



Séminaires doctorants **18**

11 March 2008

Actes édités par l'association des doctorants du campus STIC.

Les travaux individuels publiés restent l'unique propriété de leurs auteurs. La copie et la distribution de ces actes dans leur intégralité, cette notice comprise, sont toutes deux autorisées.

## Table of Contents

Phase Diagram of a higher-order active contour energy: Application to the extraction of road networks and tree crowns . . . . .	1
<i>Aymen EL GHOUL</i>	
Atrial Activity Extraction and Analysis in Atrial Fibrillation Episodes . . . .	2
<i>Pietro Bonizzi</i>	

# Phase Diagram of a higher-order active contour energy: Application to the extraction of road networks and tree crowns

Aymen EL GHOUL

INRIA Sophia Antipolis-Méditerranée, France  
aymen.el-ghoul@sophia.inria.fr

**Abstract.** This work addresses the question of stability of HOAC models. HOAC models introduce sophisticated prior geometric knowledge to describe a general family of shapes. These models define a long-range interaction energy. This new generation of active contours is used to extract road networks and trees from remote sensing images by selecting good values for the HOAC model parameters.

First, we start our study with the stability analysis of a circle for tree detection application [1]. Our aim is to determine the model's phase diagram and hence obtain the range for the parameters of the HOAC model and the radius of the resulting stable circle. The second part of this work is to determine the phase diagram of a long bar, for road network extraction [2]. The stability analysis for both configurations (bar and circle) is based on a Taylor series expansion of the energy up to second order. The first and second derivative of the energy allow us to constrain the HOAC model parameters.

## References

1. Horvath, P., Jermyn, I.H., Kato, Z., Zerubia, J.: A higher-order active contour model for tree detection. In: Proc. International Conference on Pattern Recognition (ICPR), Hong Kong (2006)
2. Rochery, M., Jermyn, I., Zerubia, J.: Higher order active contours. International Journal of Computer Vision **69** (2006) 27–42

# Atrial Activity Extraction and Analysis in Atrial Fibrillation Episodes

Pietro Bonizzi

Laboratoire I3S, Université de Nice - Sophia Antipolis, France  
bonizzi@i3s.unice.fr

**Abstract.** Atrial fibrillation represents the most common sustained cardiac arrhythmia in adults. It consists of a malfunction of the atrium characterized by a modification of the normal atrial activity pattern on the electrocardiogram signal. Its prevalence and incidence doubles with each advancing decade beyond 50 years. Risk of stroke and thromboembolism is increased fivefold compared to people not affected by it. Physical impairments together with the fact that it is a pathology of the elderly - and taking into account the increasing age of the population - highlight a problem with steadily increasing social impact in the next decades. Clinical intervention aims at restoring the physiological functioning of the heart, according to its answer to external stimuli. Therefore, proper tools able to evaluate the functioning of the heart before and after intervention are needed. An appropriate way to achieve this is through the analysis of the atrial activity signal extracted from the surface electrocardiogram recorded during atrial fibrillation episodes. Atrial fibrillation in electrocardiogram overlaps with ventricular activity in temporal and frequency domain and so the accuracy in this extraction is not a simple task. In this aspect, an automated method is presented for atrial activity signal extraction based on a blind source separation formulation that exploits spatial information about the atrial activity. This prior knowledge is used to optimize the spectral content of the estimated atrial activity signal on the full electrocardiogram recording. The atrial activity extraction quality of the proposed technique is comparable to that of other atrial fibrillation signal's extraction algorithms, but is achieved at a reduced cost and without manual selection of parameters.[1] [2]

## References

1. Fuster, V., Ryden, L.E., Asinger, R.W.: guidelines for the management of patients with atrial fibrillation. **38** (2001) 1266i–1266lxx
2. Castells, F., Rieta, J.J., Millet, J., Zarzoso, V.: Spatiotemporal blind source separation approach to atrial activity estimation in atrial tachyarrhythmias. *International Journal of Computer Vision* **52** (2005) 258–267

Notes

Lined paper for notes, consisting of multiple horizontal lines.







## **Les séminaires doctorants**

Les séminaires des doctorants STIC permettent aux futurs docteurs d'échanger leurs expériences dans leur travail de thèse, tant sur le plan scientifique que sur le plan professionnel et éducatif. Ces rencontres ont lieu mensuellement dans l'un des laboratoires STIC de Sophia Antipolis.

Un séminaire est l'occasion de deux à quatre interventions. Chaque intervention comporte un exposé technique d'une vingtaine de minutes suivi d'une période d'échanges et de retours d'expérience d'une dizaine de minutes.

Ces actes compilent les résumés en anglais des exposés techniques du séminaire doctorant du 11 March 2008.

## **L'ADSTIC**

L'ADSTIC est l'association des doctorants du campus sciences et techniques de l'information et de la communication de l'université de Nice Sophia Antipolis. Créée en 2004, l'ADSTIC est une association loi 1901.

L'objectif fondamental de l'ADSTIC est de simplifier la vie du doctorant pour qu'il réalise au mieux sa thèse. Son action repose avant tout sur trois aspects :

- l'aspect social,
- l'aspect professionnel,
- l'aspect administratif et juridique.

L'ADSTIC se veut aussi un lien entre les doctorants passés, actuels et futurs...

Pour plus de renseignements, visitez notre site Internet : <http://adstic.free.fr>.