Singapore Employs AI for Biomarkers for Mental Disorders

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Scientists at Nanyang Technological University Singapore (NTU Singapore) found out that Artificial intelligence (AI) has the potential to locate the biomarkers of mental diseases hidden among complicated profiles of genetic markers and behavioural indications due to its efficiency in processing and deriving insights from vast datasets.

The use of technology may also be able to forecast whether a patient's mental disability will get worse over time and contribute to the development of individualised treatment plans that are specific to each patient's needs.

One of the areas of concentration of NTU Singapore's newly established Centre for Biomedical Informatics is utilising the capabilities of AI and data science to aid in the prediction of mental health disorders.

The New Zealand-Singapore Data Science Research Programme, a partnership between NTU Singapore, the Institute of Mental Health (IMH) in Singapore, and Auckland University of Technology (AUT), is one of the initiatives the centre is working on to aid in the prediction of schizophrenia in young people. The programme is creating machine-learning computational models that identify biomarkers related to the emergence of schizophrenia symptoms.

The scientists want to determine how these factors relate to one another by combining all this information into a single model. According to NTU Singapore's Asst Prof Wilson Goh, correlations between gene expression and metabolic data have been identified thanks to AI programmes that analyse massive datasets. Physicians may be able to spot early signs of schizophrenia and treat the condition before the patient's quality of life declines by taking a closer look at additional data dimensions.

In contrast to schizophrenia, dementia is a brain disorder that mostly affects the elderly. Advanced dementia patients have memory loss, impaired judgement, and confusion, which make daily tasks more difficult.

The Dementia Research Centre (Singapore) at NTU Singapore is creating AI-powered solutions to detect and postpone the advancement of the disease to address the rising instances of dementia in ageing populations in Asia and around the world.

One of the projects at the centre is the Biomarker and Cognitive Impairment Study (BioCIS), a five-year study to understand what happens to the brain at the early stages of dementia. It works with local hospitals to recruit 1,500 patients from all ethnicities who have a mild cognitive impairment, the earliest stage of dementia.

By analysing structural attributes of the brain from brain scans, evaluating brain activity with functional magnetic resonance imaging, and looking for protein biomarkers in the blood, BioCIS aims to find biomarkers linked to cognitive impairment.

Moreover, a non-invasive AI tool that may help in the early detection of depression, a common mood condition that can strike at any age, has also been developed by NTU Singapore. Depression, which can be triggered by distressing life events, affects millions of individuals. People with depression commonly experience mood swings that cause them to withdraw from society, and over half of cases go undiagnosed and untreated.

The NTU Singapore team has created AI software that analyses data from fitness trackers to find digital biomarkers of depression and forecast a person's risk of acquiring it. This technology benefits from the growing acceptance of wearable activity trackers.

The data allowed the researchers to link specific patterns in the fitness tracking behaviours of the participants to depressive symptoms like helplessness and hopelessness, a loss of interest in routine tasks, and changes in food or weight.

The computer could successfully identify those people with a high risk of depression and those without risk of depression with an accuracy of 80 per cent in tests using data from depressed and healthy participants.

To assist individuals, researchers, mental health professionals, and policymakers in enhancing mental wellbeing, researchers believe that Ycogni might be combined with Smart Buildings or Smart Cities efforts.