# 02460 Advanced Machine Learning LOGBOOK

Name 1, [sxxxxxx@student.dtu.dk](mailto:sxxxxxx@student.dtu.dk)

Name 2, [sxxxxxx@student.dtu.dk](mailto:sxxxxxx@student.dtu.dk)

Name 3, [sxxxxxx@student.dtu.dk](mailto:sxxxxxx@student.dtu.dk)

The main purpose of the logbook is that it serves as a tool for you to organize the project. Further, it serves as a way to collecting information related to the learning objectives:

* Presentation of methods and results at meetings with project supervisor and fellow students
* Plan and carry out the course of the project in collaboration with the project supervisor
* Organize and coordinate the work in the project group

**Overall Project Goals**

**Define own learning objectives for the project**

*Describe*

**Carry out a well-founded delimitation of the project and formulate specific hypotheses and aims**

*Describe*

**Project Meetings**

**Week 1: 08.03.2016**

*Questions*

What kind of dataset should we use? Where to find them?

*Reading, who and what*

Website on artifacts removal using ICA

<http://sccn.ucsd.edu/~jung/Site/EEG_artifact_removal.html>

An overview of platforms

Delorme, A., Kothe, C., Vankov, A., Bigdely-Shamlo, N., Oostenveld, R., Zander, T.O. and Makeig, S., 2010. MATLAB-based tools for BCI research. In Brain-Computer Interfaces (pp. 241-259). Springer London.

A recent on-line ICA method

Hsu, S.H., Mullen, T., Jung, T.P. and Cauwenberghs, G., 2015. Real-time Adaptive EEG Source Separation using Online Recursive Independent Component Analysis.

*Implementation, who and what*

Tried to install the fieldtrip library which was supposed to interpret eeg data. But finally we found Matlab data, which we transformed into csv files trough a Matlab script we wrote ourselves.

*Results, who and what*

We got csv files of several eeg recording, which is supposed to be clean data. CSV files can be easily used with python.

*Decisions, who and what, what do you don alone, what do you do together*

We decided not to use any of the frameworks we found that day.

**Week 3: 16.03.2016**

*Questions*

What are artifacts? How to simulate them? In which way can PCA helps to remove them?

*Reading, who and what*

*Implementation, who and what*

We made the first version of our code:

* Adding artifacts to an eeg dataset
* Apply PCA to a dataset
* Use PCA results to remove artifacts by projecting onto a subset of components.

*Results, who and what*

We added some artifacts but results were not satisfactory.

*Decisions, who and what, what do you don alone, what do you do together*

We decided to do some work on artifact addition during Easter break.

**Week 4: 31.03.2016**

*Questions*

How can we improve our artifacts? Does using PCA for artifacts removal a good idea?

*Reading, who and what*

*Implementation, who and what*

We improved our results by not adding artifacts to all components. We normalized our data prior to PCA and artifacts.

*Results, who and what*

Artifacts seem to be removed. However the price to pay is that cleaned data is sometimes closer to principal components than to original data.

We also installed the libraries that we should use to do live recording with an eeg helmet. But we have not been able to make the emocapper work properly.

*Decisions, who and what, what do you don alone, what do you do together*

We decided to investigate the source of our problems by asking questions during next meeting with our supervisor.

**Supervisor Meetings**

**Week 1: 10.03.2016**

*Presentation of results since last meeting*

We explained the kind of eeg dataset we had found. We also got an eeg recorder, and discussed what kind of programming language we would use: in order to use the eeg helmet, we have to use python with linux.

*Action points for next week*

Try to add artifacts, and to apply a simple PCA, to see if we can manage to remove artifacts.

**Week 2: 17.03.2016**

*Presentation of results since last meeting*

We explained the implementation we had done so far. We asked questions about what artifacts are supposed to look like.

*Action points for next week*

We should try to actually mimic specific artifacts that we can see in the paper he linked us. So one of their artifacts is a sudden dive on the graph, which is the kind of thing we could try to mimic (although what we do right now is not wrong per se). Artifacts occur in time intervals, not constantly.

Removing artifacts: we should just use W instead of Winv because we use PCA and the eigenvectors are orthogonal so it's the same.

We should try plotting the original data (before adding artifacts) and compare it to after we remove artifacts.

**Week 3: 31.03.2016**

*Presentation of results since last meeting*

*Action points for next week*