Project Plan

Sleep Stage classifications

Groupe_1: Names…….

Motivation:

- Get full grade.

Description:

- Classifying sleep stages based on physionet data.

Existing solution:

- Time-frequency analysis using complex Morlet wavelets for features extraction + Autoencoder for classifications [1] – too many parameters to handle.
- Applied directly CNN on raw data [2]. – No data pre-processing
- CNN + BiRNN [3]. – imbalance problem not addressed.

Proposed solution:

- Using 1D CNN for features extraction (data pre-processing).
- Setup a base line and try to outperform it (exp: common sense about next sleep stage).
- Apply different RNN algorithms (LSTM, GRU, BiRNN) and compare the results.
- Use dropout on RNN and see if there are improvements
- Stack many RNN layers and see if there are improvements.
- Address imbalanced data problem by treating the error of each misclassified sample equally.

Milestones:

- Week 8: Data cleaning and pre-processing.
- Week 9-10: Apply LSTM and 1-D convNet on data.
- Week 11: Analyse results.
- Week 12: Apply improvements if possible.
- Week 13: Prepare slides for the presentation

References:

[1] Tsinalis et Al. “automatic sleep stage scoring using time-frequency analysis and stacked sparse autoencoders” Ann Biomed Eng (2016) 44: 1587.

[2] Tsinali et Al. “Automatic Sleep Stage Scoring with Single-Channel EEG Using Convolutional Neural Networks”. Arxiv (2016).

[3] Supratak et Al, “Deepsleepnet: a model for automatic sleep stage scoring based on raw single-channel eeg”. IEEE TRANSACTIONS ON NEURAL SYSTEMS AND REHABILITATION ENGINEERING (2017).