



Mauna Kea Technologies

PhD position in Computer Vision and Machine Learning for Biomedical Images.

Statistical Learning of Biomedical Images for a Confocal Laser Endomicroscopy Smart Atlas.

Context

The position is proposed at **Mauna Kea Technologies'** Paris office and in the **Asclepios research team of Inria** Sophia Antipolis - Méditerranée, located on the French Riviera.

Mauna Kea Technologies is a global medical device company focused on leading innovation in endomicroscopy, the field of microscopic imaging during endoscopy procedures. Mauna Kea Technologies has developed a new imaging modality, the probe-based Confocal Laser Endomicroscopy (pCLE). It provides physicians and researchers with real-time access to histological information during standard endoscopy procedures through high-resolution cellular imaging of internal tissues. <http://www.maunakeatech.com/>

Inria is a public research institute dedicated to informatics and computational sciences. Its mission is to produce a research of excellence and to transfer it to guaranty its impact. The Asclepios project-team is specialized in the analysis and simulation of medical images and has acquired a worldwide recognition in these topics. <http://www.inria.fr/equipes/asclepios>

Inria and Mauna Kea Technologies have been working in tight collaboration for many years and two successful PhD theses on image registration and content-based image retrieval have been carried out. This has yielded significant research contributions presented in top international conferences and published in high impact factor journals. Besides, an Inria Innovation Lab (I-Lab) project has been launched with Mauna Kea Technologies to enhance technology transfer.

Job description:

As a PhD student you will develop new concepts and translate them into options for innovations with industrial relevance. You will apply your knowledge in exploratory and proof of concept activities to demonstrate implementation options. You will be encouraged to think out of the box, innovate and find solutions to real-life problems.

The main objective of your research project is to develop statistical learning methods for content-based image retrieval systems (CBIR). These methods will be applied to build and optimize a Smart Atlas of biomedical images and more specifically to Confocal Laser Endomicroscopy (CLE) images. Such a Smart Atlas is a content-based image retrieval (CBIR) system to assist the clinician in the interpretation of CLE videos. It automatically searches an annotated database and extracts the most similar videos to the CLE video of interest (Andre et al., Medical Image Analysis 2011).

More specifically, the first part of the project will be dedicated to the construction of a large database of synthetic Confocal Laser Endomicroscopy (CLE) sequences. This synthetic database will be used to infer CBIR models that adapt well to the synthetic CLE data. The second part of the research project will be dedicated to the adaptation of the CBIR algorithms from synthetic to real CLE images.

Requirements

To be successful you need to have:

- a strong background in applied mathematics, machine learning and computer vision
- good programming skills (C++, ITK, python)
- a genuine technical curiosity
- good communication skills
- well-above-average results from a (technical) university

How to apply?

Does this profile fit your ambitions? Then you might be the person we are looking for!

To be able to process your application, please enclose the following documents with your application:

- a curriculum vitae
- a motivation letter (also explaining your research interests)

Please send your application to francois.lacombe@maunakeatech.com, nicholas.ayache@inria.fr and remi.cuingnet@maunakeatech.com.

Related publications:

Barbara André, Tom Vercauteren, Anna Buchner, Michael Wallace and Nicholas Ayache. "Learning Semantic and Visual Similarity for Endomicroscopy Video Retrieval." IEEE Transactions on Medical Imaging, Vol. 31 No. 6, June 2012

Barbara André, Tom Vercauteren, Anna M Buchner, Murli Krishna, Nicholas Ayache, and Michael B Wallace. "Software for automated classification of probe-based confocal laser endomicroscopy videos of colorectal polyps." World J Gastroenterol. 2012 October 21, Vol. 18 No. 39, October 2012

Barbara André, Tom Vercauteren, Anna Buchner, Michael Wallace and Nicholas Ayache. "A Smart Atlas for Endomicroscopy using Automated Video Retrieval." Medical Image Analysis, Vol. 15 No. 4, 2011