

Information Engineering and Technology Faculty
German University in Cairo



A MATLAB GUC for analyzing electroencephalographic (EEG) signals

Bachelor Thesis

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Supervisor: Prof. Dr.-Ing B. Yang
Submission Date: 14 September, 2008

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This is to certify that:

- (i) the thesis comprises only my original work toward the Bachelor Degree
- (ii) due acknowledgement has been made in the text to all other material used

Marwa Mohamed Ali El Hefnawy
14 September, 2008

Abstract

Electroencephalography (EEG) is one of the important tests that measures the electric signals in the brain by using special kind of electrodes. In order to analyse the EEG signals, be able to detect the occurrence of seizures and diagnose their types afterwards, a MATLAB graphical user interface program was implemented to display the recorded EEG data. The data can be displayed for the whole recording time. It is possible to apply some digital signal processing concepts on the signals such as amplification and filtering using digital FIR and IIR filters. Time - Frequency analysis is a major process that is applied on the EEG data to detect the high power points of the signals. Short time Fourier transform and wavelet transform are both used for this analysis trying to obtain the best resolution representation in the time and frequency domains.

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Chapter 1

Introduction

The main task of the introduction in the report is to present the logical chain

- starting from the current state-of-art,
- evaluation of its weaknesses,
- formulation of the main problem,
- showing the way of solving the problem and
- finishing with the contribution of the presented work to this solution.

The introduction can consist of a one text body, but it can also be differently structured. Typical components are the motivation and the aim of the project. The introduction has typically 1 to 4 pages.

1.1 Motivation

The motivation should answer following questions: Why the work has been done? For whom? What is its importance?

1.2 Aim of the project

The description of the project task should describe what is the technical aim of the work? what are the specific tasks? how it can be proved, that the task is reached?

Chapter 2

Background

In this chapter, you should present the background information needed for the proposed work of the thesis.

The background chapter is typically subdivided in several subsections. In some cases it is also more suitable to make more than one main chapter with very diverse theoretical backgrounds, if needed. The background chapter (or chapters) should not constitute more than 25-30% of the total text.

It is recommendable that each chapter begins by an introductory paragraph or two. It is like a mini-introduction to this chapter.

2.1 First Section

Especially important in the background presentation are the references on the most acknowledged books, articles or crucial WWW-links. The most efficient way to do it, is by use of the special tool called BibTeX. It is a simple data base with formalized entries for the referred literature. An example of such entries you can find in the document "bachelor.bib". By running the BibTeX in the LaTeX Command Prompt window you can link from the .bib document only this entries, which are actually cited in your report. This allows to use the same literature data base for different documents. Your literature list attached at the end of the document will be either in the sequence of referring in the text or alphabetic.

2.1.1 Getting BibTeX working

To get the bibliography attached:

1. prepare your reference data base document (here: bachelor.bib)
2. place the `\bibliographystyle` command in backmatter.
3. place the `\bibliography` command in backmatter.
4. run LaTeX
5. run Bibtex `bachelor` in Command Prompt
6. run LaTeX twice

2.1.2 Examples of references

This is for example the reference on a very common textbook [1], and this is a reference on very interesting journal article [2].

2.2 Another Section

Chapter 3

My Own Approach

After presentation of the theoretical background, typically your contribution should be introduced. This depends of the type of the project. This chapter can be divided in two or more separate chapters.

Chapter 4

Conclusion

Write your conclusions here. Typically 1-2 paragraphs where you tell what was the problem and how it was solved. Then the main results in 1-2 paragraphs or possibly as a list. In addition, you can describe topics for future research in the last paragraph.

Bibliography

- [1] S. Abdennadher and T. Frühwirth. *Essentials of Constraint Programming*. Springer, 2002.
- [2] S. Abdennadher and C. Rigotti. Automatic Generation of CHR Constraint Solvers. *Journal of Theory and Practice of Logic Programming (TPLP)*, 5(2), 2005.