

Calendar for "Generalized Linear Models", 2nd Semester 2011/2012

| Date | Week | Lecture | Contents | Topic |
|--------|------|---------|--|---|
| 17-Feb | 1 | 1 | Survey of students' background. Programme, bibliography, software. Data generating process, random sample. Likelihood function. Point and interval estimation. Maximum likelihood estimation (MLE). | Introduction. Revision |
| 24-Feb | 2 | 2 | Regularity conditions. Equivariance of MLE. Properties of estimators: bias, efficiency, Cramér-Rao lower bound. Fisher information. Examples. Properties of estimators: consistency. Sufficient conditions. | Revision |
| 2-Mar | 3 | 3 | Properties of MLE. Exponential family of distributions: introduction. Natural and scale parameters. Mean and variance. Variance function. Examples: Poisson, Normal and Binomial distributions. | Revision. Exponential family. |
| 9-Mar | 4 | 4 | Exponential family of distributions: Gamma distribution. Review of Normal Linear Model. Introduction to Generalized Linear Models. | Exponential family. Linear and GL models |
| 16-Mar | 5 | 5 | Link functions, canonical link function. Examples. Linear predictor, variables, factors, interactions. Examples. Deviance. | Generalised Linear Models. Deviance. |
| 23-Mar | 6 | 6 | Scaled deviance. Model fit and model comparison. Examples. | Deviance |
| 30-Mar | 7 | 7 | Discussion of selected exercises from Exercise Sheet n. 1: Ex. 2, 3 (iv), 6, 7(i). Note on parametrisation. | Exercise Sheet n. 1 |
| 6-Apr | 8 | ---- | Easter holidays | |
| 13-Apr | 9 | ---- | ---- | ---- |
| 20-Apr | 10 | 8 | Exercise Sheet n. 1: discussion of Ex. 7(ii)-(iv). Pearson and deviance residuals. Test of hypotheses on individual parameters. Test of linear restrictions - nested models. Estimation of dispersion parameter. SPlus example: binomial model, logistic regression for the probability of failure of O-rings (introduction). | Residuals, model adequacy, testing hypotheses, dispersion |
| 27-Apr | 11 | 9 | Introduction to SPlus: reading data, creating new numerical and qualitative variables, displaying a two-way table, creating a matrix, converting a qualitative variable into a factor, factor levels, estimating a glm model. Estimation of a binomial GLM: modeling of proportions; family and link options; weights; default dispersion parameter value; displaying and interpreting estimation results; individual parameter significance tests; tests based on the deviance; obtaining extra output; interpreting graphs. Example 1: logistic regression for the probability of failure of O-rings (Worksheet 7). Example 2: logistic regression for the Missing Persons Data (Worksheet 8). | Introduction to SPlus; SPlus examples: Binomial |
| 4-May | 12 | 10 | Splus example from Worksheet 8 (cont.): Poisson approximation for the modeling of missing persons data. Poisson modelling of rates. Offset. SPlus examples with Poisson: number of accidents and number of medals. (Worksheet 10). Use of ANOVA with test "Chi" for Binomial and Poisson: analysing a model and comparing models. Importance of order of regressors in ANOVA. Test of linear restrictions on parameters. | SPlus examples: Poisson. |
| 11-May | 13 | 11 | SPlus example (cont.): number of accidents (Worksheet 10), estimation of a Poisson quasi-likelihood model. Use of ANOVA with test "F". Introduction to quasi-likelihood estimation. Expression of the likelihood equations for the general and regression models. Choice of mean value and variance functions, and discussion of their suitability. Estimation of the dispersion parameter (cont.). Cloh data example (from Azzalini): quasi-likelihood estimation of a Poisson model with overdispersion. | Quasi-likelihood. |
| 18-May | 14 | 12 | Discussion of selected exercises from Exercise Sheet n. 2. General revision. | Exercise Sheet n. 2 and revision |