

Detection and Visualization of fragmentation in hypnograms for several patients

Fragmentation in sleep can be a signal of diseases such as insomnia or narcolepsy. When analyzing a big number of patients, it can be challenging to detect and visually present this information to an expert.

Sleep staging, which consists in scoring the sleep of patient, is moving towards an automatized approach where Machine Learning (ML) models can be used to score the sleep of the patients. In general terms, these models behave accurately. However, a serious validation is needed to ensure the correctness of the model in recognizing, among others, transitions between sleep stages.

Hypnograms visually depict the sleep of a patient during the night. Figure 1 shows an example of hypnogram in which REM stage contains fragmentation. On the contrary, Figure 2 shows an example of a normal hypnogram. Even though there is a little fragmentation in a normal hypnogram (Figure 2), it does not happen as often as in a fragmented sleep (Figure 1).

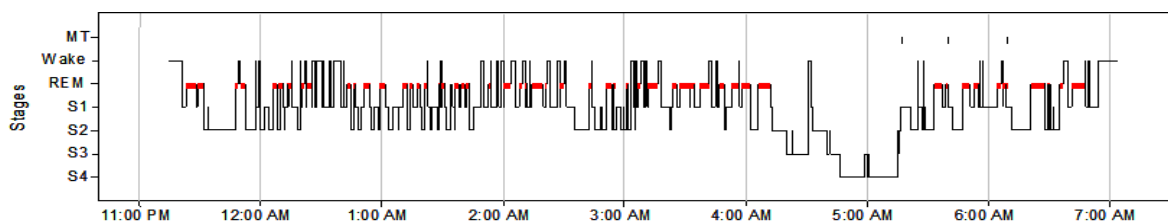


Figure 1. Example of hypnogram with REM fragmentation.

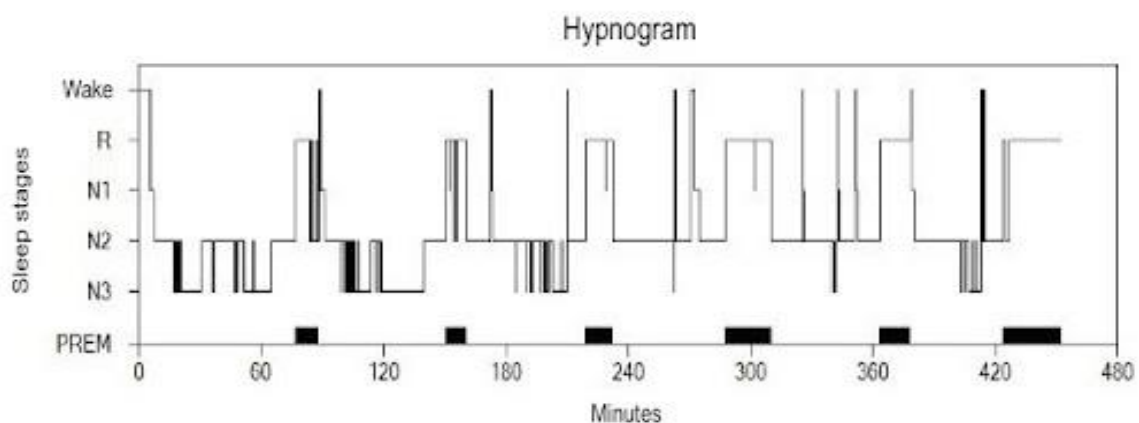


Figure 2. Example of normal hypnogram.

In this project, students will code an algorithm that detects fragmentation in hypnograms and design visualizations to communicate the outputs of the algorithm in an informative manner. The challenge in this project lies in coming up with ways to visualize this information for many patients (between 70 and 200, for example) in an informative way such as the expert can quickly get insights into the fragmentations of several patients.

Data: <https://archive.physionet.org/physiobank/database/sleep-edfx/>