UNIVERSITY OF GENOA
DEPARTMENT OF INFORMATICS, BIOENGINEERING, ROBOTICS AND SYSTEMS ENGINEERING
MASTER'S PROGRAM IN BIOENGINEERING

Thesis Project Form

Title (tentative): Modelling the neurodegeneration course from the prodromal to the overt stage of neurodegenerative disease

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Description

Motivation and application domain

Patients with idiopathic REM sleep behaviour disorder (iRBD) have an equal chance of developing parkinsonism or dementia within 10-15 years of diagnosis. By the time parkinsonism or dementia occurs, approximately 70% of dopaminergic neurons are lost, limiting treatment options and their effectiveness. Both clinical signs (e.g., motor and cognitive impairment) and cortical electrophysiological changes (e.g., cortical hyperexcitability, and higher neural synchronisation) characterise iRBD patients. Utilising clinical and neurophysiological trajectories of iRBD patients may offer the opportunity to predict the development of parkinsonism/dementia at an early stage. These findings may help to identify appropriate iRBD patients for the timely adoption of disease-modifying drugs, ultimately improving patient's quality of life.

General objectives and main activities

The main project aim is to investigate and extend existing progression models to include non-monotonic variables to achieve a more accurate representation of clinical and neurophysiological progression in patients with iRBD. The project will involve several key activities: (i) a comprehensive review of current progression models in neurodegenerative diseases, focusing on their limitations for non-monotonic variables; (ii) the use of statistical and computational techniques to modify existing progression models by incorporating non-monotonic variables; (iii) the testing of the newly developed models on the collected data to evaluate their performance; (iv) the analysis of the results to observe how the new model can facilitate early prediction of parkinsonism or dementia in iRBD patients.

Training Objectives (technical/analytical tools, experimental methodologies)

1. Background literature review on progression models
2. Training and testing of disease progression models
4. Data analysis

Place(s) where the thesis work will be carried out: DIBRIS

Additional information

Maximum number of students: 1