Signal processing for multimodal perinatal monitoring

Alexander Caicedo Dorado, KUL1

Abstract

the aim pof this phD project is the development of novel multimodal signal processing techniques based on multi-way signal and 3D canonical correlation analysis in order to extract the common dynamics among multiple neonatal recordings (cerebral oxygenation, EEG, ECG, EOG, EMG, respiration, saturation, etc...) in order to monitor and detect risk situations in an automated way.

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Epileptic Seizure Detection

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Abstract

Epilepsy is a neurological disorder, where abnormal electrical discharges in the brain cause seizures. The abnormal brain activity appears on EEG recordings, therefore it can be used for epileptic seizure detection.

This project is aiming at developing a mimetic detection algorithm, inspired by an existing method for neonatal seizure detection. According to the preliminary results, the method looks promising. However, there are significant differences between neonatal and adult siezures; moreover, several artifacts, such as blinking, muscle or chewing artifacts contaminate adult recordings. The above mentioned factors have to be taken account when developing an optimal algorithm for adult epileptic seizure detection.

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Perceptually optimal clipping of audio signals

Bruno Defraene, KUL1

Abstract

Clipping consists of confining the amplitude of an audio signal to the audio systems available amplitude range, while maximally preserving sound quality. This operation is of utmost importance in small, portable audio devices such as cell phones, MP3 players and hearing aids. The goal of this project is to design, implement and evaluate novel algorithms that perform clipping of an audio signal in a perceptually optimal way. The proposed approach is to formulate clipping as a constrained optimization problem. This calls upon principles of psychoacoustics, the study of human perception of sounds. A significant improvement of sound quality as compared to state-of-the-art clipping algorithms is aimed at. Moreover, algorithms should be executable in real time.

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