The Digital Doctor: Developing a fully automated cognitive assessment system using principles of conversation analysis

The Digital Doctor: Investigating the diagnostic accuracy of a fully automated cognitive assessment system in the memory clinic

The Digital Doctor: A fully automated stratification and monitoring system for patients with memory complaints

“(Digital) Doctor, (Digital) Doctor; (A)I have been having problems with my memory and (machine) learning new things.”

Ronan O’Malley 1, Bahman Mirhedari 2, Markus Reuber 3, Annalena Venneri 3, Heidi Christensen2 , Daniel Blackburn 1

1 Sheffield Institute for Translational Neuroscience; 2 Centre for Assistive Technology and Connected Healthcare, University of Sheffield; 3 Academic Unit of Neurology, University of Sheffield.

Introduction

Referrals to specialist memory clinics have increased out of proportion to the incidence of dementia. Time and financial pressures are consequently exerted on a service striving to deliver the highest quality care. We have developed a fully automated “Digital Doctor” with the aim of providing accurate pre-clinic risk stratification as well as ongoing monitoring for patients with memory concerns.

Methods

We have recruited 15 participants with Functional Memory Disorder (FMD), Mild Cognitive Impairment (MCI) and Alzheimer’s disease each as well as 15 healthy controls. Diagnoses have been based on clinical assessments, neuropsychology and imaging.

The participants have answered 12 questions posed by the “Digital Doctor”. Recorded audio and visual data is being analysed using diarization and automatic speech recognition tools and machine learning classifiers. A diagnostic category will be assigned to the participant and compared with the clinical diagnosis.

Discussion

In previously published work the “Digital Doctor” has distinguished between neuro-degenerative dementia and FMD with an accuracy of 95%. By introducing more refined diagnostic criteria we aim to demonstrate the potential value of the digital doctor as a pre-clinic risk stratification and triage tool. Patients at low risk could avoid the emotional and practical burdens of a clinic appointment, whilst patients with higher risk could benefit from a more streamlined service. The same applies to patients with MCI who require long-term monitoring for signs of progression.