Machine Learning Technology to Support Automated Motivational Interviewing Fidelity Feedback and Communication Science

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**Abstract** (maximum 250 words)

Understanding Motivational Interviewing’s (MI) mechanisms of effect and evaluating clinicians’ fidelity to the model relies upon behavioral coding, which is time-consuming, labor-intensive, and expensive. In the past decade, machine learning (ML) techniques have begun providing an efficient alternative to intensive cognitive tasks. This abstract describes our three efforts to utilize ML to accelerate feedback to clinicians and scaling up tests of MI theory. First, supervised classification models were used with an existing coded data set to train an algorithm to code new data. Forty transcribed audio-recordings from weight loss counseling sessions with African American adolescents with obesity and their caregivers were first manually coded with the Minority Youth-Sequential Coding of Process Exchanges, a qualitative coding scheme to identify key communication behaviors. The accuracy of several classification models (Naïve Bayes, Support Vector Machine (SVM), Latent Class Allocation) using lexical, contextual, and semantic features was tested. Results indicated accuracy comparable to that of human coders. Specifically, the SVM model achieved 75% accuracy which demonstrates great promise toward the goal of automatic coding of treatment session data. Second, Markov models were used to evaluate communication transitions with the goal of determining causal sequences of communication. Finally, we focus on predicting the outcome of patient-provider communication sequences and propose deep learning model, in particular, Recurrent Neural Networks (RNNs). Experimental results show that RNN achieved 87% accuracy which is 24% higher than the approach based on probabilistic models in predicting the success of motivational interviews. These results indicate that the proposed method can be used for real-time monitoring of progression of clinical interviews and more efficient identification of effective provider communication strategies.

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