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Intitulé de la thèse

Intelligent Monitoring of Psychoactive Substance Use

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Abstract: Psychoactive substance use disorders present a major public health challenge. They are one of the most significant economic burdens facing the world today. Early, accurate and effective diagnosis of these disorders is essential to improving treatment outcomes and reducing the prevalence of substance use disorders. Developing an awareness of psychoactive substance dependence relies on early diagnosis, which may prove challenging using traditional techniques since they can be subjective and inaccurate. Mobile apps and artificial intelligence have undergone multiple development and application in a multitude of sectors. Using mobile apps and artificial intelligence in the medical field can help protect people's mental health. The process involves monitoring certain indicators of their activity and offering guidance for living a healthy lifestyle. With wearable technology, it is possible to read vital signs and environmental parameters locally, efficiently, and noninvasively.

This thesis addresses the problem of screening and diagnosing psychoactive substance use disorders and takes an electroencephalography data-driven method and artificial intelligence techniques to analyse vital signals. Psychoactive substance use damages vital organs, most notably the brain. An electroencephalogram is one way to measure brain electrical activity, which has proved useful in diagnosing psychoactive substance use. Applying high-performance computerized techniques to analyse digital electroencephalography signals can address the need for timely diagnosis and improve the reliability and efficiency of electroencephalography reports to support traditional methods. This approach is a key component of the portability of a physiological signal analysis solution. This thesis explores how mHealth and artificial intelligence can assist in preventing, monitoring, and managing addiction to psychoactive substances, especially alcohol and cannabis as risk factors for noncommunicable diseases. In answering this central question, we provide the following contributions: 1) we examine the various technological aspects aimed at improving mental and neurological health care. A technical and functional analysis of mHealth applications in the mental and neurological health domains is undertaken, using an in-depth analysis of the acceptability and feasibility of mHealth interventions. 2) We focus on determining the most relevant electroencephalography recordings for psychoactive substance addiction diagnosis, to reduce the size of electroencephalography data sets.

This thesis broadens the scope of mHealth and artificial intelligence use for screening and diagnosis purposes. A combination of AI methods and mHealth technologies can improve the portability of

solutions based on EEG recordings for diagnosis, management and monitoring of psychoactive substance use disorders. A potential benefit of this research is the identification of future applications that can leverage artificial intelligence and mobile technologies in order to provide tailored recommendations in a context of evidence-based care and in order to ensure continuity of mental health services.

Keywords: m-Health, Psychoactive Substance Use, Alcohol Use Disorder, Cannabis Use Disorder, Electroencephalography, EEG, Biological Time Series, Optimal Channel Selection, Dimensionality reduction, Feature selection, Discrete to Continuous algorithm, DtC, Logistic regression