Polytech network form for PhD Research Grants from the China Scholarship Council

This document describes the PhD subject and supervisor proposed by the French Polytech network of 14 university engineering schools. Please contact the PhD supervisor by email or Skype for further information regarding your application.

Supervisor information	
Family name	DUPONCHEL
First name	Ludovic
Email	ludovic.duponchel@polytech-lille.fr
Web reference	https://www.researchgate.net/profile/Ludovic_Duponchel
Lab name	LASIR Lab (Lab of the French Research Council)
Lab web site	https://lasir.univ-lille1.fr/?page_id=5459
Polytech name	Polytech Lille
University name	University of Lille
Country	France

PhD information	
Title	Deap learning in hyperspectral imaging for biomedical exploration
Main topics regards to CSC list (3 topics at maximum)	Bioomedical engineering. Teledetection and geographical information science.

Required skills in science and engineering	Data analysis, Machine learning

Subject description (two pages maximum)

Deep Learning is a new area of Machine Learning research, which has been introduced with the objective of moving Machine Learning closer to one of its original goals i.e. Artificial Intelligence. We have all heard of Deep Learning for example with Google developments on text, audio files and images. This concept allows us to detect, classify or unmix signals going deeper into the considered data structure. As a consequence, it is potentially possible to outperform more classical Machine Learning approaches with this approach.

At the same time, biomedical imaging for diagnostic purposes is a scientific field in full mutation. Indeed biologists begin to understand that coupling microscopes and spectrometers is a good way to obtain an exhaustive exploration of their complex samples from hyperspectral data cubes at the molecular level in organs, tissues or cells. Moreover increasingly powerful imaging systems generate always bigger and more hyperspectral data sets from a biological sample. In this context, it is the right time to evaluate the potential of this hot topic (Deep Learning and hyperspectral imaging) in order to develop diagnostic tools of tomorrow.

The work conducted in this thesis will concern data analysis of hyperspectral images of cancer cells or other pathologies. The person sought will have good skills in Machine Learning. Research experiences in hyperspectral data analysis and Deep Learning will be appreciated but not a requirement to apply. Hyperspectral images will be acquired only by doctors in hospitals, the PhD thesis being only focused on data analysis.