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Master's Theses in Artificial Intelligence and Sleep Medicine

Introduction: Isolated REM sleep behavior disorder (iRBD) is a sleep disorder characterized by abnormal muscle activity and dream enactment during REM sleep. Longitudinal studies have shown that up to 90% of iRBD patients convert to Parkinson's disease (PD) after a decade. Therefore, iRBD is considered by now the strongest biomarker of early PD. Despite the relation between iRBD and PD is clear, so far there are no biomarkers that could be used to predict the time to conversion from iRBD to PD. Aims of the theses: The aim of the theses is to investigate whether it is possible to identify biomarkers with artificial intelligence that can predict conversion of iRBD patients to PD. The biomarkers will be extracted from electrophysiological signals recorded during sleep. Two different projects are proposed.

- Project 1: In this project, features describing sleep instability and alterations in brain waves (EEG) will be extracted from the data and used to train and validate machine learning algorithms that can predict the risk of conversion to PD for iRBD patients.
- Project 2: In this project, a deep learning approach (i.e. without explicit feature extraction) will be investigated. Raw EEG data will be given in input to a deep neural network in order to predict the risk of conversion to PD for iRBD patients.

Interdisciplinary and international environment: The projects will be carried out in collaboration between the Department of Computer Science of the University of Innsbruck (Prof. Antonio Rodríguez-Sánchez) and the Department of Neurology of the Medical University of Innsbruck (Matteo Cesari, PhD and Prof. Birgit Högl). The team is international and the work will be carried out in English. Expected workload: It is expected that each project will last 8 months. A student salary for a workload of 20 hours per week is foreseen according to Austrian Science Fund (FWF) rules. The expected start is March/April 2022. Contacts: Prof. Antonio Rodríguez-Sánchez (antonio.rodriguez-sanchez@uibk.ac.at), Matteo Cesari (matteo.cesari@i-med.ac.at)

Master's Theses in Artificial Intelligence for detecting snow avalanches

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