Computational PLatform for Assessment of Cognition In Dementia (C-PLACID)

https://neurodegenerationresearch.eu/survey/computational-platform-for-assessment-of-cognition-in-dementia-c-placid/

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Country

United Kingdom

Title of project or programme

Computational PLatform for Assessment of Cognition In Dementia (C-PLACID)

Source of funding information

EPSRC

Total sum awarded (Euro)

€ 1,938,800

Start date of award

05/01/2015

Total duration of award in years

3.0

The project/programme is most relevant to:

Alzheimer's disease & other dementias

Keywords
Research Abstract
Cognitive impairment is the hallmark of dementia. Cognitive problems, such as difficulties with memory, language and reasoning, are the most obvious, frustrating and debilitating aspects of most neurodegenerative diseases. As a result, assessment of a person's cognition is a vital component of both diagnostic services and research investigations, and is the most common outcome measure by which the effectiveness of potential pharmaceutical and non-

pharmaceutical therapies is judged. However, many traditional paper-and-pencil cognitive assessments have a number of limitations, including the lack of independence across tests, the qualitative nature of cognitive profiling, the influence of practice effects, a failure to capture some critical aspects of performance, a limited dynamic range, the complexity of some test instructions, and their inability to adequately assess some domains of cognition. Whilst sophisticated computational techniques are now used routinely to analyze neuroimaging data about changes in the shape of the brain, there have been few attempts to use comparable techniques to understand complex cognitive datasets. Here we attempt to redress that imbalance by harnessing engineering, computational statistics and mathematics to improve the cognitive assessment of people with or at risk from dementia.

The current project aims to develop a computational platform to support substantial improvements in the analysis and visualisation of complex cognitive datasets, and the automatization, optimization and innovation of techniques and devices used to acquire cognitive data. The specific aims of the study represent an interlinked series of engineering solutions to the longstanding cognitive assessment problems highlighted by clinicians. The first set of computational goals are to generate multidimensional cognitive profiles for different dementias by using multivariate machine learning algorithms, and to predict the evolution of cognitive deficits through the implementation of event-based models. The second set of goals relate to attempts to improve existing cognitive tests either by devising ways to measure voice reaction times automatically, implementing psychophysical principles, and utilizing eyetracking to capture additional sensitive metrics of task performance. The third set of goals involve the development of novel testing paradigms including 'instruction-less' tests of cognition suitable for patients with different types and severities of dementia, and the construction of sensors and virtual reality scenarios to measure social cognition.

A critical aspect of the project is the availability of four exceptionally well-characterized, longitudinally studied cohorts of individuals with or at risk of dementia in whom to develop and evaluate the new models and algorithms and pilot the improved and novel testing paradigms. The clinical cohorts include individuals with a Familial Alzheimer's disease gene mutation and their non-carrier siblings, people with typical and atypical variants of Alzheimer's disease including the progressive visual syndrome Posterior Cortical Atrophy, and patients with behavioural or linguistic phenotypes of Frontotemporal Dementia. In addition, data from 500 members of the MRC 1946 Birth Cohort whose cognition has been tracked through life and who are now of an age whereby a proportion will be in the early stages of neurodegeneration will also be evaluated.

The project involves a richly interdisciplinary team with an exciting blend of established collaborations and new partnerships. The work brings together one of the world's leading dementia units (Dementia Research Centre) with three other high profile UCL departments, namely UCL Computer Science, the Centre for Medical Image Analysis, and the UCL Interaction Centre. The experts from these centres will work together with collaborators and patient and carer support groups to improve the study and implement its findings.

Lay Summary
Further information available at:

Types:
Investments > €500k

Member States:
United Kingdom

Diseases:
Alzheimer's disease & other dementias

Years:
2016

Database Categories:
N/A

Database Tags:
N/A