STAT328

Market Research and Forecasting

S2 Day 2015

Dept of Statistics

Contents

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General Information

Unit convenor and teaching staff
Unit Convenor and Lecturer
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AHH 2-371

Credit points
3

Prerequisites
6cp at 200 level including (STAT270(P) or STAT271(P) or BIOL235(P) or PSY222(P) or PSY248(P))

Corequisites

Co-badged status

Unit description
Advanced quantitative methods including conjoint analysis, principal component analysis and other statistical techniques that have important applications in market research form the first part of this unit. Emphasis is placed on market research applications. The unit then covers methods for modelling and forecasting trends based on time series data, including procedures for seasonal adjustment.

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:

Know when it is appropriate to carry out a principal component analysis (PCA), whether to use a correlation matrix or covariance matrix for the PCA, be able to perform a PCA using a computer package, be able to interpret the output from a PCA and determine how many principal components to use.

Know when it is appropriate to carry out a Factor Analysis (FA), be able to perform the appropriate FA using a statistics package, know how to interpret the factors, determine how many factors to retain, and be aware of the difference between a FA and PCA.

Know how to conduct a Conjoint Analysis (CA) and how to generate an orthogonal plan.

Know what a time series model is and be familiar with the two major types of forecasting models. Be able to fit AR, MA and ARIMA models using a statistics package and be able to interpret the output. Be able to to decide which is the appropriate model to fit to the time series data.

Know how to combine a regression and an ARIMA in the same model. Be able to fit such a model using a statistical package and be able to interpret the output.

Know why you would want to smooth the data first. Be able to use a statistical package to smooth the data and then fitting an ARIMA to the smoothed data.

Assessment Tasks

Name	Weighting	Due
Assignment 1	5%	21/08/15
Assignment 2	5%	9/10/15
Assignment 3	5%	30/10/15
Test 1	10%	31/08/15
Test 2	10%	26/10/15
HW & Tutorial Participation	5%	Weekly
Final Examination	60%	TBA

Assignment 1

Due: **21/08/15**
Weighting: **5%**

Online submission through iLearn by 2 pm on the due date. Must be submitted as a pdf. This can be done in Word or using freeware like Cute PDF Writer. There is no "group work" assessment in this unit. All work is to be the student's own.

On successful completion you will be able to:

- Know when it is appropriate to carry out a principal component analysis (PCA), whether to use a correlation matrix or covariance matrix for the PCA, be able to perform a PCA using a computer package, be able to interpret the output from a PCA and determine how many principal components to use.

- Know when it is appropriate to carry out a Factor Analysis (FA), be able to perform the

appropriate FA using a statistics package, know how to interpret the factors, determine how many factors to retain, and be aware of the difference between a FA and PCA.

Assignment 2

Due: **9/10/15**
Weighting: **5%**

Online submission through iLearn by 2 pm on the due date. Must be submitted as a pdf. This can be done in Word or using freeware like Cute PDF Writer. There is no "group work" assessment in this unit. All work is to be the student's own.

On successful completion you will be able to:

- Know how to conduct a Conjoint Analysis (CA) and how to generate an orthogonal plan.
- Know what a time series model is and be familiar with the two major types of forecasting models. Be able to fit AR, MA and ARIMA models using a statistics package and be able to interpret the output. Be able to to decide which is the appropriate model to fit to the time series data.

Assignment 3

Due: **30/10/15**
Weighting: **5%**

Online submission through iLearn by 2 pm on the due date. Must be submitted as a pdf. This can be done in Word or using freeware like Cute PDF Writer. There is no "group work" assessment in this unit. All work is to be the student's own.

On successful completion you will be able to:

- Know how to combine a regression and an ARIMA in the same model. Be able to fit such a model using a statistical package and be able to interpret the output.
- Know why you would want to smooth the data first. Be able to use a statistical package to smooth the data and then fitting an ARIMA to the smoothed data.

Test 1

Due: **31/08/15**
Weighting: **10%**

This will be held in the second hour of the lecture in Week 6.

Permitted materials for the class test are a calculator, lecture notes, assignments, assignment solutions, homework solutions and tutorial solutions. There is no computer access during the class test. No electronic devices are allowed (e.g. iPhones, iPads, tablets, laptops, mobile phones). Failure to attend the test without relevant documentation to explain the absence will

result in zero marks being awarded for the test. The test is compulsory and there will be NO supplementary class tests. The procedure for submitting a Special Disruption to Studies online can be obtained by visiting ask.mq.edu.au. Test 1 covers lecture material from Weeks 1 - 5 inclusive and will be of 50 minutes duration.

On successful completion you will be able to:

- Know when it is appropriate to carry out a principal component analysis (PCA), whether to use a correlation matrix or covariance matrix for the PCA, be able to perform a PCA using a computer package, be able to interpret the output from a PCA and determine how many principal components to use.
- Know when it is appropriate to carry out a Factor Analysis (FA), be able to perform the appropriate FA using a statistics package, know how to interpret the factors, determine how many factors to retain, and be aware of the difference between a FA and PCA.
- Know how to conduct a Conjoint Analysis (CA) and how to generate an orthogonal plan.

Test 2

Due: **26/10/15**
Weighting: **10%**

This will be held in the second hour of the lecture in Week 12. Permitted materials for the class test are a calculator, lecture notes, assignments, assignment solutions, homework solutions and tutorial solutions. There is no computer access during the class test. No electronic devices are allowed (e.g. iPhones, iPads, tablets, laptops, mobile phones). Failure to attend the test without relevant documentation to explain the absence will result in zero marks being awarded for the test. The test is compulsory and there will be NO supplementary class tests. The procedure for submitting a Disruption to Studies online can be obtained by visiting ask.mq.edu.au. Test 2 covers lecture material from Weeks 7 - 11 inclusive and will be of 50 minutes duration.

On successful completion you will be able to:

- Know what a time series model is and be familiar with the two major types of forecasting models. Be able to fit AR, MA and ARIMA models using a statistics package and be able to interpret the output. Be able to to decide which is the appropriate model to fit to the time series data.
- Know how to combine a regression and an ARIMA in the same model. Be able to fit such a model using a statistical package and be able to interpret the output.
- Know why you would want to smooth the data first. Be able to use a statistical package to smooth the data and then fitting an ARIMA to the smoothed data.

HW & Tutorial Participation

Due: **Weekly**

Weighting: **5%**

Every week tutorial participation will be monitored and most weeks there will be set homework to submit to the lecturer at the start of the following lecture.

On successful completion you will be able to:

- Know when it is appropriate to carry out a principal component analysis (PCA), whether to use a correlation matrix or covariance matrix for the PCA, be able to perform a PCA using a computer package, be able to interpret the output from a PCA and determine how many principal components to use.

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Final Examination

Due: **TBA**
Weighting: **60%**

The final Examination will be held during the end-of-year Examination period. The final Examination is 3 hours long (with an additional 10 minutes' reading time).

The final examination will cover all topics in the unit. Students may take into the final Exam ONE A4 page of notes handwritten (not typed) on BOTH sides. Calculators will be needed but must not be of the text/programmable type. You are expected to present yourself for examination at the time and place designated in the University Examination Timetable. The timetable will be available in draft form approximately eight weeks before the commencement of the examinations and in final form approximately four weeks before the commencement of the examinations.

The only exemptions to sitting an Examination at the designated time are because of documented illness or unavoidable disruption. In these circumstances you may wish to consider applying for Disruption to Studies (formerly known as Special Consideration). Information about unavoidable disruption and the disruption to studies process is available at http://students.mq.edu.au/student_admin/exams/disruption_to_studies/ Students need to apply

for Disruption to Studies online at https://ask.mq.edu.au If a Disruption to Studies is granted as a result of the Disruption to Studies process the Examination will be scheduled after the conclusion of the official examination period.

On successful completion you will be able to:

- Know when it is appropriate to carry out a principal component analysis (PCA), whether to use a correlation matrix or covariance matrix for the PCA, be able to perform a PCA using a computer package, be able to interpret the output from a PCA and determine how many principal components to use.

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Delivery and Resources

There is one two hour lecture and one two hour practical each week in this unit. Lectures and practicals commence in Week 1.

Technologies used and required

Lecture material will be placed on iLearn. The statistical package SPSS will be used in some of the lectures.

Recommended Texts

There is no set textbook for this unit. Useful reference texts for the Market Research part of the unit are • Applied Multivariate Techniques by Subhash Sharma (QA278.S485/1996) • Applied Multivate Methods for Data Analysis by Dallas E. Johnson (QA278.J615/1998) • Multivariate Statistical Methods by Bryan F. J. Manly (QA278.M35/2004) There is no suitable reference text for Conjoint Analysis. Most treatments in Market Research textbooks are either too simple or too technical. A useful reference for the Forecasting part of the unit is • Forecasting: Methods and Applications by Spyros Makridakis, Steven C. Wheelwright and Rob J. Hyndman (HD30.27.M34/ 1998)

Unit Schedule

Week	Topic
1 (27 July)	Principal Component Analysis (PCA)
2 (3 August)	PCA
3 (10 August)	PCA and Factor Analysis (FA)
4 (17 August)	FA
5 (24 August)	Conjoint Analysis (CA)
6 (31 August)	Revision and Test 1
7 (7 September)	Introduction to Time Series
8 (28 September)	ARIMA models
9 (5 October)	Public Holiday - No lecture
10 (12 October)	ARIMA models
11 (19 October)	Dynamic regression models and intervention analysis
12 (26 October)	Exponential Smoothing and Class Test 2
13 (2 November)	Periodicity

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central. Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html

Assessment Policy http://mq.edu.au/policy/docs/assessment/policy.html

Grading Policy http://mq.edu.au/policy/docs/grading/policy.html

Grade Appeal Policy http://mq.edu.au/policy/docs/gradeappeal/policy.html

Grievance Management Policy http://mq.edu.au/policy/docs/grievance_management/policy.html

Disruption to Studies Policy http://www.mq.edu.au/policy/docs/disruption_studies/policy.html *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

In addition, a number of other policies can be found in the Learning and Teaching Category of 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/support/student_conduct/

Results

Results shown in *iLearn*, 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.

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 improve your marks and take control of your study.

- Workshops
- StudyWise
- Academic Integrity Module for Students
- Ask a Learning Adviser

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

IT Help

For help with University computer systems and technology, visit http://informatics.mq.edu.au/help/.

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

Graduate Capabilities

Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

Learning outcomes

- Know when it is appropriate to carry out a principal component analysis (PCA), whether to use a correlation matrix or covariance matrix for the PCA, be able to perform a PCA using a computer package, be able to interpret the output from a PCA and determine how many principal components to use.
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- Know how to combine a regression and an ARIMA in the same model. Be able to fit such a model using a statistical package and be able to interpret the output.
- Know why you would want to smooth the data first. Be able to use a statistical package to smooth the data and then fitting an ARIMA to the smoothed data.

Assessment tasks

- Assignment 1
- Assignment 2
- Assignment 3
- Test 1
- Test 2
- HW & Tutorial Participation
- Final Examination

Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

Learning outcomes

- Know when it is appropriate to carry out a principal component analysis (PCA), whether

to use a correlation matrix or covariance matrix for the PCA, be able to perform a PCA using a computer package, be able to interpret the output from a PCA and determine how many principal components to use.

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- Assignment 2
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- Test 1
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- Final Examination

Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

Learning outcomes

- Know when it is appropriate to carry out a principal component analysis (PCA), whether to use a correlation matrix or covariance matrix for the PCA, be able to perform a PCA

using a computer package, be able to interpret the output from a PCA and determine how many principal components to use.

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- Assignment 1
- Assignment 2
- Assignment 3
- Test 1
- Test 2
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- Final Examination

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

Learning outcomes

- Know when it is appropriate to carry out a principal component analysis (PCA), whether to use a correlation matrix or covariance matrix for the PCA, be able to perform a PCA using a computer package, be able to interpret the output from a PCA and determine how many principal components to use.

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- Assignment 2
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- Final Examination

Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

Learning outcomes

- Know when it is appropriate to carry out a principal component analysis (PCA), whether to use a correlation matrix or covariance matrix for the PCA, be able to perform a PCA using a computer package, be able to interpret the output from a PCA and determine how many principal components to use.
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- Test 2
- HW & Tutorial Participation
- Final Examination

Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

Learning outcomes

- Know when it is appropriate to carry out a principal component analysis (PCA), whether to use a correlation matrix or covariance matrix for the PCA, be able to perform a PCA using a computer package, be able to interpret the output from a PCA and determine how many principal components to use.
- Know when it is appropriate to carry out a Factor Analysis (FA), be able to perform the appropriate FA using a statistics package, know how to interpret the factors, determine how many factors to retain, and be aware of the difference between a FA and PCA.
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