Longitudinal Data Analysis

Assignment 1: Continuous Longitudinal Data

2017–2018

Due date: October 27, 2017

1 Introduction on Acupuncture data

The dataset contains data from a randomized study comparing acupuncture with placebo in the treatment of severe headache. A detailed description of the study can be found in Vickers et al. (BMJ Online, 2004, doi: `10.1136/bmj.38029.421863.EB`). The outcome studied here is the severity of the headache, recorded four times a day on a six point Likert scale, during one week, and the total summed to give a headache score. The severity was measured at baseline, 3 months after study initiation, and one year after study initiation. Covariates that were believed to influence headache severity are age, the number of years of headache disorder, and the frequency of headaches. Of key interest is to study whether headache severity evolves differently for placebo patients than for patients receiving acupuncture, and whether the evolution depends on patient characteristics measured at baseline.

2 Data file

- SAS file aculda.sas7bdat

- Variables:

  1. ID: identification number

  2. GROUP: treatment allocation (0: placebo, 1: acupuncture)

  3. AGE: age of patient at baseline

  4. CHRONICITY: number of years of headache disorder, prior to entry in the study

  5. FREQUENCY: number of days with headache during a four-week recording period at baseline

  6. TIME: time-point at which outcome was recorded (0, 3, 12 months)

  7. SEVERITY: severity of headache score

3   Assignments

1. Describe the data, and use graphical techniques to explore the mean structure, the variance structure and the correlation structure. Summarize your conclusions. What are the implications with respect to statistical modelling ?

2. Fit a multivariate model, and find the most parsimonious mean structure which can be used to describe the average evolutions in the data. What covariance structures are applicable in this case ? What is the most parsimonious structure you can find ?

3. Use an explicit two-stage analysis to get an initial impression about trends and effects of covariates.

4. Formulate a plausible random-effects model. Fit your model, and compare the results with those from the multivariate model. Check the appropriateness of your random-effects model. Calculate the subject-specific intercepts/slopes and compare them with the ones you obtained from a two-stage analysis. What do you conclude ?

4   General remarks

- For each question, motivate your choice of techniques, estimation methods, assumptions you make, and describe possible advantages/disadvantages, problems.

- For each of the above questions, summarize your conclusions and report them to a clinician.

- Carefully reflect on the parameterization of your models.

- Do you have any recommendations with respect to future similar experiments ?