Remote Teaching
'Flipped Classroom' Mode,
Data Analytics
Summer 2020

OXFORD BROOKES UNIVERSITY

Faculty of Technology, Design and Environment

School of Engineering, Computing and Mathematics

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DALT7004: Statistical Programming

The aim of the module is to introduce core programming techniques in R essential for performing data manipulation, data processing and data analyses of traditional and alternative data sources through practical sessions.

Learning Outcomes

1. Undertake complex data analysis tasks by performing data entry, data manipulation and statistical procedures in R with application to survey data, administrative data, census data and big data.
2. Identify and select appropriate built-in functions and implement technical and analytical processes not readily available in the software by using iterative methods and simulations to solve complex problems.
3. Identify and evaluate the theoretical aspects of statistical programming.

Outline Syllabus

- Introduction, data types and structures
- Importing and exporting data
- Basic statistical methods
- Basic graphics
- Advanced graphics
- Further statistical methods
- Basic programming
- Further programming
- Packages

Daily Timetable (Via Google Meet)

Google Meet	Time	Monday	Tuesday	Wednesday	Thursday	Friday
1	09:00- 09:30	Introduction to AM session (agree the lecture material to be self-studied)				
2	09:30 - 11:00	Self-study				
3	11:00 - 12:00	Lecture support				
4	12:00 - 13:00	Lunch break				
5	13:00 - 13:30	Introduction to PM session (agree the tutorial material to be self-studied)				
6	13:30 - 15:00	Self-study				
7	15:00 - 16:00	Tutorial support				

Assessment Tasks

Statistical programming tasks and writing a report.

Reading List

Author	Title	Publisher	Date
Zuur A, Ieno E, & Meesters E.	A Beginner's Guide To R.	Springer	2009
Dalgaard, P.	Introductory statistics with R	Springer	2008

DALT7011: Introduction to Machine Learning

The module aims to provide the students with the principles of computer learning and its applications. It covers the fundamentals of machine learning methodologies, implementations and analysis methods appropriate for machine learning applications. The module will enable students to analyse a machine learning problem, critically evaluate the different approaches that are available, and create an effective solution.

Learning Outcomes

1. Evaluate and articulate the issues and challenges in machine learning, including model selection, complexity and feature selection.
2. Demonstrate a working knowledge of the variety of mathematical techniques normally adopted for machine learning problems, and of their application to creating effective solutions.
3. Critically evaluate the performance and drawbacks of a proposed solution to a machine learning problem.
4. Create solutions to machine learning problems using appropriate software.

Outline Syllabus

- Foundations of machine learning and relation to Artificial Intelligence (AI)
- Supervised learning
- Unsupervised learning
- Artificial Neural Networks

Daily Timetable (Via Google Meet)

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3	11:00 - 12:00	Lecture support				
4	12:00 - 13:00	Lunch break				
5	13:00 - 13:30	Introduction to PM session (agree the tutorial material to be self-studied)				
6	13:30 - 15:00	Self-study				
7	15:00 - 16:00	Tutorial support				

Assessment Tasks

Report on machine learning problem

Reading List

Author	Title	Publisher	Date
Bishop, C. M.	Pattern Recognition and Machine Learning	Springer	2006
Flach, P. A.	Machine Learning: The Art and Science of Algorithms That Make Sense of Data	CUP	2012
Harrington, P.	Machine Learning in Action	Manning	2012
Mitchell, T. M.	Machine Learning	McGraw Hill	1997

DALT7014: DATA MINING

This module will provide an introduction to the key concepts in data mining, information extraction and indexing, pattern recognition techniques and various analytical approaches (e.g. regression modelling, etc). It will also discuss what to apply and when with which data, etc.

Learning Outcomes
1. Apply appropriate data mining techniques and technologies to multi variate, large, sparse data sets and critically analyse the results
2. Optimise data mining pathways to enhance system reliability
3. Integrate Data Mining approaches with relevant associated techniques

Outline Syllabus
- Approaches to Data Mining and Knowledge Discovery
- The Data Mining pathway
- Indexing and retrieval strategies
- Working with appropriate i measure functions
- The Machine Learning/Data Mining/Big Data continuum
- Natural Language Processing

Daily Timetable (Via Google Meet)

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2	09:30 - 11:00	Self-study				
3	11:00 - 12:00	Lecture support				
4	12:00 - 13:00	Lunch break				
5	13:00 - 13:30	Introduction to PM session (agree the tutorial material to be self-studied)				
6	13:30 - 15:00	Self-study				
7	15:00 - 16:00	Tutorial support				

Assessment Tasks
Evaluate a range of knowledge discovery techniques for use on a given data set. Utilising data mining pathway, data mine a range of given, disparate data sets and writing of a report

Reading List

Author	Title	Publisher	Date
Wayne P. Johnson , Glenn J. Myatt	Making Sense of Data I: A Practical Guide to Exploratory Data Analysis and Data Mining, 2nd Edition	Wiley	2014
Bater Makhabel	Learning Data Mining with R	Packt Pub. Ltd,	2015
Ian H. Witten, Eibe Frank, Mark A. Hall, Christopher J.	Data Mining, 4th Edition	Morgan Kaufmann	2016
Online resource	UC Irvine (nd) UC Irvine Machine Learning Repository - http://archive.ics.uci.edu/ml/		

DALT7016: Data Visualisation

This module will build on the basic data visualisations introduced in the compulsory modules. It will cover information design, interaction design and user engagement; state of the art tools to build useful visualisations for different types of data sets and application scenarios; mapping.

Learning Outcomes
1. Critically analyse data visualisation approaches with respect to human sensory modalities.
2. Create appropriate visualisations for temporal, dynamic, and high dimensionality data.
3. Devise methodologies for data interaction to facilitate exploratory data analysis.

Outline Syllabus
*   The human perceptual system
*   Representing complex data
*   Representing dynamic and temporal data
*   Exploratory data analysis
*   Visualisation software tools

Daily Timetable (Via Google Meet)

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1	09:00- 09:30	Introduction to AM session (agree the lecture material to be self-studied)				
2	09:30 - 11:00	Self-study				
3	11:00 - 12:00	Lecture support				
4	12:00 - 13:00	Lunch break				
5	13:00 - 13:30	Introduction to PM session (agree the tutorial material to be self-studied)				
6	13:30 - 15:00	Self-study				
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Assessment Tasks
Part 1: Evaluate a range of different data visualisations on a given set of multi variate, dynamic, data Part 2: Develop a report to visualise data in different formats

Reading List

Author	Title	Publisher	Date
Atmajitsinh Gohil	R Data Visualization Cookbook	Packt Publishing	2015
Tamar Muzner	Visualization Analysis and Design	CRC Press	2015
Andy Kirk	Data Visualisation	Sage Publications	2016
Mathew Ward, George Grinstein, Daniel Keim	Interactive Data Visualization, 2nd Edition	CRC Press	2015