BUSA7001

Applied Predictive Analytics

Session 1, In person-scheduled-weekday, North Ryde 2022

Department of Actuarial Studies and Business Analytics

Contents

Disclaimer

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General Information

Unit convenor and teaching staff
George Milunovich
george.milunovich@mq.edu.au

Credit points
10

Prerequisites
BUSA7000

Corequisites

Co-badged status

Unit description
This unit introduces modern machine learning methodology which is used in solving many business problems in the modern world. Topics will be chosen from a wide set of possible areas including data analytics principles such as training and test data and the bias-variance tradeoff, modern approaches to regression including shrinkage techniques, tree based models and neural networks, methods for classification and the predictive analytics workflow. Emphasis throughout the unit will be on business applications drawn from a variety of fields.

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: Assess data requirements needed to generate good predictions.

ULO2: Apply a number of predictive analytics techniques to a range of business problems.

ULO4: Analyse business problems using data science methods.

ULO3: Devise computer code required to implement predictive analytics.

ULO5: Perform data cleaning for a complex dataset.

General Assessment Information

Late submissions of assessments

Unless a Special Consideration request has been submitted and approved, no extensions will be granted. There will be a deduction of 10% of the total available assessment-task marks made from the total awarded mark for each 24-hour period or part thereof that the submission is late. Late submissions will only be accepted up to 96 hours after the due date and time.

No late submissions will be accepted for timed assessments – e.g., quizzes, online tests.

Table 1: Penalty calculation based on submission time

Submission time after the due date (including weekends)	Penalty (% of available assessment task mark)	Example: for a non-timed assessment task marked out of 30
< 24 hours	10%	10% x 30 marks = 3-mark deduction
24-48 hours	20%	20% x 30 marks = 6-mark deduction
48-72 hours	30%	30% x 30 marks = 9-mark deduction
72-96 hours	40%	40% x 30 marks = 12-mark deduction
> 96 hours	100%	Assignment won't be accepted

Special Consideration

To request an extension on the due date/time for a timed or non-timed assessment task, you must submit a Special Consideration application. An application for Special Consideration does not guarantee approval.

The approved extension date for a student becomes the new due date for that student. The late submission penalties above then apply as of the new due date.

Assessment Tasks

Name	Weighting	Hurdle	Due
Programming tasks	30%	No	Week 3, 5 and 9
Class Test	30%	No	Week 6
Individual Assignment	40%	No	Week 13

Programming tasks

Assessment Type [1]: Practice-based task
Indicative Time on Task [2]: 20 hours

Due: **Week 3, 5 and 9**
Weighting: **30%**

A sequence of tutorial assessments implementing computer code and performing related analytics tasks.

On successful completion you will be able to:
- Assess data requirements needed to generate good predictions.
- Apply a number of predictive analytics techniques to a range of business problems.
- Devise computer code required to implement predictive analytics.

Class Test

Assessment Type [1]: Quiz/Test
Indicative Time on Task [2]: 20 hours
Due: **Week 6**
Weighting: **30%**

A test of approximately 60 minutes duration to be held in the session.

On successful completion you will be able to:
- Assess data requirements needed to generate good predictions.
- Apply a number of predictive analytics techniques to a range of business problems.
- Devise computer code required to implement predictive analytics.

Individual Assignment

Assessment Type [1]: Modelling task
Indicative Time on Task [2]: 30 hours
Due: **Week 13**
Weighting: **40%**

The assignment is a hands-on project. Students will be required to understand and clean a complex real-world dataset, develop a predictive model for it and implement their work in Python script.

On successful completion you will be able to:

- Assess data requirements needed to generate good predictions.
- Apply a number of predictive analytics techniques to a range of business problems.
- Analyse business problems using data science methods.
- Devise computer code required to implement predictive analytics.
- Perform data cleaning for a complex dataset.

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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
Teaching

- 3 hours of teaching per week
- If you are enrolled into the "Online-flexible" attendance mode, you are not required to register into any classes as there is no real-time live online class. A lecture recording will be made available to students after the on-campus class is held.

Prescribed Textbook

- The textbook for this unit is **Python Machine Learning** *(Third Edition)* by Sebastian Raschka and Vahid Mirjalili. Kindle and paperback versions are available from https://www.amazon.com.au/Python-Machine-Learning-Sebastian-Raschka/dp/1789955750/ . This book covers most but not all of the topics in the unit. The lecture and tutorial/computer lab notes will cover the additional material that you need to know.
- Further readings may be assigned for the various topics each week. This will either be journal articles, or other materials available on iLearn, web or available electronically via the Macquarie University Library.

Technology Used and Required

- ***You will need a reasonably good laptop that you will need to bring to class (if attending in-person lectures)***
- Free Python 3.x and JupyterLab (both available in the free Anaconda Python distribution) will be used extensively throughout the unit, and will be assessed in the

class test, assignments and final exam.

- You will need access to the internet to obtain course information, view recorded lectures and download teaching materials from the unit website.
- It is your responsibility to check the unit website regularly to make sure that you are up-to-date with the information for the unit.

Required Unit Materials and/or Recommended Readings

- Recorded video lecture and computer labs will be posted on iLearn before the lectures.
- Lecture Notes are the required materials and will be posted on the website before the lectures.
- Relevant references will be provided in Lecture Notes as recommended materials. Some of them will be posted on the website.

Unit Schedule

Week	Topic	Textbook Chapter	Assessment
1	Introduction	Ch. 1	
2	Classification Algorithms - Part 1	Ch. 2	
3	Classification Algorithms - Part 2	Ch. 3	Programming Task 1
4	Classification Algorithms - Part 3	Ch. 3	
5	Data Preprocessing	Ch. 4	Programming Task 2
6	---- Class Test ----		Class Test
7	Dimensionality Reduction	Ch. 5	
	Recess (2 weeks)		
8	Model Evaluation and Hyperparameter Tuning	Ch. 6	
9	Combining Different Models for Ensemble Learning	Ch. 7	Programming Task 3
10	Regression Analysis	Ch. 10	
11	Clustering Analysis	Ch. 11	
12	Applying Machine Learning to Sentiment Analysis	Ch. 8	
13	Embedding a Machine Learning Model into a Web Application	Ch. 9	Individual assignment

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central (https://policies.mq.edu.au). 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
- Assessment Procedure
- Complaints Resolution Procedure for Students and Members of the Public
- Special Consideration Policy

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

To find other policies relating to Teaching and Learning, visit Policy Central (https://policies.mq.edu.au) and use the search tool.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/admin/other-resources/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

Academic Integrity

At Macquarie, we believe academic integrity – honesty, respect, trust, responsibility, fairness and courage – is at the core of learning, teaching and research. We recognise that meeting the expectations required to complete your assessments can be challenging. So, we offer you a range of resources and services to help you reach your potential, including free online writing and maths support, academic skills development and wellbeing consultations.

Student Support

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

The Writing Centre

The Writing Centre provides resources to develop your English language proficiency, academic writing, and communication skills.

- Workshops
- Chat with a WriteWISE peer writing leader

- Access StudyWISE
- Upload an assignment to Studiosity
- Complete the 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

Macquarie University offers a range of Student Support Services including:

- IT Support
- Accessibility and disability support with study
- Mental health support
- Safety support to respond to bullying, harassment, sexual harassment and sexual assault
- Social support including information about finances, tenancy and legal issues

Student Enquiries

Got a question? Ask us via AskMQ, or contact Service Connect.

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.