The aim of this PhD project is to design and validate a machine learning approach for the differential diagnosis of neurodegenerative diseases from multimodal data. The first objective of the project will be to develop approaches that can handle multiple and unbalanced diagnostic classes. We will then aim to extend this to situations where two diagnoses can co-exist in the same patient (mixed disease). The second main objective will be to adequately integrate multiple types of data (imaging, fluid biomarker, clinical and genetic data). Indeed, while most existing approach rely on neuroimaging data (most often MRI), this information is not sufficient for accurate differentiation between multiple diseases. We will in particular aim at developing approaches that can adequately model non-additive interactions between the different types of data.

To develop and validate the approach, we will use different multimodal datasets including publicly available datasets and local datasets of the ICM and the Pitié-Salpêtrière hospital.

References


Main activities
- Design of machine learning methods for differential diagnosis
- Implementation of corresponding software prototype
- Validation on clinical research datasets
- Writing of scientific publications
- Scientific presentations at international conferences and internal seminars

Skills
- Knowledge of medical image analysis
- Knowledge of machine learning algorithms
- Good programming skills, preferably in Python

Benefits package
- Subsidised catering service
- Partially-reimbursed public transport

Remuneration
Gross Salary per month: 1 982 € the first 2 years and 2 085 € the last year