Machine learning for differential diagnosis of neurodegenerative diseases from multimodal data

Mots clés : Array

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Résumé du projet de recherche (Langue 1)

Dementia can be due to various neurodegenerative diseases including Alzheimer's disease, fronto-temporal lobar degeneration, dementia with Lewy bodies, primary progressive aphasias and cortico-basal degeneration. These diseases have different pathophysiological mechanisms and different evolution profiles. Being able to differentiate between neurodegenerative diseases (a task known as differential diagnosis) is therefore essential for optimal clinical care of patients as well as for effective design of clinical trials. 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.