



Post-doc position at Sophia Antipolis, Nice region, France

Satellite image processing and deep learning

Géoazur laboratory and Inria-SAM

Application before July 31, 2019

18 months post-doc position on project “Extraction of curvilinear structure networks in image data using an innovative deep learning approach: application to fracture and fault network extraction from satellite data”

Project

Curvilinear structure networks are widespread in both nature and anthropogenic systems, ranging from angiography, earth and environment sciences, to biology and anthropogenic activities. Recovering the existence and architecture of these curvilinear networks is an essential and fundamental task in all the related domains. At present, there has been an explosion of image data documenting these curvilinear structure networks. Therefore, it is of upmost importance to develop numerical approaches that may assist us efficiently to automatically extract curvilinear networks from image data.

In recent years, a bulk of works have been proposed to extract curvilinear networks. However, automated and high-quality curvilinear network extraction is still a challenging task nowadays. This is mainly due to the network shape complexity, low-contrast in images, and high annotation cost for training data. To address the problems aroused by these difficulties, this project intends to develop a novel, *minimally-supervised* curvilinear network extraction method by combining deep neural networks with active learning, where the deep neural networks are employed to automatically learn hierarchical and data-driven features of curvilinear networks, and the active learning is exploited to achieve high-quality extraction using as few annotations as possible. Furthermore, composite and hierarchical heuristic rules will be designed to constrain the geometry of curvilinear structures and guide the curvilinear graph growing.

The proposed approach will be tested and validated on extraction of tectonic fractures and faults from a dense collection of satellite and aerial data and “ground truth” available at the Géoazur laboratory in the framework of the Faults_R_Gems project co-funded by the University Côte d’Azur (UCA) and the French National Research Agency (ANR). Then we intend to apply the new automatic extraction approaches to other scenarios, as road extraction in remote sensing images of the Nice region, and blood vessel extraction in available medical image databases.

Candidate profile

Strong academic backgrounds in Stochastic Modeling, Deep Learning, Computer Vision, Remote Sensing and Parallel Programming. A decent knowledge of Earth and telluric features (especially faults) will be appreciated.

At UCA, Géoazur and Inria we seek to increase the number of women in areas where they are under-represented and therefore we explicitly encourage women to apply. We are also committed to increasing the number of individuals with disabilities in our workforce and therefore we encourage applications from such qualified individuals.

Post-doc salary and conditions

Duration: 18 months

Starting date: between September 1st and December 1st, 2019

Salary: gross salary per month 3000 EUR (i.e. approx. 2400 EUR net)

Hosting laboratory: GEOAZUR, Sophia Antipolis (<https://geoazur.oca.eu/fr/acc-geoazur>)

Advisors: Drs. Isabelle MANIGHETTI (Géoazur) and Josiane ZERUBIA (Inria-SAM). See:

<https://www.oca.eu/fr/isabelle-manighetti>

<http://www-sop.inria.fr/members/Josiane.Zerubia/index-eng.html>

Work conditions: Tight collaboration between Géoazur and Inria-SAM (<http://www-sop.inria.fr>). Position located at Géoazur, with research discussions planned twice a week at Inria Sophia.

How to apply

Dead-line to apply: July 31, 2019

Please email a full application to both Isabelle Manighetti (manighetti@geoazur.unice.fr) and Josiane Zerubia (josiane.zerubia@inria.fr), indicating "UCA-AI-post-doc" in the e-mail subject line. The application should contain:

- a motivation letter demonstrating motivation, academic strengths, and related experience to the position
- CV including publication list
- at least two major publications in pdf
- minimum 2 reference letters

Contacts :

Isabelle Manighetti : manighetti@geoazur.unice.fr

Josiane Zerubia : josiane.zerubia@inria.fr