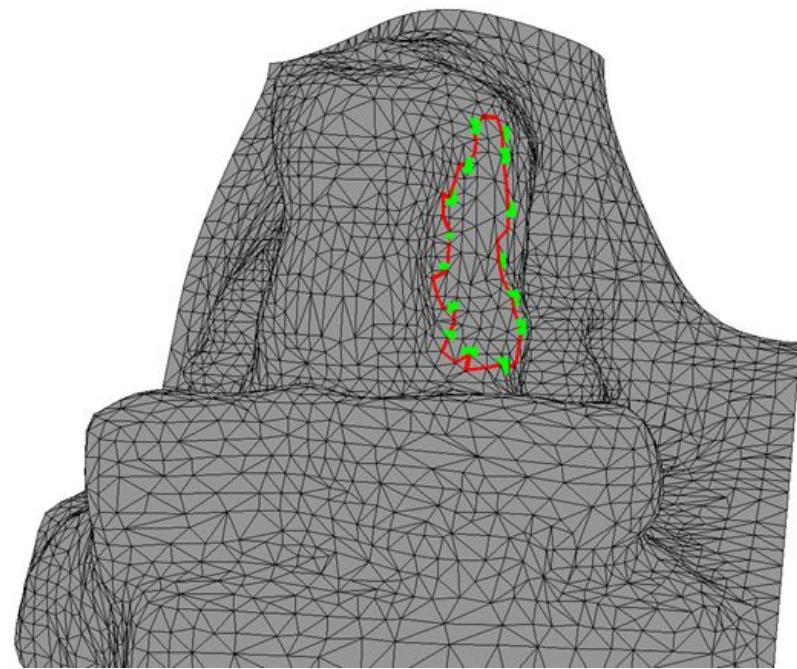
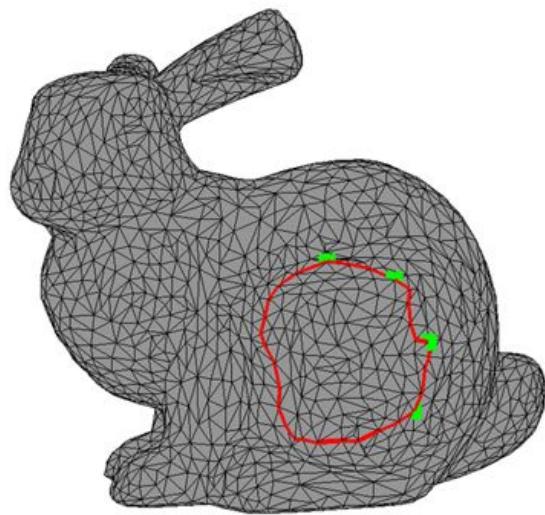
- Intelligent Scissoring for Interactive Segmentation of 3D Meshes. PhD thesis.
- Kiefer William, Princeton University, April 2004.
- Interaction utilisateur



Livewire 3D



Livewire 3D



Livewire 3D

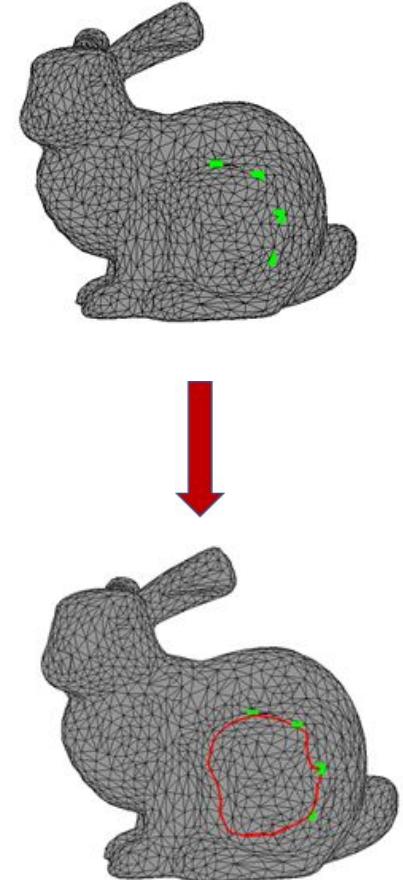
- Comme pour Dijkstra, on attribue des **poids** à chaque sommet pour calculer un **chemin**.

- Les poids se calculent en fonction du voisinage d'arêtes (**le 1-ring**).

- Fonction de coût d'arête pour calculer le poids à un sommet:

$$\text{cost}(e) = C_{\text{len}}(e) * C_{\text{ang}}(e) * C_{\text{curv}}(e) * C_{\text{dot}}(e) * C_{\text{vis}}(e) * C_{\text{dist}}(e) * C_{\text{angee}}(e)$$

- Utilisé itérativement pour tracer le contour..



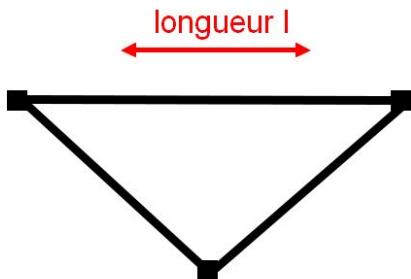
Critères de coût

- $\mathbf{C}_{\text{len}}(\mathbf{e})$: Longueur d'arête
- $\mathbf{C}_{\text{ang}}(\mathbf{e})$: Angle dièdre
- $\mathbf{C}_{\text{curv}}(\mathbf{e})$: Courbure
- $\mathbf{C}_{\text{dot}}(\mathbf{e})$: Orientation de la normale
- $\mathbf{C}_{\text{vis}}(\mathbf{e})$: Visibilité
- $\mathbf{C}_{\text{dist}}(\mathbf{e})$: Distance contour
- $\mathbf{C}_{\text{angee}}(\mathbf{e})$: Limite d'angle

Critères de coût

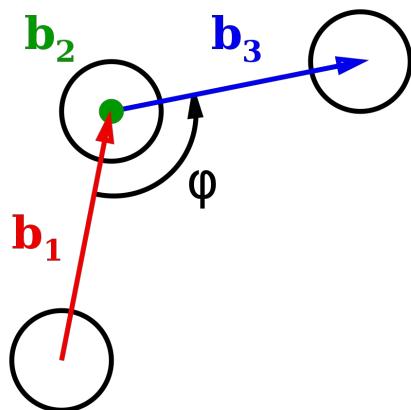
Longueur d'arête

Distance euclidienne

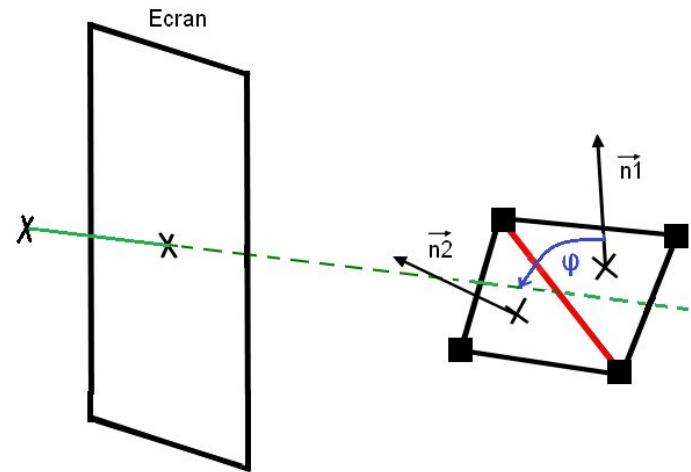


Angle dièdre

$$\frac{\theta_e}{2\pi}$$



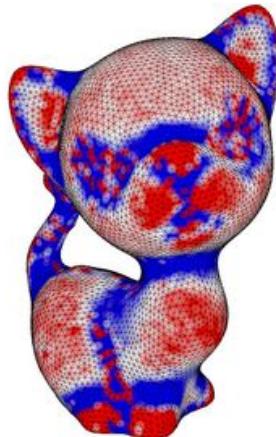
Orientation de la normale



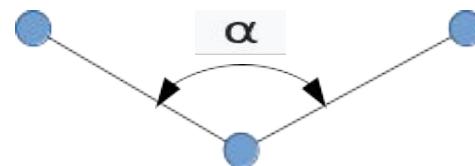
Critères de coût

Courbure

$$K(P_i) = \frac{1}{A_i} (2\pi - \sum_j \theta_i^j)$$

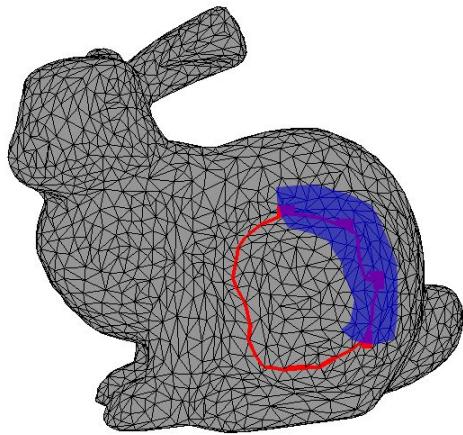


limite d'angles

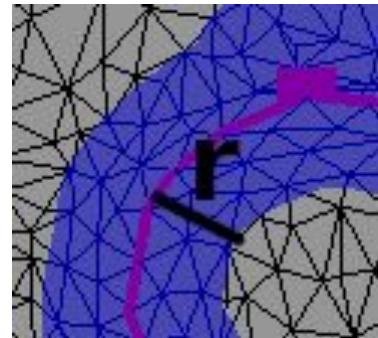


Critères de coût

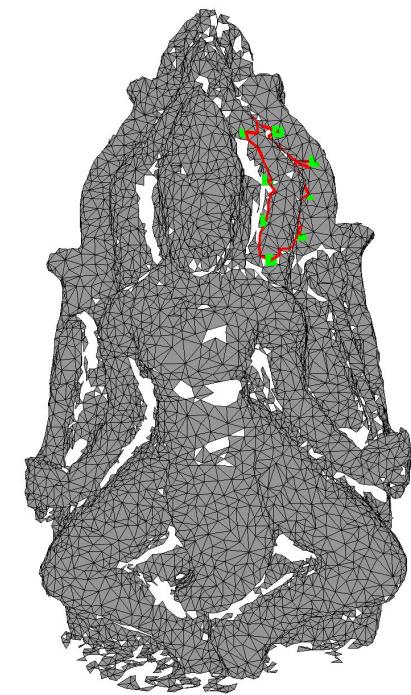
Visibilité



Distance à la ligne centrale
du contour



Identification de parties à segmenter

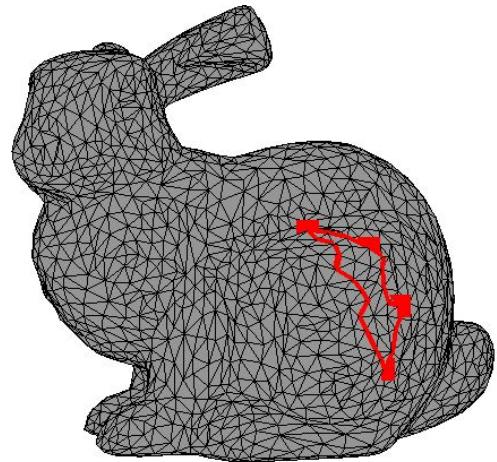


Identification de parties à segmenter

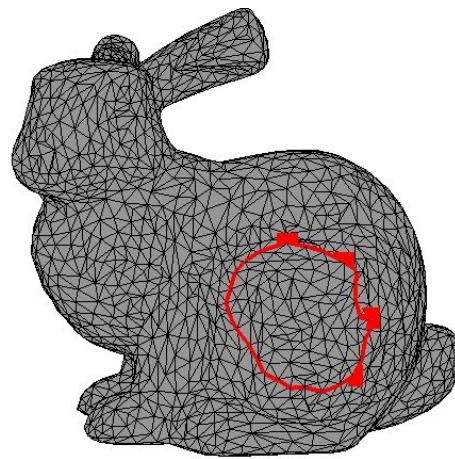
- Identification.
- Extraction de points d'intérêt 3D (contour) sur un nuage de point avec PCL.
- Projection (test de distance)



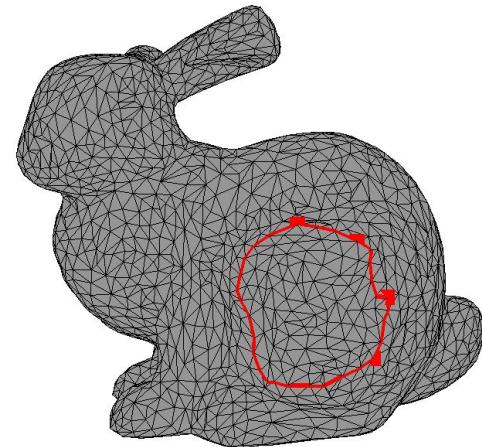
Résultats : Le Stanford Bunny



Critères manquants :
courbure, normale, visibilité

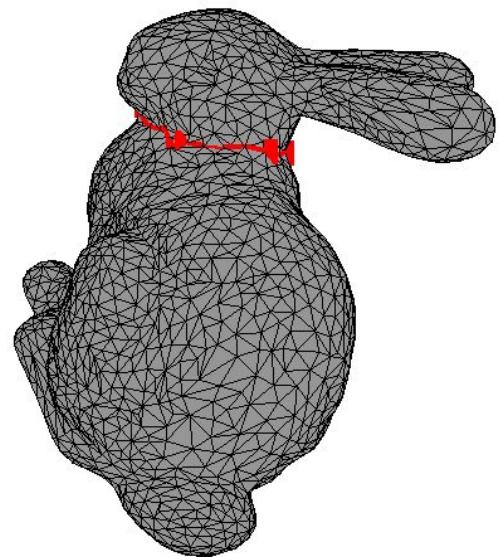


Critères manquants :
dièdre, courbure, normale

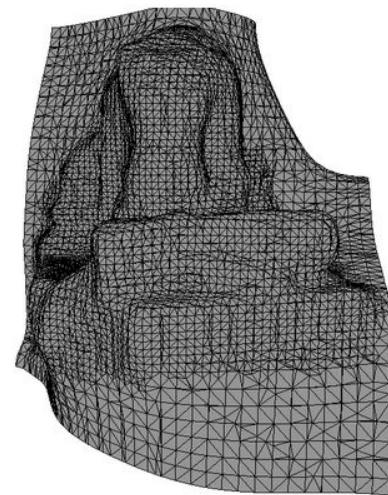


Aucun critère manquant

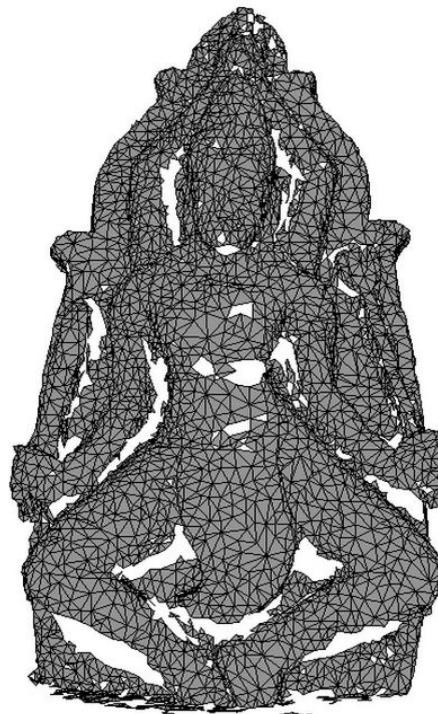
Résultats : Le Stanford Bunny



Statue “myson”



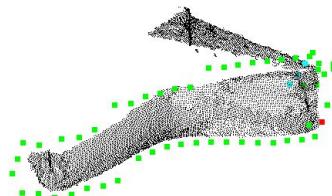
Statue de siva



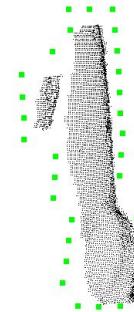
Extraire les contours Myson



Contour 0



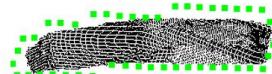
Contour 1



Contour 2



Contour 0

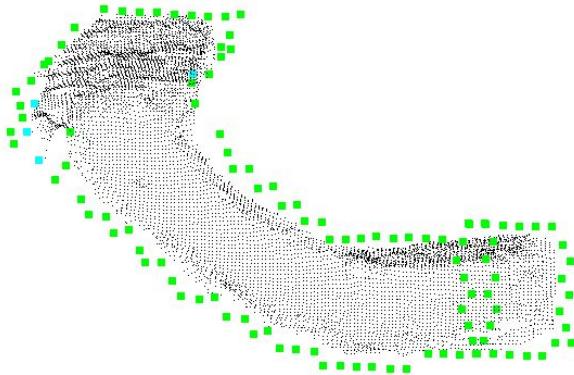


Contour 1

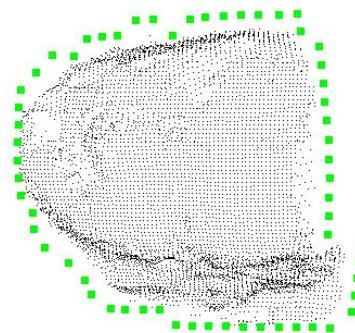


Contour 2

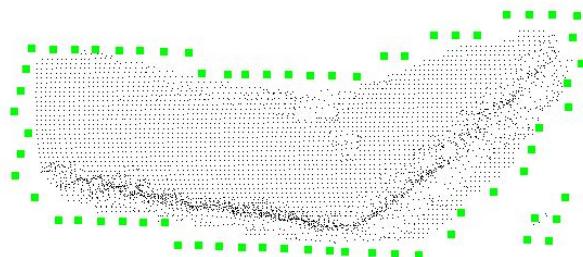
Extraire les contours Siva



Contour 0

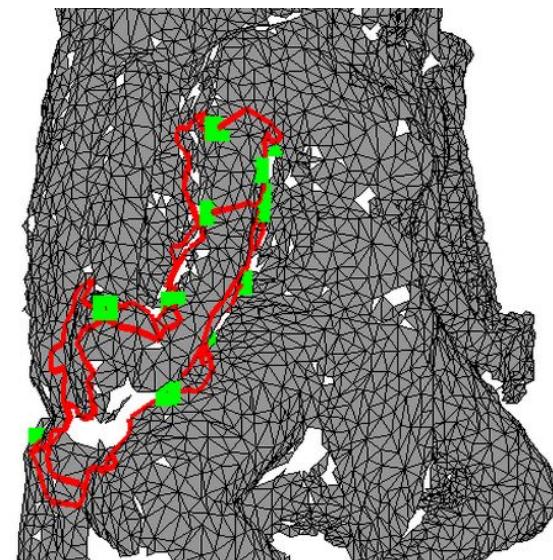
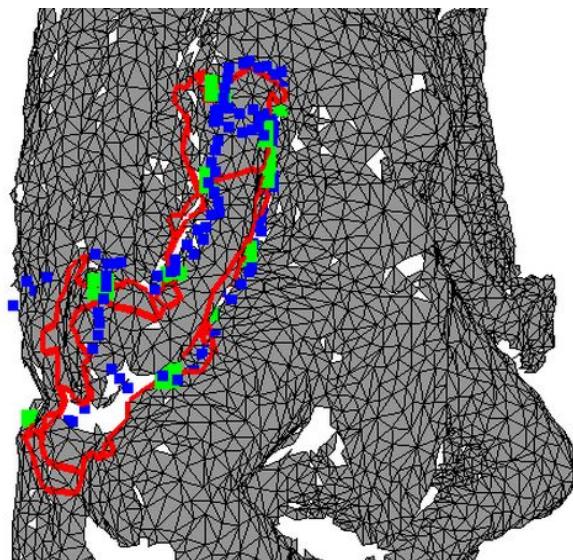
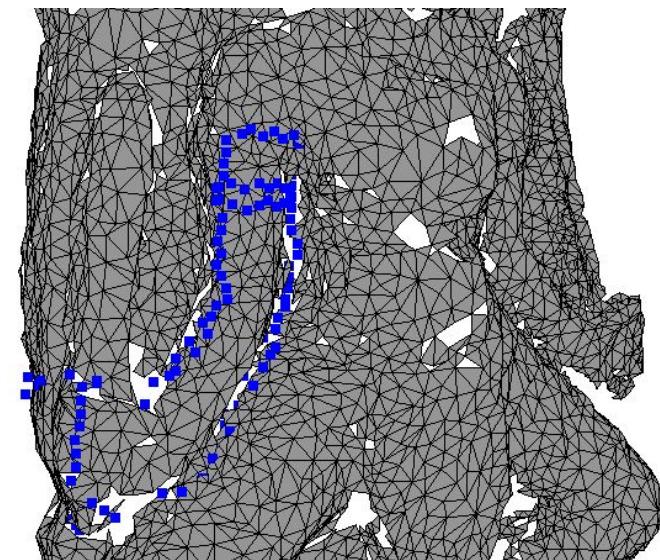


Contour 1

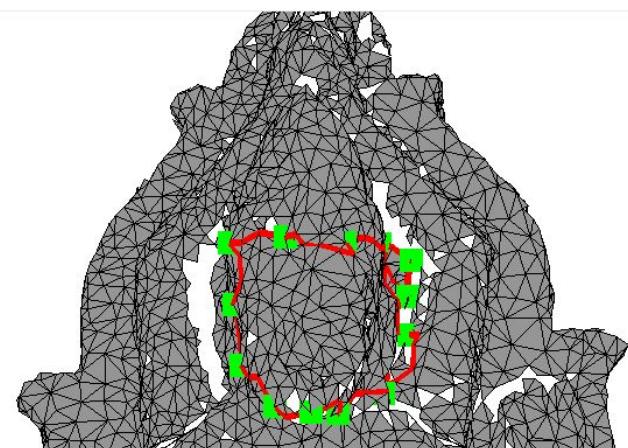
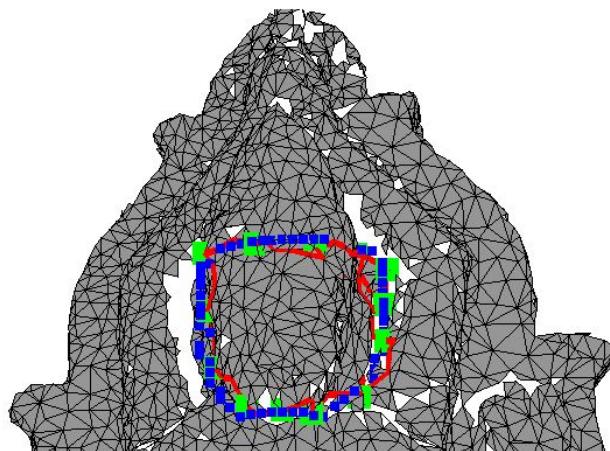
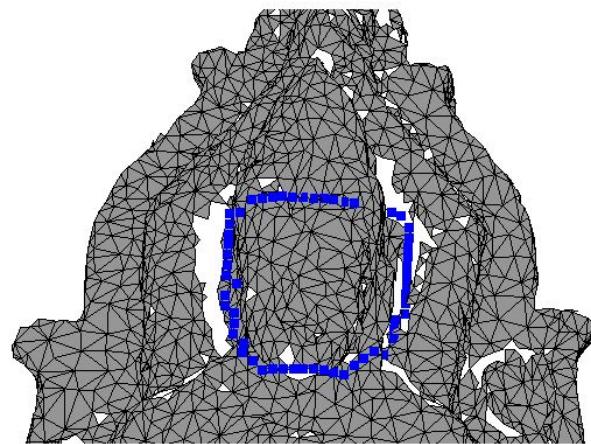


Contour 6

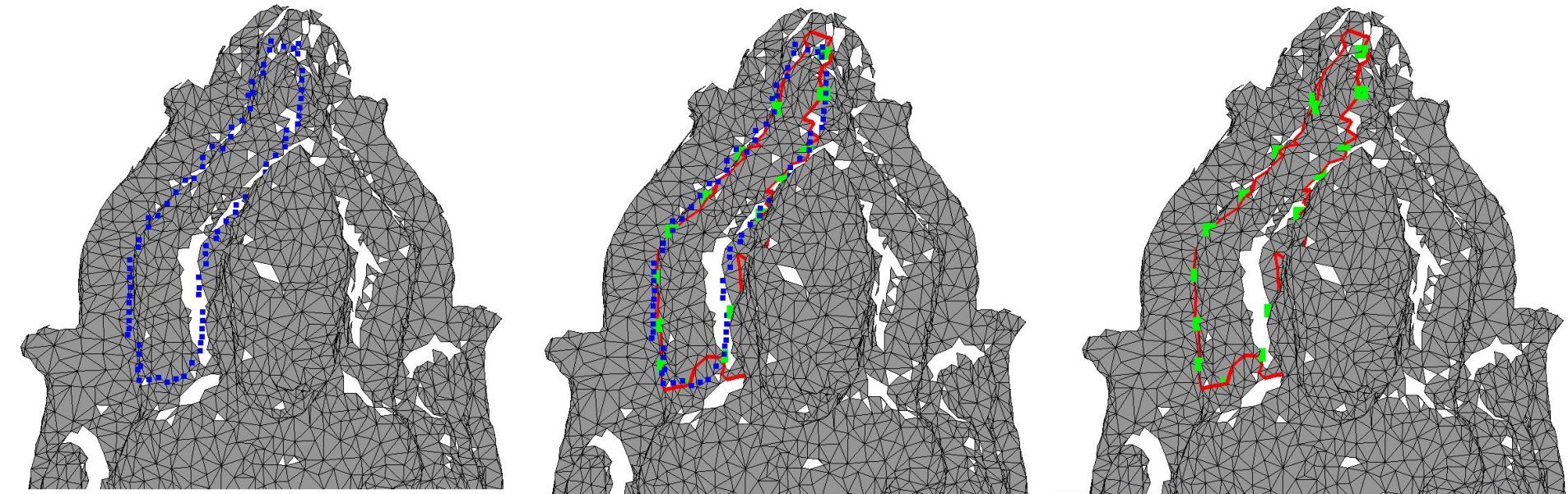
Résultats Siva contour 0



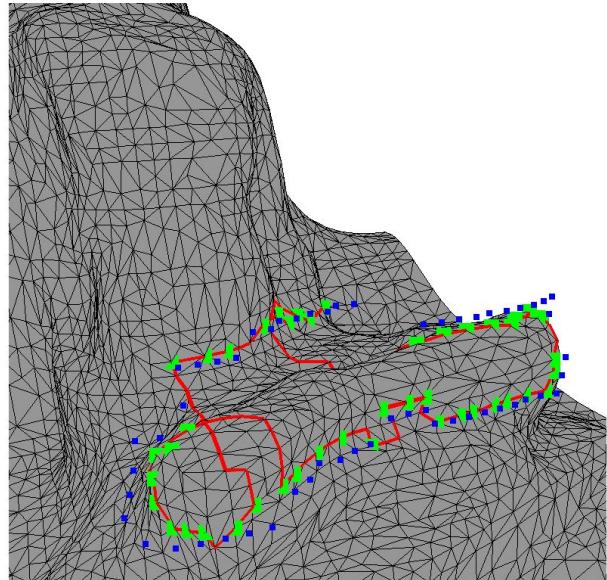
Résultats Siva contour 1



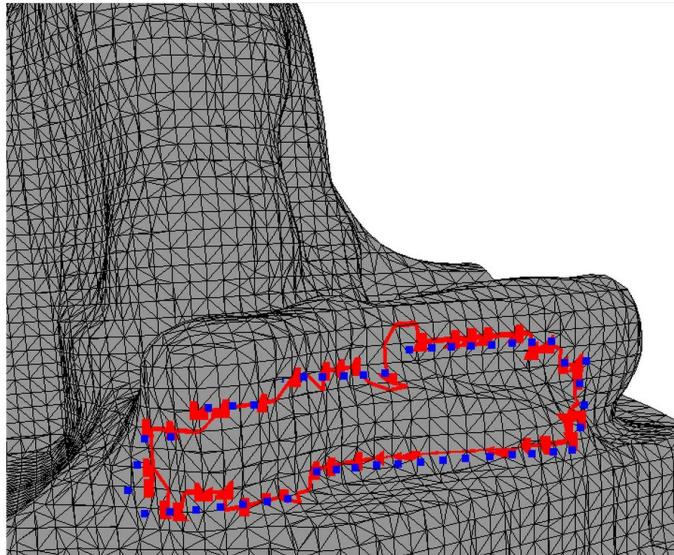
Résultats siva contour 5



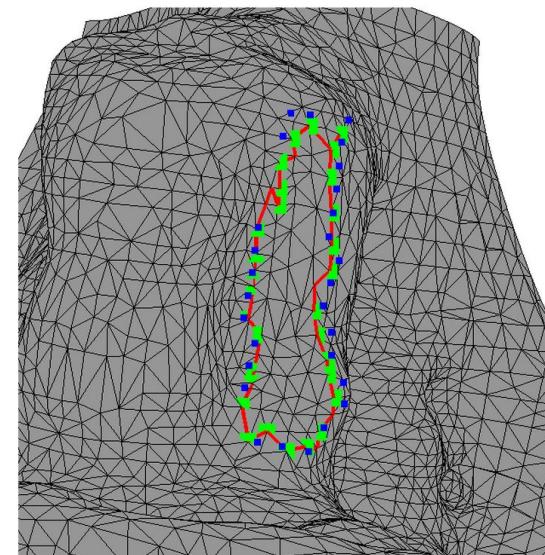
Résultats Myson



Contour 0

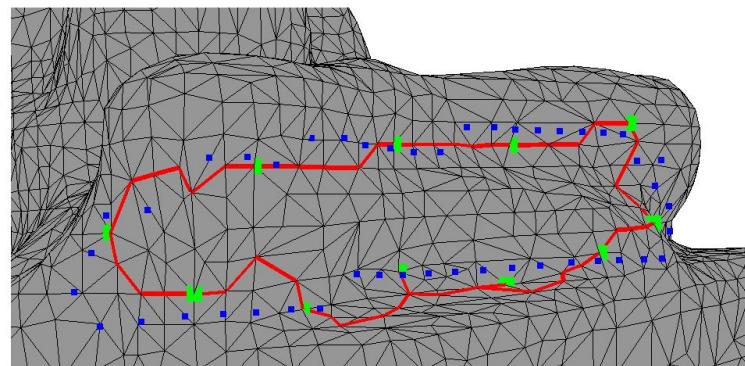


Contour 1

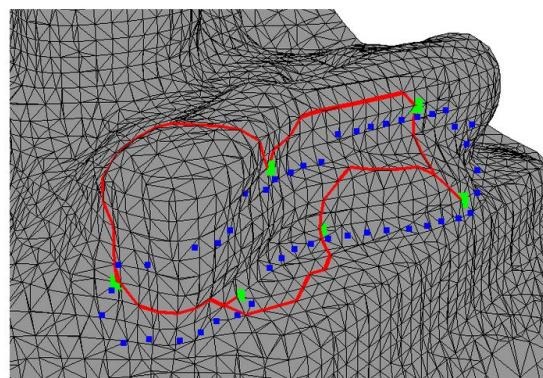


Contour 2

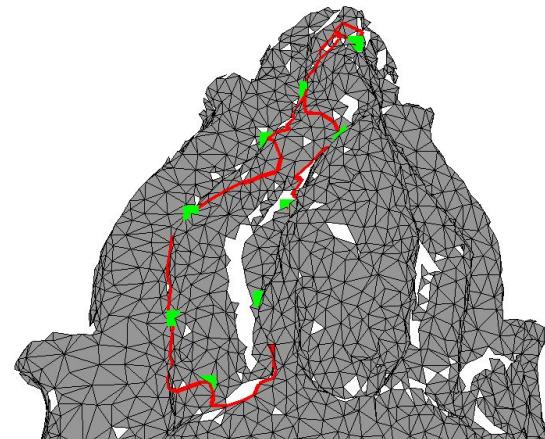
Résultats contours réduits



Contour myson 1 moyen



Contour myson 1 faible

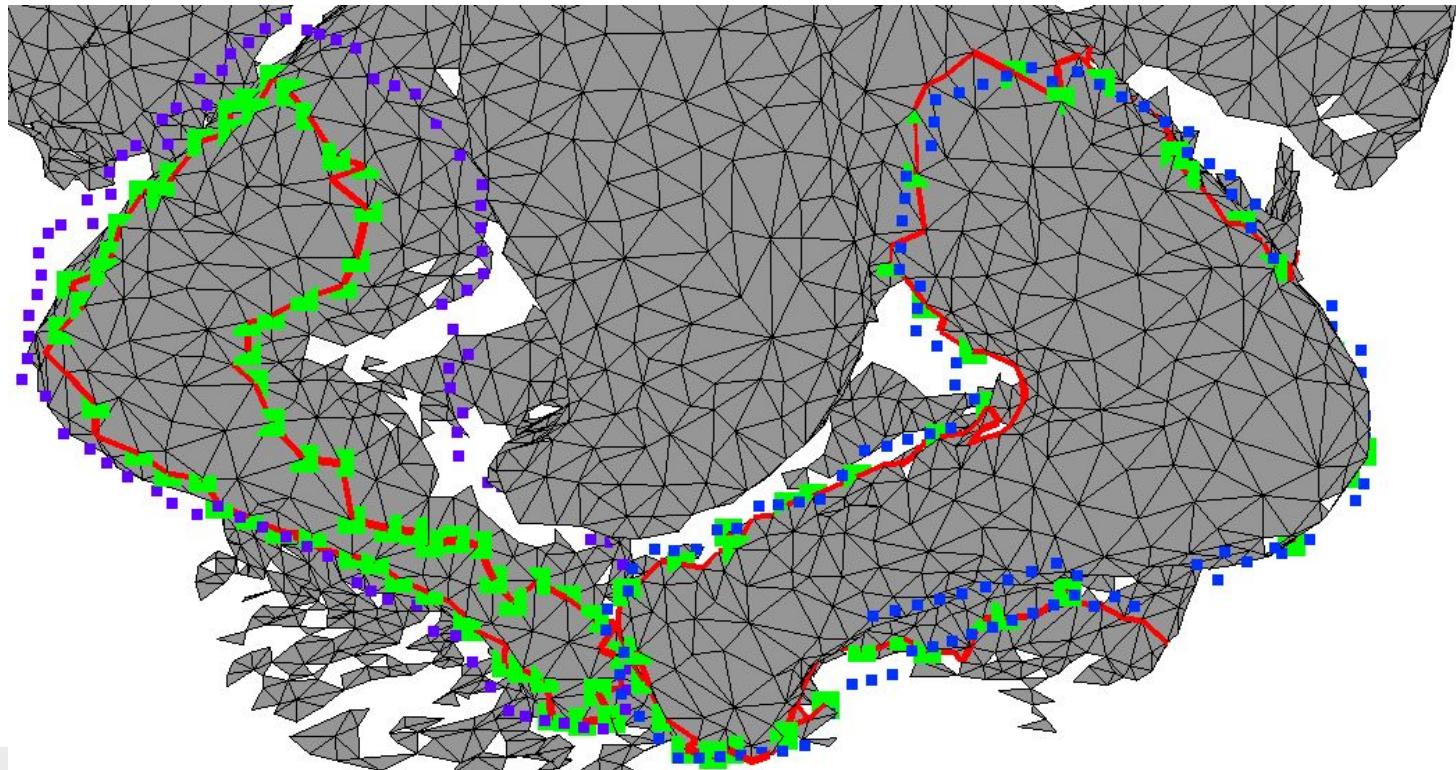


Contour siva 5 faible

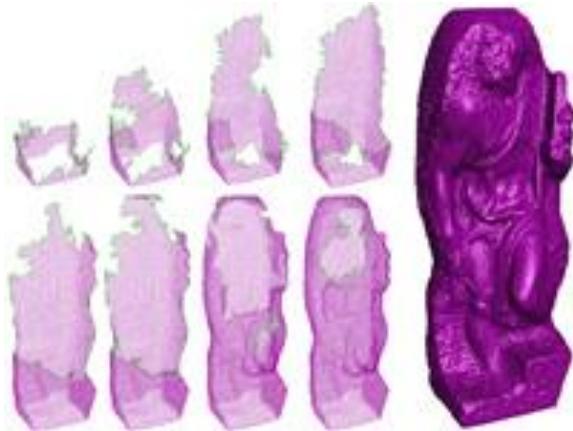
Démonstration (vidéo)



Conclusion

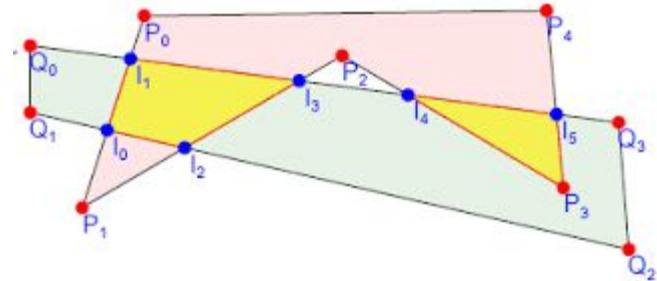


Travaux futurs



Traitement "Out-of-core" sur
les maillages

[Isenburg 2003]



Recouvrement de zones
pour le Multi-Livewire

Bibliographie

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