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The non-existent average individual

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Summary

The importance of the ‘person’ in a ‘person with an illness’ can not be overstated, a quote originating from Hippocrates as early as 400 BC. The importance of the individual is even more prevalent in fields of medicine in which notions of disease, illness, and patient are inherently heterogeneous. This heterogeneity suggests that ‘one-size-fits-all’ treatments might not be the way forward, and tailored treatments need to be devised. A field of medicine in which this holds is the field of *psychopathology*.

Psychopathology and mental health research currently strongly depend on the Diagnostic and Statistical Manual of Mental Disorders (DSM). This DSM brought standardization to a field that used to be heavily fragmented, and served as a means to offer a shared clinical language. However, the use of the practical and research oriented use of the DSM is highly criticized. The currently relatively static and not scientifically founded DSM could benefit from a more dynamical and higher dimensional world view, underlining the importance of the individual.

In accordance with such dynamical and continuous world view, we propose the present work. In this work we focus on the personal aspects of psychopathology and the research thereof. We subdivided this dissertation into two main parts. The first part comprises the collection of data needed for a more personalized approach to psychopathology research. We describe the implementation of two large scale e-mental health research platforms known as HowNutsAreTheDutch (HND) and Leefplezier. These platforms both embrace this novel perspective and were designed to measure psychopathology both from an *intraindividual* as well as the more traditional *interindividual* perspective. We focus on the use of these individualized techniques and describe how they could be applied to a new and more personalized medicine in the field of e-mental health. Besides this psychological perspective, we introduce Physiqal, a platform that can be used to augment such psychologi-

cal data with physiological data as collected using commercially available wearable sensors. We describe the architecture of these platforms from the perspective of service-oriented computing and architectures. We perform a case-study in which we analyze the HND and Leefplezier platforms to propose a general architecture for future platforms.

Secondly, we investigate the analysis of data collected using these e-mental health research platforms, and provide two different perspectives and implementations for analyzing such data. First we approach this from a traditional time series analysis perspective, in which we model our time series as a linear autoregression model (using a technique known as vector autoregression (VAR)). Later we shift focus towards a more data-adaptive and semi-parametric machine learning approach. Our main focus with these approaches is to devise new implementations and combinations of analysis techniques with the goal to provide individuals with advice tailored to them. We argue that for a wide adaptation of e-mental health, and highly personalized methods of advice and treatment, information and communication technology (ICT) and computer science are indispensable.