

Research Grants for PhD students from the China Scholarship Council

Information Form (please read the guidelines carefully on the website www-csc.utt.fr)

Supervisor's name : LAURENT Given names : H el ene

Status (prof., assistant prof., ...) : Associate Professor

Laboratory : PRISME Website address : <https://www.univ-orleans.fr/prisme>

Institution : INSA CVL Website address : <http://www.insa-centrevalde Loire.fr>

Scientific competence of the supervisor:

Member of the Image-Vision (IV) group, H. LAURENT research interests include supervised approaches for image processing and the development and validation of dedicated applications. Supervised approaches ensure that expert knowledge is taken into account when developing dedicated algorithms which is well suited to the development of application-dependent processing techniques. It has been successfully applied within the field of image segmentation and image interpretation in biomedical engineering, notably within the framework of semantic segmentation of pathological images for cancer diagnosis and grading.

Two major publications in the field proposed for the PhD :

1. Y. Feng, A. Hafiane, H. Laurent, "A deep learning based multiscale approach to segment the areas of interest in whole slide images", Computerized Medical Imaging and Graphics, Volume 90, 101923, April, 2021.
2. Y. Feng, A. Hafiane, H. Laurent, "Weakly supervised segmentation of histopathology images: an insight in feature maps ability for learning models interpretation", VISAPP, Online Streaming, February, 2022.

Website address of the personal page :

Supervisor's email : helene.laurent@insa-cvl.fr

Description of the research work proposed for a PhD **Topic # (see list) :** III-7

Title : Automatic biomedical images analysis and interpretation

Subject :

Biomedical image has high clinical value. With the rapid development of digital image acquisition technologies, it has become an indispensable tool in clinical diagnosis. However, the amount of information in pathological images is huge, and it is a timeconsuming and laborious work to annotate medical images in clinical practice, which can add a great burden to the daily work of clinicians. Therefore, it is important to implement assistant system of diagnosis capable of extracting relevant elements in the sense of the expert and so facilitating the processing and the analysis of the medical information. The aim of the proposed thesis is to develop and validate new algorithms based on deep learning method to more accurately analyse the area-of-interest in pathological images, placing the work within the field of computational pathology. We seek to discover new information from biomedical data using automated high content imaging and learning algorithms. In that context the proposed algorithms need to take into account two main differences between pathological image and normal image. The first one is very large size with images which can consist of as many as tens of billions of pixels, thus the algorithm should be designed under the limitation of hardware. The second one is insufficient training data, especially considering pixel-level annotation, leading to weakly supervised learning which will be investigated during the thesis.

Keywords :

image processing and analysis, biomedical imaging, computational pathology, deep learning, weakly supervised learning

Expected collaborations :

Co-supervisor : Adel HAFIANE, Associate Professor, member of IV group

Background required from the applicant :

image and video processing, computer programming skills (C/C++/Python), machine learning, very good communication skills in English (both spoken and written), speaking French is a plus, willingness to learn is expected otherwise

Existence of a PDF file detailing the proposal ("yes" or "no") : no

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