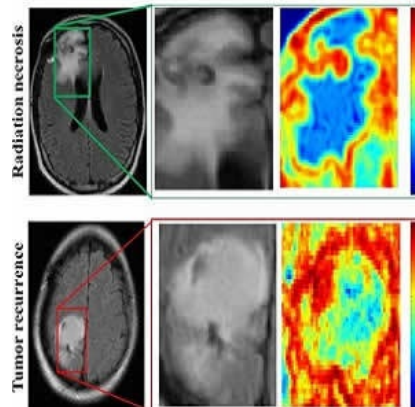




Computer Programme Outperforms Physicians at Cancer Diagnoses



We've all seen computer programmes defeat humans in Chess, Jeopardy and other similar games but now a programme has outperformed physicians at brain cancer diagnoses.

Developed at Case Western Reserve University, this computer programme turned out to be twice as accurate as two neuroradiologists in determining whether abnormal tissue on MRI were dead brain cells caused by radiation or brain cancer. The study is published in the *American Journal of Neuroradiology*.

As Pallavi Tiwari, assistant professor of biomedical engineering at Case Western Reserve and leader of the study explains, one of the biggest challenges when evaluating brain tumour treatment is to distinguish between the effects of radiation and cancer recurrence. On an MRI, both look similar but treatment for both differs vastly. Identifying the two accurately could help speed prognosis and therapy and could lead to better patient outcomes. In addition, greater accuracy combined with the expertise of radiologists could eliminate unnecessary and costly biopsies, especially since brain biopsies are highly invasive and risky and can cause considerable morbidity and mortality.

In order to develop this programme, the research team used machine learning algorithms with radiomics. They trained the computer to identify radiomic features that discriminate between brain cancer and radiation necrosis by using MRI scans from 43 patients. They then developed algorithms to find the most discriminating radiomic features.

“What the algorithms see that the radiologists don't are the subtle differences in quantitative measurements of tumour heterogeneity and breakdown in microarchitecture on MRI, which are higher for tumour recurrence,” said Tiwari.

Anant Madabhushi, F. Alex Nason professor of biomedical engineering at Case Western Reserve, and study co-author further explains that the computer looks at the edges of each pixel on the MRI scans while physicians use the intensity of pixels as a guide. If the edges point in the same direction, then the architecture is preserved but if they point in different directions, the architecture is disrupted.

MRI scans from 15 patients were analysed by the two physicians and the computer programme. One neuroradiologist diagnosed 7 patients correctly; the second physician correctly diagnosed 8 patients while the computer programme was accurate on 12 of the 15 patients.

Source: [American Journal of Neuroradiology](#)
Image Credit: Pallavi Tiwari

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