"Statistics Lab" – an Applied Statistics Workshop

Idea and Purpose

Idea

Students attend a statistical consulting session. Based on the short problem specification by the client, the relevant scientific/statistical topics are prepared before meeting with the client(s), and are discussed with members of the consulting group of the Seminar für Statistik (SfS) afterwards. Details, products and assessments are discussed below.

Purpose and Learning Outcome

- To provide a learning environment in a realistic setting.

- To apply theoretical knowledge in a consultancy situation.

- To carry out a consultancy session and produce a report.

After the course, students will have practical knowledge about statistical consulting. They will have selected the appropriate theories to the practical problem at hand. They will have deepened their statistical knowledge, and applied their theoretical knowledge to the problem. They will have gathered experience in explaining the relevant mathematical and software issues to a lay client. They will have performed a statistical analysis using R (or SPSS). They will have produced a report, and will have presented their case in the course's seminar.

Contents

- Students participate in consulting meetings at the SfS. Students can work alone or in groups of two.

- Prior to the consultings, the student receives the email information provided by the clients. The student prepares the relevant statistical background. If data is provided (usually), the students will have a look at the data using R (or SPSS) for preparation. Before the consulting meeting, the student meets with the member of the consulting team to discuss his/her preparations and plan the meeting.

- During the first meeting the student observes (and participates in the discussion if wanted). During the second meeting (with a different client), the student is given the possibility to lead the meeting. The member of the consulting team is overseeing (and contributing to) the meeting. The student takes notes of the meeting and the issues discussed.

- After the meeting, the student and the SfS consultant discuss the course of the meeting and its contents. If any questions by the client are still open, the student will work over (read-up on) these issues again. Then the student performs the recommended analysis. If new questions arise, the student can contact the client again to discuss the open issues.

- The student produces a consulting report in a manner that is comprehensible for a lay client. It should contain the problem specification, the statistical method applied and the results of the data analysis. This report is then presented in a final meeting to the client. In addition a short note (possibly in keywords) is required by the SfS of the preparation steps, experiences in the study team (if applicable), the learning achievements and the consulting experience. The client will fill in a feedback form.

- Finally, the student presents the case in the weekly course seminar in a 15-20 minute talk. All students are asked to attend the seminar regularly.

Criteria for Assessment

Students will be marked for the following criteria:

- Comprehensiveness of preparation of the consulting meeting

- Adequacy and effectiveness in leading the discussion

- Ability to perform data analysis of the statistical problem

- Quality of the written report for the lay client

- Standard and content of the seminar presentation

- If students have worked in groups, the data analysis and report is expected from every student independently

Expenditure of time for students

A total workload of about 150-180h is expected. These are subdivided roughly into the following tasks:

- Attend first consulting session – 2%

- Prepare main consulting with own client – 7%

- Lead consulting – 2%

- Discussions with SfS staff – 5%

- Analysis with R/SPSS – 30%

- Re-iterate with client – 5%

- Prepare report – 30%

- Present report to client – 1%

- Prepare talk – 5%

- Seminar attendance and talk – 13%

Administration

The course counts for 6 CP.

It is open for all students of:

- Statistics MSc (2nd year or higher)

- PhD students

Prerequisites

Statistical Basics

Knowledge required equivalent to level of 2nd year MSc in Statistics, especially regression and analysis of variance.
Useful lectures and material:

- 401-0649-00L Angewandte Statistische Regression (Prof. Marianne Müller) `http://stat.ethz.ch/teaching/lectures/HS_2009/asr`

- 401-0649-99L Angewandte statistische Regression, mit Ergänzung (Prof. Werner Stahel, Dr. Markus Kalisch)
  Script: `http://stat.ethz.ch/ stahel/courses/regression/`

- 401-0625-01L Angewandte Varianzanalyse und Versuchsplanung (Dr. Hans-Rudolf Roth) `http://stat.ethz.ch/teaching/lectures/HS_2009/anova`

- W. Stahel, "Statistische Datenanalyse: Eine Einführung für Naturwissenschaftler" (5. Auflage), Vieweg, 2005.

Statistical Software (R and/or SPSS)

Basic experience in Data Analysis with R/SPSS.
Useful material:

- 401-6215-00L Using R for Statistical Data Analysis and Graphics (Prof. Werner Stahel, Dr. Andreas Papritz) `http://stat.ethz.ch/ stahel/courses/R/`

- An Introduction to R. `http://stat.ethz.ch/CRAN/doc/manuals/R-intro.pdf`

- SPSS Course and Exercises: `ftp://stat.ethz.ch/U/sfs/SPSSKurs/`

- Andy Field, Discovering Statistics Using SPSS, 3rd Edition, 2009, SAGE.

Consulting Literature

- Javier Cabrera and Andrew McDougall, Statistical Consulting, Springer, 2002.

- James R. Boen and Douglas A. Zahn, The Human Side of Statistical Consulting, Wadsworth Inc. Belmont, 1982.

- Christopher Chatfield, Problem Solving: A Statistician's Guide, Chapman and Hall, 1990.

- D. R. Cox and E. J. Snell, Applied Statistics, Chapman and Hall, 1981.

- Depending on the consulting problem, specific additional statistical literature will be recommended.