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Subject: Search for a candidate for a potential PhD offer October 2024-2027

Thesis title: FAME-MED - Federated Learning, Generative Models and Domain Adaptation in Medical Imaging

Synopsis: Confidentiality issues are critical in the field of medical imaging, where data could reveal highly sensitive information about a patient's pathologies and medical history. Federated learning (FL) is a machine learning paradigm (one of the branches of AI) that addresses the problem of confidentiality. It is decentralised: machine learning models are trained locally on distributed data, generally on autonomous devices or servers, without centralising all the data on a master server. However, a major difficulty for federated learning in the processing of decentralised medical imaging stems from the fact that the different sites present variance in the data. This is because although institutions and hospitals may collect the same type of medical data, this data may have varying characteristics due to different collection methods, standards and protocols, institutional policies and priorities, the diversity of patient populations and different confidentiality regulations. This is exacerbated by the limited amount of training data generally available for each site and the small number of sites. This project seeks to combine federated learning and domain adaptation to overcome the disparity of data and enable, during the thesis, the multi-centre application of an innovative AI model in oncology. This is an innovative programme with a strong local position between GREYC and ISTCT and the Normandy oncology centres (co-direction).

Location and supervision: The student will be based mainly at the GREYC laboratory for the federated learning development part and at the François Baclesse centre and ISTCT for the medical application part. The thesis project will be directed by Romain Hérault and Aurélien Corroyer-Dulmont, experts in AI and oncology/medical imaging respectively.

There is also an offer of an M2 internship on the subject from February/March 2024, and the application for funding for the thesis is currently in progress.

Pr. Romain Hérault, PhD, HDR et Dr. Aurélien Corroyer-Dulmont, PhD, HDR