



**Offer #2024-07193**

## Active subdivision surfaces for the semiautomatic segmentation of biomedical volumes

**Contract type** : Internship agreement

**Level of qualifications required** : Bachelor's degree or equivalent

**Fonction** : Internship Research

### Context

Deformable models (a.k.a. snakes or active contours/surfaces) are efficient segmentation models in bioimaging, allowing the characterization of the spatial organization of biological specimens. They consist in flexible contours that deform in an image from an initial user-provided configuration toward the boundary of the object to be segmented. The deformation is driven by the minimization of a suitable cost functional, often called energy.

### Assignment

We developed a new 3D deformable models [2] based on subdivision surfaces. Subdivision is a powerful scheme to generate curves/surfaces of arbitrary topology starting from an initial coarse mesh. A refinement process, described by a subdivision mask, is recursively applied to the initial mesh to produce a continuously defined limit curve/surface. The main benefits of this representation are its simplicity of implementation and its multiresolution property, which allows for the contour of the shape to be represented at varying resolutions.

If our segmentation method has proven its efficiency on different biomedical applications, some improvements still have to be made, in term of theory and implementation.

### Main activities

The goals of this project are to:

- Discover the theory of deformable models and to understand the mathematics involved
- Develop new energies to improve the efficiency of the method. For instance, develop a novel energy to prevent deformable models from twisting and self-intersecting during its deformation.
- Improve the implementation of the method (display, interaction,...) to make the method ready for its dissemination on the platform Icy.

This project is at the frontier of applied mathematics, image processing/analysis, computer science, and biophysics.

### General Information

- **Theme/Domain** : Computational Biology  
Biologie et santé, Sciences de la vie et de la terre (BAP A)
- **Town/city** : Rennes
- **Inria Center** : [Centre Inria de l'Université de Rennes](#)
- **Starting date** : 2024-03-01
- **Duration of contract** : 6 months
- **Deadline to apply** : 2024-04-15

### Contacts

- **Inria Team** : [SAIRPICO](#)
- **Recruiter** :  
Badoual Anais / [anais.badoual@inria.fr](mailto:anais.badoual@inria.fr)

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interface with other disciplines. The Institute also employs numerous talents in over forty different professions. 900 research support staff contribute to the preparation and development of scientific and entrepreneurial projects that have a worldwide impact.

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## Instruction to apply

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