Automated social skills training system based on multimodal analysis of neurodevelopmental and psychiatric disorders

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Abstract (should be within 1st page)

This research proposed an automatic evaluation-feedback method based on data-driven analyses of newly collected multimodal interaction datasets, including people with psychiatric/developmental disabilities. The BERT-based sequential similarities have been proposed to capture idiosyncratic meaning shifts in spoken language. By analyzing monologue speech with autistic trait labels, the result highlighted the importance of BERT-based sequential similarities for severity assessment in autism spectrum disorder. The research extends to human-human SST data with schizophrenic labels, revealing atypical vocal formants in individuals with schizophrenia. The investigation further explores formal thought disorder (FTD) characteristics, linking schizophrenia and autism spectrum disorder at the symptomatic level. The analyses revealed that longer-duration speech tasks about negative memories elicit increased FTD symptoms, which helps develop personalized SST feedback. With the enhanced multimodal features derived from these analyses, training regression models for skill-specific subjective scores have been completed and integrated with a rule-based feedback generator. Two types of the SST system are developed, with the second incorporating an adaptive behavior generation model. Perception studies confirm well-synchronized, human-like behaviors, showcasing the feasibility of an automated SST system. At the end of the dissertation, I discussed the future directions of this research by comparing SST sessions by human trainers and computerized systems.