

Projekte und Diplomarbeitsthemen:

Seminar/BMT Projekt DICOM-Waveform in BioSig

Biosig <http://biosig.sf.net> is a free and open source software library for biomedical signal processing, licensed with the GNU General Public License. BioSig supports a large number of different biosignal data formats. DICOM Waveform defines the storage of biosignal data within the DICOM framework.

The aim of the project is implementing a DICOM waveform reader within the Biosig toolbox. There are several open source libraries for accessing dicom available (imebra library [2], dcmtool [3], dicom3tools [4], dicomlib [5], Grassroot Dicom [6]). The advantages and disadvantages should be evaluated. Based on this evaluation, a DICOM waveform reader should be implemented in Biosig.

- [1] <http://biosig.sf.net>
- [2] <http://imebra.com/documentation/html/index.html>
- [3] <http://dicom.offis.de/dcmtool.php.de>
- [4] <http://www.dclunie.com/dicom3tools.html>
- [5] <http://dicomlib.swri.ca/dicomlib.html>
- [6] <http://gdcm.sourceforge.net/>

Recommended knowledge: C/C++, ECG, biomedical signals

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Seminar/BMT Projekt

SVM-Classifiers for data with weighted samples and missing values

The NaN-toolbox provides a number of classifiers, for data with missing values and weighted samples. Support vector machines (SVM) are supposedly powerful classification and machine learning tools. However, there is no SVM implementation available that supports weighted samples and missing values. It should be investigated whether SVM can be modified for the use with weighted SVM and missing samples, in order to extend the NaN-toolbox.

Keywords: Classification, Missing values, weighted samples, Open Source

Recommended knowledge: Matlab, classification, optimization

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Seminar/BMT Projekt

Adaptive Methods for correcting of EOG artifact in EEG

The electrooculogram (EOG) caused by eye movements are a major source of artifacts in the electroencephalogram (EEG). There are a variety of methods for correction of EOG artifacts which can be divided into three groups, regression methods, blind source separation, and adaptive methods.

Adaptive methods should be implemented, and the performance should be compared with standard multiple regression methods.

Recommended knowledge: Matlab, EEG, biomedical signals

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Seminar/BMT Projekt Sleep stage classification

Polysomnographic recordings (PSGs) can be used to identify the sleep stages (Wake, S1, S2, S3, S4 or REM). Physiobank has a database of PSGs which can be to evaluate various methods. The aim is to use the open source tools of Biosig in order to establish an automated sleep stage classifier, and to evaluate the performance of a basic classification system based on linear methods. Physiobank has a number sleep recordings that can be used for that purpose. The aim is to generate a open source solution for automated sleep stage classification within Biosig – the open source software library for biomedical signal processing (<http://Biosig.sf.net>).

Recommended knowledge: Matlab, EEG, biomedical signals

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Seminar/BMT Projekt Functional Brain Connectivity

Anatomical connectivities in the brain are known for about 100 years, but functional connectivity is much more difficult to address. Only recently provide new methods (based on granger causality and MVAR models) new possibilities to investigate functional connectivity in the living brain.

Based on some public EEG databases, the functional connectivity during different mental tasks should be investigated.

Recommended knowledge: Matlab, EEG, biomedical signals

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Seminar/BMT Projekt

Biosignal database management tool

Biomedical signal databases contain a variety of recording specific information, including demographic information, information about the recording device and its configuration, etc. The aim is to write a tool to manage a large number of data files. IT should include:

- based on Biosig (<http://biosig.sf.net>)
- reading the header information from a list of files
- display the header information of all files in a table.
- edit the header information of specific files
- Sorting and selecting the database on various criteria
- implemented in open source (GPL or compatible license)

Recommended knowledge: C/C++, biomedical signals

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Weitere Projekte und Diplomarbeiten

Falls sie Interesse an oder Vorschläge zu Projekte und Diplomarbeiten zu den Themen Medizinische Informatik, Biosignalanalyse, Brain-Computer Interface Forschung, Gehirnforschung (EEG, fMRI), wenden sie sich an

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