Dimensional Psychoscope: A Hierarchical Taxonomy of Psychopathology (HiTOP) - Based AI Screening Tool for Enhanced Diagnostics

Zahi, Omar (School: Obour STEM School)
Dokhan, Abdullah (School: Obour STEM School)

The issue of mental health misdiagnosis, affecting more than a third of patients with severe psychiatric disorders (39.16%) according to the National Institute of Health, calls for urgent action. This misdiagnosis often stems from disorder heterogeneity, comorbidity, and symptom overlap. Despite its reliability in addressing the limitations of conventional diagnostic classification systems , the Hierarchical Taxonomy of Psychopathology (HiTOP) remains underutilized due to its complexity. This research proposes integrating HiTOP with a novel screening tool, leveraging the NeMo Llama 3.1 70B large language model to enable comprehensive assessments by covering a wide range of symptoms in a time-efficient manner. The chatbot format facilitates conversational engagement, allowing for follow-up questions that elicit more thorough information than standard self-report measures and quicker, more subtle insights than clinical interviews. A final score graph is generated for clinical use, offering a standardized patient profile with rationale for each depicted score. When compared with expert psychologist evaluations, the model showed an average cosine similarity (CS) = 0.82 and Pearson Correlation Coefficient (r) = 0.76 across a four-sample pool. Accordingly, this dimensional AI approach addresses traditional nosology limitations, potentially reducing misdiagnosis, diagnostic delay, and societal stigma.

Awards Won: