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The background of the entire page is a complex, abstract pattern of glowing blue and orange circuit traces on a dark blue, textured surface. A small, stylized human figure is walking along one of the horizontal traces in the lower-left quadrant. The overall aesthetic is futuristic and technological.

Predictive Modeling in E-Mental Health: Exploring Applicability in Personalised Depression Treatment

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In this thesis we explore whether predictive modeling can contribute to advancements in personalised depression treatment. There is a need for innovations in this field due to the high costs of psychotherapy delivery, and increasing demand. The increasing availability and use of measurement devices have created a huge wealth of data, which enables the use of predictive modeling techniques to investigate whether predictive modeling can be of value. In this thesis we primarily focussed on the short-term modeling of mood, and the long-term modeling of treatment outcome. The short-term predictions were conducted using off-the-shelf techniques, a literature based model, and models generated using genetic programming techniques. Predictive performance varied between studies due to differences in training data and experimental setup. The models were able to predict mood with an RMSE down to 0.113 on an interval scale of 0 to 1. Furthermore, we proposed a feature learning method intended to increase predictive performance, which was found to significantly increase predictive performance compared to control conditions. The genetic programming approach resulted in simple models that performed among the best found. Also, we introduced an assessment method that rigorously assesses dynamic systems model performance, because historically dynamic system models are used to model health dynamics, and the validation of such models are not always described properly. The genetic programming approach made use of this assessment method to generate its models. The long-term prediction of treatment outcome resulted in AUC values between 0.71 and 0.78. Lastly, we introduced a conceptual framework to help bridge historical and conceptual gaps between research domains that come together in this new field of predictive modeling in e-mental health, with which we conducted a literature review. We believe the predictive models can already have value in innovative treatment applications, however minimum performance requirements will vary depending on the type of application it is used in.

