STAT7123

Statistical Graphics

Session 2, Special circumstance 2020

Department of Mathematics and Statistics

Contents

Notice

As part of Phase 3 of our return to campus plan, most units will now run tutorials, seminars and ot her small group learning activities on campus for the second half-year, while keeping an online ver sion available for those students unable to return or those who choose to continue their studies onli ne.

To check the availability of face-to-face and onlin e activities for your unit, please go to timetable vi ewer. To check detailed information on unit asses sments visit your unit's iLearn space or consult yo ur unit convenor.

General Information

Unit convenor and teaching staff
Tania Prvan
tania.prvan@mq.edu.au

Credit points
10

Prerequisites
Admission to MRes

Corequisites

Co-badged status

Unit description
We present the principles of effective graphical presentation, set them in a historical context and apply them to a variety of statistical data sets. Emphasis is given to use of modern multivariate graphical techniques such as trellis/lattice graphs and mosaic plots to show a variety of displays of data and model fits, and to display model consistency with data. To present graphics, we introduce and use R, as well as other standard packages. Participants choose an area for further investigation related to their interests.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at https://www.mq.edu.au/study/calendar-of-dates

Learning Outcomes

On successful completion of this unit, you will be able to:

ULO1: be familiar with important and contemporary examples of graphics, and be able to use them.

ULO2: be aware of the elements of graphical design, and use them to critically appraise presented graphics in articles and web pages and suggest appropriate ways to improve them.

ULO4: be familiar with a range of modern multivariate graphical techniques and know when it is appropriate to use them.

ULO3: use the computer to generate appropriate graphics using particular packages or languages and be able to develop the ability to do so in others.

ULO5: use statistical graphics to investigate and analyse data, check statistical model assumptions and effectively present the results of statistical investigations graphically to a range of audiences.

Assessment Tasks

Name	Weighting	Hurdle	Due
Portfolio	25%	No	Week 7
Assignment 1	25%	No	Week 9
Assignment 2	25%	No	Week 12
Online Final Examination	25%	No	Exam Period

Portfolio

Assessment Type [1]: Portfolio
Indicative Time on Task [2]: 20 hours
Due: **Week 7**
Weighting: **25%**

An individual portfolio of five items relating to statistical graphics, each item using a maximum of two pages, on topics or questions given in the lecture notes.

On successful completion you will be able to:

- be familiar with important and contemporary examples of graphics, and be able to use them.
- be aware of the elements of graphical design, and use them to critically appraise presented graphics in articles and web pages and suggest appropriate ways to improve them.
- be familiar with a range of modern multivariate graphical techniques and know when it is appropriate to use them.

Assignment 1

Assessment Type [1]: Qualitative analysis task
Indicative Time on Task [2]: 20 hours
Due: **Week 9**
Weighting: **25%**

Five statistical graphics should be collected during the first half of the semester from newspaper articles or journal articles published this year. You must not draw your own graphics or get someone else to do so for you. Credit will be given for interesting, carefully chosen graphics which show evidence of searching widely. The five statistical graphics must be included in your submission along with the source of each graphic (title of the article, authors, source, page numbers or url etc.) and each graphic must be discussed.

This discussion must include strengths and weaknesses of each graphic. It may include the reason why you chose the graphic.

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Assignment 2

Assessment Type [1]: Quantitative analysis task
Indicative Time on Task [2]: 20 hours
Due: **Week 12**
Weighting: **25%**

A data set with some documentation will be given. This data set must be analysed and a concise, well-organised report on your analysis must be prepared. The analysis must be appropriate and be substantially graphical. Appropriate statistical graphics explored or mentioned in the lectures should be used. The statistical package R must be used.

On successful completion you will be able to:

- be familiar with important and contemporary examples of graphics, and be able to use them.
- be aware of the elements of graphical design, and use them to critically appraise presented graphics in articles and web pages and suggest appropriate ways to improve them.

- be familiar with a range of modern multivariate graphical techniques and know when it is appropriate to use them.
- use the computer to generate appropriate graphics using particular packages or languages and be able to develop the ability to do so in others.
- use statistical graphics to investigate and analyse data, check statistical model assumptions and effectively present the results of statistical investigations graphically to a range of audiences.

Online Final Examination

Assessment Type [1]: Examination
Indicative Time on Task [2]: 3 hours
Due: **Exam Period**
Weighting: **25%**

The final examination is nominally two hours longs with 10 minutes reading time. It will be done online. There will be extra time to upload handwritten solutions to iLearn.

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- be familiar with a range of modern multivariate graphical techniques and know when it is appropriate to use them.
- use statistical graphics to investigate and analyse data, check statistical model assumptions and effectively present the results of statistical investigations graphically to a range of audiences.

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[1] If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the Writing Centre for academic skills support.

[2] Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

Delivery and Resources

There are 2 hours of lectures and 1 practical each week in this unit. Lectures commence in Week 1 and practicals commence in Week 2. Lecture material will be put up on iLearn. There is no specified textbook for this unit and a variety of readings will be available.

The following books are good general references that may be used during the semester.

- Chen, C., Hardle, W. and Unwin, E. (eds.) (2008) Handbook of Data Visualization. Springer-Verlag, Berlin.
- Cleveland, W. (1993) Visualizing Data. Hobart Press, New Jersey.
- Rahlf, T. (2017) Data Visualisation with R. Springer International Publishing AG.
- Tufte, E. (2001) The Visual Display of Quantitative Information (Second Edition). Graphics Press: Cheshire, Conn.
- Tufte, E. (1990) Envisioning Information. Graphics Press: Cheshire, Conn.
- Tufte, E. (1997) Visual Explanations: Images, and quantities, evidence and narrative (third edition). Graphics Press: Cheshire, Conn.
- Wickham, H. and Grolemund, G. (2017) R for Data Science Import, Tidy, Transform, Visualize, and Model Data. O'Reilly Media, Inc, USA.

There will be weekly readings.

Technologies used and required

Lecture material will be placed on iLearn. R (https://www.r-project.org/) and Mondrian (http://www.theusrus.de/Mondrian/) will be used in some of the lectures. Students will need to use R and Mondrian. All assessments except for the final examination must be word processed and converted to pdf files for online submission in iLearn. A Word document can be saved as pdf.

Unit Schedule

Below is an outline of topics to be covered.

Week	Topic
1	Introduction to statistical graphics
2	Principles of statistical graphics
3	Getting familiar with R
4	More R
5	Mosaic Plots
6	Parallel Coordinate Plots
7	More R

8	Linear Models I
9	Linear Models II
10	Time and time-oriented data
11	Visual Data Mining
12	High dimensional graphics
13	Review

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- Academic Appeals Policy
- Academic Integrity Policy
- Academic Progression Policy
- Assessment Policy
- Fitness to Practice Procedure
- Grade Appeal Policy
- Complaint Management Procedure for Students and Members of the Public
- Special Consideration Policy *(**Note:** The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.)*

Students seeking more policy resources can visit the Student Policy Gateway (https://students.mq.edu.au/support/study/student-policy-gateway). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit Policy Central (https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central).

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/study/getting-started/student-conduct

Results

Results published on platform other than eStudent, (eg. iLearn, Coursera etc.) or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be

made available in eStudent. For more information visit ask.mq.edu.au or if you are a Global MBA student contact globalmba.support@mq.edu.au

Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to help you improve your marks and take control of your study.

- Getting help with your assignment
- Workshops
- StudyWise
- Academic Integrity Module

The Library provides online and face to face support to help you find and use relevant information resources.

- Subject and Research Guides
- Ask a Librarian

Student Services and Support

Students with a disability are encouraged to contact the Disability Service who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

If you are a Global MBA student contact globalmba.support@mq.edu.au

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the Acceptable Use of IT Resources Policy. The policy applies to all who connect to the MQ network including students.