Teaching computers to find factors that affect the mental health of app users

By training computers to find patterns in how users answer questions regarding their mental health in self-report apps, factors that affect the users' psychological well-being can be found.

Machine Learning is an expression that in the past few years have begun to challenge the position of *Artificial Intelligence* in popular culture. The concept of simply teaching computers to identify patterns and relationships in data is becoming increasingly appealing in many fields of science.

In healthcare in particular, the potential impact of using machine learning techniques to analyse Big Data could be great. In 2011, McKinsey reported that the potential value of Big Data in healthcare could be as high as $ 300 billion[1]. Already, healthcare companies and institutions around the globe have begun to harness the power of physiological data to predict and prevent hospitalisations and save lives. In the past few years, scientists have begun to look at mental health data to see if this can be used in a similar way. With mental unwellness being one of the main contributors to disability in the world[2], the benefits of using such data to gain insight in what factors affect mental health could potentially be great.

In a project[3] carried out at the AI company Lytics in Malmö, Sweden, a machine learning algorithm was implemented in a self-report application for handheld devices to identify which factors affect the psychological well-being of the app's users. The app, called A New Universe, allows users to on a daily basis answer a set of questions regarding their life situation and mental health. The anonymised data is stored on a server, where it can be used for research.

To study if the answers to the questions posed by the app can be used to predict the user's psychological well-being, a machine learning algorithm was used to sift through the answers and attempt to predict the user's self-reported well-being based on his or her answers to the questions. In this method, different sets of questions are evaluated and the sets whose answers most accurately describe the mental health of the user are extracted.

Using this method, a set of a dozen highly predictive questions could be found in the total set of 160 questions. These questions explore areas related to the user's self-esteem, relationships, sleep quality, attitude towards food, physical activity and more. Interestingly, this smaller set of questions generated predictions with similar quality to predictions made using the full set of 160 questions, indicating that the answers to a few, well-chosen questions can reveal much about how the individual is feeling.

An important insight made in this project is that it seems possible to apply machine learning techniques to soft data, such as self-reports, and identify which factors are connected to the mental health of the individual.

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[1] http://www.mckinsey.com/business-functions/business-technology/our-insights/big-data-the-next-frontier-for-innovation
[2] https://www.mentalhealth.org.uk/sites/default/files/fundamental-facts-15.pdf
[3] Tallroth, A and Ålander, M. "Adaptive Question Selection In Questionnaire-based Mental Health Data Collection Apps Using Machine Learning Algorithms", Department of Biomedical Engineering, Lund University, 2016.