Imperial College London

A machine learning tool stratifying early and late Alzheimer's disease (ApV)

A tool for predicting Alzheimer's Disease (AD) with greater accuracy than conventional methods.

Proposed use

This technology is suggested for use in AD, a disease in which current testing strategies are imprecise especially in indeterminate or asymptomatic cases.

Problem addressed

It is estimated that nearly 44 million people worldwide have AD or related dementia and that the disease remains undiagnosed in 3 out of 4 people. A battery of tests with variable sensitivity including cognitive, neuropsychological, imaging and laboratory tests are required in combination to make a diagnosis of AD or a less severe but related condition, such as Mild Cognitive Impairment (MCI). Even so, it is only with pathological assessment at death that AD diagnosis is definitive. This highlights the challenges and need for a more precise test that can better detect the presence of AD in a patient.

Technology overview

This technology screens simple brain MRI images of those with or without symptoms and precisely detects MCI or AD in a given patient based on computational assessment of entire brain features.

Inventor information

Professor Eric Aboagye is a professor at Imperial College and leads the NIHR Biomedical Research Centre Imaging Theme. He was recipient of the 2009 Sir Mackenzie Davidson Medal and was elected as a Fellow of the Academy of Medical Sciences in 2010 for outstanding contributions to the advancement of medical science. He has also acted as an advisor to GE-Healthcare, GSK, Roche and Novartis .

Benefits

- Detecting AD or MCI **early, and accurately.** This provides the best possible chance to apply early therapeutic interventions to halt disease progression

- Aid in better diagnosis and selection of patients for pharmacological studies during clinical trials, which may aid clinical trial success.

Rachel Spruce

Industry Partnerships and Commercialisation Executive, Medicine

e: r.spruce@imperial.ac.uk
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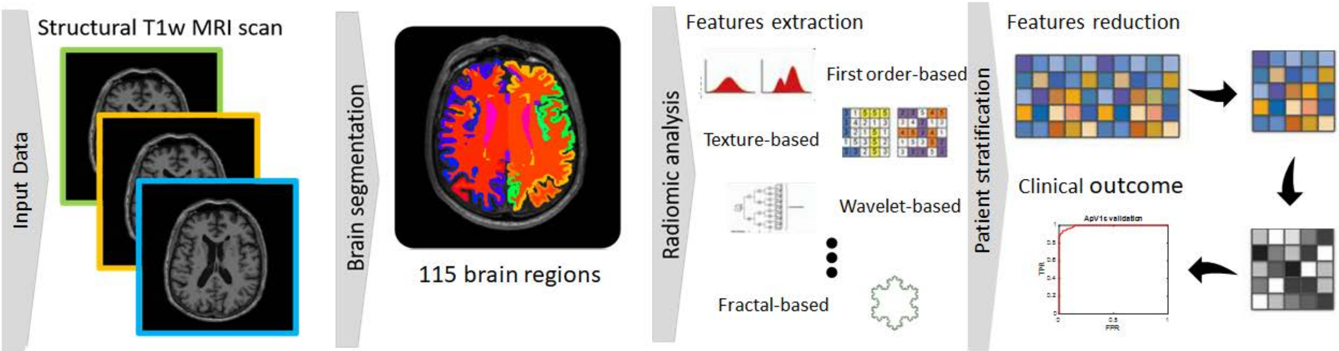

The Workflow: T1 weighted MRI images are collected and segmented in 115 brain regions. With a radiomic analysis, 656 features related to shape and size, intensity, texture and wavelet decompositions of each brain region are extracted. The application of machine learning algorithms allows the reduction of the number of features with the selection of the most significant and less redundant ones. Patient stratification is based on the distribution of the MRI-based biomarker resulted from the machine learning.