De: **CRM** CRM@CRM.UMontreal.CA
Objet: SÉMINAIRE (14/10/2015, Lauren D. Cohen)
Date: 28 septembre 2015 11:45
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SÉMINAIRE

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DATE :
Le mercredi 14 octobre 2015 / Wednesday, October 14, 2015

HEURE / TIME :
10 h 30 / 10:30 a.m.

CONFERENCIER(S) / SPEAKER(S) :
Lauren D. Cohen (CEREMADE, UMR CNRS 7534, Université Paris Dauphine)

TITRE / TITLE :
Geodesic Methods for Segmentation of biomedical images

LIEU / PLACE :
CRM, UdeM, Pavillon André-Aisenstadt, 2920, ch. de la Tour, salle 5340

RESUME / ABSTRACT :
Tubular and tree structures appear very commonly in biomedical images like vessels, microtubules or neuron cells. Minimal paths have been used for long as an interactive tool to segment these structures as cost minimizing curves. The user usually provides start and end points on the image and gets the minimal path as output. These minimal paths correspond to minimal geodesics according to some adapted metric. They are a way to find a (set of) curve(s) globally minimizing the geodesic active contours energy. Finding a geodesic distance can be solved by the Eikonal equation using the fast and efficient Fast Marching method. Different metrics can be adapted to various problems. In the past years we have introduced different extensions of these minimal paths that improve either the interactive aspects or the results. For example, the metric can take into account both scale and orientation of the path. This leads to solving an anisotropic minimal path in a 2D or 3D+radius space. On a different level, the user interaction can be minimized by adding iteratively what we called the keypoints, for example to obtain a closed curve from a single initial point. The result is then a set of minimal paths between pairs of keypoints. This can also be applied to branching structures in both 2D and 3D images. Geodesic Voting consists in computing geodesics between a given source point and a set of points scattered in the image. The geodesic density is defined at each pixel of the image as the number of geodesics that pass over this pixel. The target structure corresponds to image points with a high geodesic density. We will illustrate different possible applications of this approach.

In this talk we will present recent methods based on geodesics for biomedical applications, like automatic segmentation of vascular tree in retinal images.

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Responsable(s) :
Michel C. Delfour (delfour@CRM.UMontreal.CA)
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