MRI fast track for Alzheimer's diagnosis

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A new approach to analyzing MRI brain scans could help speed up the diagnosis of Alzheimer's and other degenerative diseases, according to research published to be published in the *International Journal of Computational Science and Engineering*.

Clayton Chen of Taichung Veterans General Hospital, Taiwan, Shih-Yu Chen of University of Maryland, USA, and their colleagues explain how standard approaches to analyzing a magnetic resonance imaging (MRI) use a computer to compare pixels in the scan image so that different types of tissue can be identified. This allows cancerous cells to be highlighted as opposed to healthy cells, for instance. However, despite improvements in the quality and resolution of MRI scanning in recent years, each pixel in a scan may represent the presence of several different cell types. This means that differentiating between healthy and unhealthy tissue at close to the cellular level is not usually possible with inter-pixel analysis.

In progressive, degenerative diseases, including Alzheimer's and Parkinson's diseases, the differences between healthy and diseases tissues may be very subtle, albeit the impact on the patient can be wholly debilitating. MRI has not therefore been the diagnostic tool of choice for tracking progress in this disease or a patient's response at the cellular level to treatment.

Now, Chen and colleagues have built on earlier studies to devise what they refer to as intra-pixel analysis. Rather than comparing pixels across an MRI scan, their approach looks at the differences within individual

pixels over a short period of time. This unconventional approach allows them to treat the pixels as dynamic entities and so delineate the tissues types at particular positions in the scan. In order to exploit this additional dimension in MRI, the scanner must be set to use pulse sequences so that different spectroscopic information, associated with different tissue types, is recorded over a short period of time rather than the snapshot of standard MRI.

The team explains that by "unmixing" the spectroscopic data from individual pixels they can extract more than one tissue type from the pixel and so boost the resolution and information obtained in a an MRI scan of small regions of the brain where only very subtle physical changes may have occurred between scans. The technique might allow much earlier diagnosis of degenerative brain diseases and allow doctors to make a better clinical prognosis based on the rate at which changes occur at the near to cellular level in their patient.

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