

Cross-Modal Predictive Modeling of Mental Health Treatment Outcomes: A Machine Learning Framework for Comparing Psychiatric Counseling Therapy and Therapeutic AI-Chatbots

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Mental health problems are becoming the order of the day and burdening the traditional psychiatric guidance frameworks in terms of expenses, unreachability and waiting durations. Conversely, mental health chatbots that are based on AI have become popular because of their anonymity, 24/7, and low cost. Although both traditional counseling and chatbot approaches have feasible advantages, no standard way of operating has been established to compare the efficacy of the two with individual patients. This has been a barrier to the use of individualized mental health interventions. The paper examines the application of machine learning and in this case, the Random Forest algorithm to predict and compare the results of conventional therapy and AI chatbot assistance. Available references define the major signs of treatment success and provide an overview of the benefits and shortcomings of chatbot interventions, yet no model exists to evaluate how people can react to the alternative medium. To solve this, a random forest model was created using data on clinical therapy outcome and the results were used on the data of chatbot users to forecast possible outcomes. The reported chatbot outcomes were compared statistically and through the qualitative feedback with the expected therapy outcomes. The research will establish personal characteristics that relate to increased benefits in either form of therapy. The expected outcomes will be used in clinical decision making, enhancement of digital mental health tools and help in choosing the most appropriate treatment.

Keywords: *Mental health, Personalized decision making, Predictive analytics, Comparative treatment evaluation, AI chatbots*