Anomaly detection and assessment of cognitive behaviour using FMRI brain slice images

Medical imaging is a term that describes the techniques and processes that are used to make images of various parts of the human body for diagnostic and treatment purposes. The use of medical imaging aids clinicians in making more precise diagnosis and treatment decisions. Some of the imaging methods are X-ray, MRI, fMRI, PET CT and etc.

The process of normal neuronal firing in the brain takes place as communication between neurons through electrical impulses and neurotransmitters. Abnormal neuronal firing can occur when the signals between neurons are somehow disrupted.

Among all the disruptions inherent in brain injury, cognitive functioning is one of the most devastating. The simple task of remembering vital information is a struggle for many patients. Cognitive rehabilitation emphasizes independence in every therapeutic module and exercise, building skills that restore the rhythm of living. The anomaly analysis of cognitive impairment is assessed with the aid of imaging techniques.

Functional magnetic resonance imaging (fMRI) is increasingly recognized for its potential as a powerful new tool in clinical neuropsychology. This is likely due to the fact that, with some degree of innovation, it is possible to convert practically any familiar cognitive test into one that can be performed in the MRI scanning environment.

fMRI measures the small changes in blood flow that occur with brain activity. fMRI may detect abnormalities within the brain that cannot be found with other imaging techniques. MRI is a non-invasive imaging technique that does not involve exposure to radiation.

Physicians perform fMRI to:

- examine the functional anatomy of the brain.
- determine which part of the brain is handling critical functions such as thought, speech, movement and sensation, which is called brain mapping.
- help assess the effects of stroke, trauma, or degenerative disease (such as Alzheimer's) on brain function.
- monitor the growth and function of brain tumors.
- guide the planning of surgery, radiation therapy, or other invasive treatments for the brain.

The anomaly present in the fMRI image is recognised and segmented using soft computing techniques, making it easier for doctors to diagnose.