STAT811/411 Generalized Linear Models

Unit Information: Semester 2, 2008

Lecturer
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Recommended reading
There is no prescribed text for this unit. The following are useful references:

- Online SAS manual, also available in the SAS software:
  http://support.sas.com/onlinedoc/913/docMainpage.jsp

The first four texts are on 3-day loan.

Some references to texts on Generalized Linear Models using SAS are given on
http://www.statsci.org/glm/books.html

Distance mode
Distance students will be receiving printed course notes via mail. You will be alerted by email when material has been mailed out, so if you do not receive these within a few days then please contact
Lesley Mooney, the Postgraduate Administrator in the Department of Statistics (phone: (02) 9850 8550 e-mail lmooney@efs.mq.edu.au).

Completed assignments may mailed to the lecturer at
Department of Statistics, Macquarie University, NSW 2109, Australia
or e-mailed or faxed.
On-campus mode
Lectures will be held on Monday evenings. From 6pm to approximately 7.30pm the lecture will be in E5A 131. After that there is a computing session, held in E4B 306, till 9pm.

Software
We will be using the software SAS version 9. Should you need your own version of SAS, you can obtain a fully working version (with one year’s licence). Please see separate handout concerning this.

Blackboard
We will be using Blackboard for posting of course notes, assignments, solutions and data sets, and online discussions. You are encouraged to use the bulletin board for discussions on the course material. Remember that if you are confused about something, the chances are that other students are also confused. Everybody benefits from the discussions, and you should not be embarrassed to admit that you do not understand a concept.

iLecture: digital (audio) recordings of lectures
Audio recordings of the lectures will be available on the Blackboard site, the day after the lecture is delivered.

Web sites
The public web site for the course is at http://www.stat.mq.edu.au/units/stat811/. A very helpful web site is http://www.statsci.org/glm/.

Timetable

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<th>Week</th>
<th>Lecture</th>
<th>Assessment</th>
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<td>4 August</td>
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<td>2</td>
<td>11 August</td>
<td>Assignment 1 handed out</td>
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<td>3</td>
<td>18 August</td>
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<td>4</td>
<td>25 August</td>
<td>Assignment 1 handed in</td>
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<td>5</td>
<td>1 September</td>
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<td>6</td>
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<td>7</td>
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<td>8</td>
<td>6 October</td>
<td>NO CLASS (public holiday)</td>
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<td>9</td>
<td>13 October</td>
<td>Assignment 2 handed in</td>
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<tr>
<td>10</td>
<td>20 October</td>
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<td>12</td>
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<td>Week</td>
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<tr>
<td>1</td>
<td>The classical normal linear model</td>
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| 2    | Introduction to GLMs  
The framework of generalized linear models is introduced, and the theory behind  
maximum likelihood estimation of the parameters started. |
| 3    | Maximum likelihood estimation of the parameters; Poisson regression for count data |
| 4    | Inference; comparison of models  
The deviance as a measure of fit; hypothesis testing |
| 5    | Model checking  
Definition of residuals in GLMs; checking for violation of model assumptions |
| 6    | Model selection; overdispersion  
Selection of models via AIC; the phenomenon of overdispersion; compound Poisson  
models to overcome it; the negative binomial model for counts |
| 7    | Overdispersion contd; binary responses  
Quasi-likelihood as an alternative method to overcome overdispersion; logistic regression  
for binary responses |
| 8    | No lecture (public holiday) |
| 9    | Logistic regression contd |
| 10   | Ordinal and categorical responses  
Models in which the response is ordinal (e.g. none/mild/moderate/severe) or categorical  
(e.g. walk/bus/train/car) |
| 11   | Correlated data  
Models for longitudinal data, and other data structures in which there is clustering or  
correlation between observations |
| 12   | Correlated data contd |
| 13   | Generalized additive models; more correlated data  
Models in which no parametric form of the systematic part of the model is specified; more  
on correlated data |
**Examination**
There will be a two-hour sit-down examination, and a take-home examination which you have four days to complete. You will be permitted to bring an A4 sheet of notes, handwritten or typed, on both sides, into the sit-down examination.

Please note that students who have not performed satisfactorily in the assignments, will not be permitted to write either the sit-down or the take-home examination. Any student who is to be excluded from the examinations, will be notified in writing of this after the due date of the last assignment.

**Assessment** will be as follows:

Three assignments 45%

Examination:
- Sit-down component 25%
- Take-home component (4 days) 30%

*In order to pass the unit, students need to perform satisfactorily on all components of assessment (assignments and examinations).*

**Plagiarism**
Please read the University’s plagiarism policy carefully at [http://www.student.mq.edu.au/plagiarism/](http://www.student.mq.edu.au/plagiarism/).