

MASTER'S THESIS INTERNSHIP OFFER

DESCRIPTION

- › **Title :** Active learning method for image classification
- › **Hosting organization:** Université de Poitiers
- › **Lab:** XLIM /LMA
- › **Research Team:** Labcom Damialab XLIM, Equipe proba-stats LMA
- › **Scientific pole:** ASALI
- › **Starting date (month/date):** 6 mars 2023

- › **Short description of the internship offer (up to 5 sentences):**

active learning, image classification, deep learning

- › **Objectives (up to 5 sentences):**

The objective of this project is to test theoretical methods of active learning in the context of image classification. There are several issues to be addressed, such as the choice of descriptors and the proximity measurement between images.

- › **Description of the internship offer:**

Image classification is a classical supervised learning problem. The quality of the decision taken by a supervised learning algorithm depends a lot on the training base used, especially on the volume of labeled data. Very often it is expensive to build a solid learning base, as in the medical or industrial field with a sparse class. In this case it is almost impossible to have a sufficient number of observations in the rare class, and moreover, the classes of the learning base will be very unbalanced. It is therefore important to know how to build the learning base while minimizing both the cost and the error rate of classification.

In this project, we propose to use active learning methods to improve the quality of classification by using a training base of optimal size. More precisely, we have a relatively small base of labeled images. We have access to the decision of an expert who can validate one or several labels of given images and we can therefore improve the decisions of the algorithm.

The expert's work represents the cost of building the learning base. At each step of the algorithm, according to the expert's decisions, new images are added to the learning base and a choice is made as to which images to show to the expert at the next step. The latter is chosen according to a certain



measure of proximity between the images and should improve the quality of the decision and the base at the next step, by improving the decision algorithm.

› **Description of the research team:**

The scientific objectives are complex due to their diverse nature and the vast subjects they underlie: AI for massive data, ecosystem development, reinforcement learning, Active Learning. One of the particularities is to position AI at the interfaces, and thus to confront these model-based or data-based approaches to very diverse scientific contexts (mechanics, photonics, education ...). This approach is possible thanks to the complementarity of the scientific expertise of the researchers in the fields of signal processing, statistics and data analysis, and machine learning, both in experimental and numerical applications. The work and results are valorized by numerous partnerships according to different mechanisms (CIFRE grants, post-doctorates, partnership research agreements, etc.) of knowledge transfer.

SKILLS

› **Expected skills of the applicant:**

Development, Data Analysis, Machine Learning, Statistics

PHD THESIS OPPORTUNITIES

› **PhD thesis opportunity after the Master course:**

Yes No

› **If yes, financing already obtained:**

Yes No

› **If yes, what kind of funds:** LabCom

CONTACT & APPLICATION

› **Surname and first name and mail of the internship supervisor(s):**

Thierry Urruty (thierry.urruty@univ-poitiers.fr), Philippe Carré (philippe.carre@univ-poitiers.fr)

› **The application shall be sent to the email:** philippe.carre@univ-poitiers.fr

› **Closing date for applications:** Cliquez ou appuyez ici pour entrer une date.

