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Today's Goal: Find Literature about features for EEG/EMG classification

Unsupervised Online Classifier in Sleep Scoring for Sleep Deprivation Studies

4 EEG parameters and 1 EMG parameter are extracted from each 5-s epoch: the standard deviation of the rectified EEG (SD-EEG), the number of sign inversions of the filtered EEG (Zero-crossings), theta (5–9 Hz) to delta (0.5–4.5 Hz) power ratio (hereafter named EEG Ratio 1), and the 0.5–20 Hz/0.5–55 Hz power ratio (EEG Ratio 2).

The values of the spectral power in selected bands result from a fast Fourier transform (FFT) of the filtered EEG with 0.5 Hz resolution.

The EMG signal is subjected to a simple rectification and its median amplitude calculated.

Used Bayes Classifier (with Gaussian assumption)

Neural Network Model: Applications to Automatic Sleep Analysis of Human Sleep

Features extracted were:

EEG-

1. Relative Power in the Delta band [0-4 Hz]
2. Relative Power in Theta band [4-8 Hz]
3. Relative Power in Alpha band [8-13 Hz]
4. Relative Power in the Beta1 Band [13-22 Hz]
5. Relative Power in the Beta2 Band [22-35 Hz]
6. Total EEG Power [0-35 Hz]
7. Delta/Theta power ratio
8. Alpha/theta power ratio
9. Mean frequency of EEG spectral density
10. Dispersion of EEG spectral density

EMG-

1. Total Power of EMG Spectral Density
2. Mean Frequency of EMG Spectral Density
3. Dispersion of EMG Spectral Density

They used a Neural Net to classify, a multilayer perceptron network. Optimized size of the hidden layer for accuracy (too large=memorization of certain input patterns, too small=requiring more iterations and less accuracy).

To validate the Neural Net, they also used KNN and Bayes Classification with Gaussian assumptions for comparison.

Classifiers to check out:

1. Neural Network- Multilayer perceptron
2. Neural Network- Self Organizing Map
3. Hidden Markov Model with Viterbi Learning
4. Bayes Classification
5. k-means (though sensitive to noise)

Features: Neural Net paper features. Entropies.