Transforming Mental Health Care with Web Intelligence: AI Solutions for Precision Psychiatry

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Abstract:
The intersection of web intelligence and brain informatics has opened new avenues for transforming mental health care. This talk explores three key works demonstrating the powerful potential of AI and machine learning in addressing complex challenges in psychiatry. First, we delve into the advancements in precision psychiatry through deep learning and machine learning approaches for depression detection, diagnosis, and treatment. This survey highlights the current progress and the potential for AI to shift the landscape of mental health care toward more individualised, evidence-based treatment methods. Next, we focus on predictive biomarkers for repetitive transcranial magnetic stimulation (rTMS) outcomes in depression. By employing functional MRI and explainable AI techniques, we illustrate how AI-driven insights can enhance treatment personalisation by identifying key biomarkers that differentiate responders from non-responders. Finally, we introduce a novel genetic algorithm designed to optimise the scheduling of rTMS treatments in clinical settings, improving operational efficiency and resource deployment. This work showcases how algorithmic innovation can streamline medical workflows and improve patient access to timely care. Together, these works highlight how cutting-edge AI techniques can revolutionise brain informatics and offer promising solutions for the future of mental health treatment.

Short bio：
Dr. Xiaohui Tao is Professor at School of Mathematics, Physics and Computing, University of Southern Queensland, Australia. His research encompasses a wide spectrum, including artificial intelligence, data analytics, machine learning, and natural language processing. His academic contributions are well-recognised with over 200 publications in eminent journals such as TKDE, TOIS, TNNLS, INFFUS and notable conferences including AAAI, IJCAI, ICDE, SIGIR, EMNLP, and CIKM. Dr. Tao's contributions to the academic community have been acknowledged with prestigious awards like the Australia Research Council Grant and the Australian Endeavour Research Fellow, as well as recognition from many international conferences. As a Senior Member of both the IEEE and ACM, Dr. Tao also contributes as the Vice Chair of the IEEE Technical Committee on Intelligent Informatics. His editorial endeavours include serving as the EiC for Natural Language Processing Journal and Web Intelligence Journal. Dr. Tao concluded his PhD from the Queensland University of Technology, Australia, in 2009.