

Automatic diagnosing of dementia based on standard magnetic resonance imaging has the capacity to reduce diagnostic uncertainties. The algorithm learns a disease specific pattern of atrophy from training samples. When the training is completed, the required software can be installed on MRT-machines or desktop PCs and allows classifying new incoming data within minutes.

We have explored the usefulness of this approach in a number of studies and successfully separated pathologically proven cases of Alzheimer's Disease from those with fronto-temporal lobar degeneration and from healthy aging. In additional work, we have studied symptom-free carriers of the genetic mutation leading to Huntington's Disease as a model for pre-clinical degeneration. Multivariate classification methods were able to detect those with the genetic mutation more than 10 years before the onset of motor symptoms.

Recent studies indicate that an SVM trained on validated scans from a highly specialized centre can be used successfully to classify structural images obtained at a primary referral centre (see figure). Even in that setting the accuracy achieved by SVMs compares well to that by radiologists. The results presented here are encouraging and have a number of implications that suggest a general adoption of computer-assisted methods for MRI scan-based dementia diagnosis should be seriously considered. The most important of these are a) improving diagnosis in places where trained neuroradiologists or cognitive neurologists are scarce; b) increasing speed of diagnosis without compromising accuracy by eschewing lengthy specialist investigations; and c) recruitment of clinically homogeneous patient populations for pharmacological trials.