The exercise procedure for exercise 1-3 in S-38.3183 - Spring 2007

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Abstract

This paper introduces the method and format with which the exercises in course S-38.3183 are to be done and exercise reports are to be returned. To get your report into the grading process it must be submitted via email to *s383183-exercise@netlab.tkk.fi*. No returns in paper format or otherwise are allowed. The reports must be in pdf-format and sent as attachments to the email message. Do not forget your name and study book number from your report. This paper also gives a recommended structure of exercise documents. Furthermore, the grading principles and method of working is presented. In addition, a brief description of a problem-solving process is given to structurize the students' work.

I. Introduction

The course S-38.3183 is lectured in Spring 2007 for the second time. The course includes 12 lectures and 3-5 exercises. The exercises appear to be the standard TKK ”laskari”-style: Students are given exercise questions and they are to answer them and return their answers before the next exercise. However, some modifications have been made to increase the risk of learning. In particular, the exercise lectures concentrate on introduction to the course, problems and suggestion of tools to be used. However, exercise lectures do not attempt to ”hold the hands of the students” and guide them step-by-step through all solutions. Analyzing Internet traffic is hard work and can not be learned just by watching the teacher do the analysis. The students are required to write their own individual reports. However, group work is encouraged and, in fact, required to get passing grades from the exercises.

A. Template for the return of the exercises

The source-file for this document may be used as a template for the return. It utilizes the widely used IEEE-format which is available for both LaTeX- and MSWord –environments. All reports must be returned in pdf-format. No other format is accepted. The LaTeX source-file for this document is available in http://www.netlab.hut.fi/opetus/s383183/k07/exercises/source.tex

II. Problem solving

All engineering often requires solving practical or theoretical problems. It is wise to develop one's own problem solving procedure that can be applied to various problems. A suggestion of a problem-solving process is presented here:

1) Define the problem. Make sure that you understand what is the input (data available) and what you want as output (what should be solved with the input). Here you can also make assumptions, as you take into regard the lack of details in the input data. It is also wise to introduce the general area of the problem to help you determine the mathematical tools for the next step.
2) Develop a mathematical model of the problem. Or, preferably, look one up. The mathematical problem might be very simple (e.g., how many lines there are in the trace-file) or quite complex (method of testing for self-similarity in a dataset).
3) Based on the mathematical model, build a computational method for solving the problem. Check again that you have the required input and that your model/method actually provides you with the desired output.
4) Implement the computational method. In this step you code your procedure for getting the desired output. This could be a Matlab-script, a command line or short awk- or perl-script etc. This step requires great care to be taken to avoid logical errors. Be careful.
5) Test the solution and evaluate, analyze and assess the results. Search for causality. Be critical. Make conclusions. Suggest how your results could be made even more reliable.

This procedure is also a good basic structure for the exercise report.

III. Method of working

The reports are written and returned solo as individual contributions. However, a large part of the work might be done quicker and with better individual results if performed in groups. Therefore, the following is strongly suggested:

- As you begin your work, form groups of three to four students. It would be best if each member of the group would have a different data set to be analyzed to avoid the temptation to copy all the results and to enable the possibility to learn from other data sets.
- Work together as you see fit. If someone in the group is good in making Matlab-scripts let him/her be the one to do the actual coding. If someone else has the ability to quickly form an overall view of the problem and the steps to solve it, use this person's ability. Someone might be more familiar with the typesetting environment you are using. The overall goal is to learn to share your strengths and absorb from other people's work what your own skills lack. However, everyone is required to write their own report and draw up their own conclusions (after discussing about them within the group).
- The final report of each person must contain a section titled "Acknowledgments" where everyone who has influenced the report must be mentioned by name and their individual respective contribution. Your own work should also be clearly defined and reported. It must be stressed that the quality of group work is one key factor of the grading of your work.

- Be advised that more names and more collaboration is not a bad thing. Be also advised that working totally by yourself may lead to rejection of the report. Naturally, plagiarism and 1-to-1 copies of other's reports are considered cheating and lead to appropriate consequences as defined by the Department of Electrical and Communications Engineering and Helsinki University of Technology.
- It is recommended, although not mandatory, to change your working groups during the course. An ideal situation would see a change in your workgroup for every exercise.

IV. Report structure

In Section II the general structure of the report is given. Additional instructions follow:

- Start with *Introduction*: Introduce the problem, the given input data
- Present the mathematical basics of your solution. Type out the equations and only the equations you need. For instance, do not just tell that you are going to calculate the mean. Instead, state clearly that you are going calculate the mean defined as

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n} \tag{1}$$

- Present the complete mathematical solution and process to obtain your results.
- Include the code, command lines and scripts so that anyone can do the same experimentation with their own data and thus verify or contradict your results.
- Present the results in clear figures and tables. Try to avoid complex figures and aim for simplicity. If you know what you are looking for in the data, your pictures will usually clearly indicate this. If you're not sure what you're after, your figures and tables will usually reveal this. When you include a figure or a table, be absolutely sure that you refer to it (and explain it) in the text.
- As a final part of your work make conclusions based on the results. If you see causality somewhere, be sure to state it. Be critical and be honest.
- In the Acknowledgements-section you should clearly state all those, by name and contribution, who have contributed and influenced your work. Very few things in the world are accomplished completely alone.
- As a final part of work state all your references and sources of information. The list of references should enable the reader to get their hands on the same material and to verify that you've interpreted the sources correctly.

The report should be as short as possible. Be concise and document all necessary information. However, omit redundancy and avoid unnecessary verbosity. No strict page counts are given. Enough is enough.

A. Tips to improve your work

Before every exercise, study the appropriate statistical methods. If a statistical property has parameters, experiment with different parameter values. If "Chapter 2" gives sugggestions on how to determine the parameters, try these also.

Your conclusions reveal what you understand from the traffic (based on the statistics that the exercise has told you to determine). Do not merely work towards doing just the plots and statistics that the exercise points out! Work towards your conclusions and understanding of the traffic! This is important.

Work together. Organize and delegate within your group. This will save you time. Remember to acknowledge contributions!

V. Grading

The reports are graded on a three-step scale: Reject, pass, pass with distinction. All reports must be passed in order to pass the course. Therefore, one rejection means that all exercise work is rejected and you need to take the course again in the next year!

To achieve the highest grade of ”pass with distinction” from a report the following elements must be present in the report:

- Clear and logical structure in the report.
- Proper language and ease of reading. Note: You are recommended to use English, however, Finnish and Swedish are also accepted. Nevertheless, the get the most out of this course, please use English!
- Clear, and to the point figures. Clear and accurate presentation of the results.
- The problem needs to be clearly defined and properly solved.
- The procedures (scripts, command lines) with which the solutions are obtained need to be clearly documented. The reader of the report has to be able to duplicate the work.
- Clear, concise and to the point conclusions and discussion based on the results are mandatory.
- The work flow and time spent needs to be documented, and other people’s contribution clearly identified in the Acknowledgement-section. Also all sources of relevant information (article, program documentation etc.) regarding the solution of the problem need to be presented in the References-section.

A. Return of the exercises

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VI. Acknowledgements

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