MONASH University
Information Technology

FIT3020
Information visualisation

Unit Guide

Semester 1, 2014

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Table of Contents

FIT3020 Information visualisation - Semester 1, 2014

With the increasing amount of data available, it is important to be able to represent large collections from a wide range of domains in forms that more readily convey embedded information. The human sense of vision is a powerful tool for pattern recognition - this sense can be harnessed via multimedia interactive presentations. This unit will examine the fundamental principles of information visualisation and the range of tools and methods which are available to represent large data sets. These techniques can be applied across a wide range of fields including geographical, medical, statistical and scientific visualisation. The unit will examine in detail the visualisation of geospatial data in GIS (Geographic Information Systems).

Mode of Delivery

Caulfield (Day)

Workload Requirements

Minimum total expected workload equals 12 hours per week comprising:

(a.) Contact hours for on-campus students:

- Two hours of lectures
- One 2-hour laboratory

(b.) Additional requirements (all students):

- A minimum of 8 hours independent study per week for completing lab and project work, private study and revision.

Unit Relationships

Prerequisites

Completion of 12 points at level 2 from FIT

Chief Examiner

Dr Matthew Butler

Campus Lecturer

Caulfield

Ruben Hopmans

Consultation hours: See the unit website for consultation details

Tutors

Caulfield

Ruben Hopmans

Consultation hours: See the unit website for consultation details

Your feedback to Us

Monash is committed to excellence in education and regularly seeks feedback from students, employers and staff. One of the key formal ways students have to provide feedback is through the Student Evaluation of Teaching and Units (SETU) survey. The University's student evaluation policy requires that every unit is evaluated each year. Students are strongly encouraged to complete the surveys. The feedback is anonymous and provides the Faculty with evidence of aspects that students are satisfied and areas for improvement.

For more information on Monash's educational strategy, see:

www.monash.edu.au/about/monash-directions/ and on student evaluations, see:
www.policy.monash.edu/policy-bank/academic/education/quality/student-evaluation-policy.html

Previous Student Evaluations of this Unit

Previous feedback highlighted that the nature of the overall content as well as assignments was a strength of the unit. Students in the previous offering suggested tightening the the lab/tutorial classes to be more focused and explicit, rather than broader and exploratory in nature. As a consequence lab/tutorial exercises have been modified to provide more opportunity for explicit and tangible visualisation example outcomes.

If you wish to view how previous students rated this unit, please go to
https://emuapps.monash.edu.au/unitevaluations/index.jsp

Academic Overview

Learning Outcomes

At the completion of this unit students will have -A theoretical and conceptual understanding of:

- the basic concepts of human visual perception and its impact on cognition;
- the functions of visualisation with respect to amplifying cognition;
- the properties of data and the rules for mapping data to images;
- the role of factors such as pattern, space, colour, interactivity and animation in visualisation;
- the range of applications to which visualisation approaches can be applied, particularly with respect to geospatial data.

Developed attitudes that enable them to:

- critically select from the range of available visualisation techniques and apply the one that is best for the domain at hand.

Developed the skills to:

- evaluate a given data set and infer valid conclusions based on a supplied visualisation;
- design and construct an appropriate type of visualisation for a given data set;
- manipulate visual variables such as colour and size to optimise a visualisation;
- identify the principle components of a map and describe map projections commonly used;
- import, display and manipulate data within a Geographic Information System (GIS).

Demonstrated the teamwork skills necessary to:

- work as a member of a project team.

Unit Schedule

Week	Activities	Assessment
0		No formal assessment or activities are undertaken in week 0
1	Information Visualisation Introduction: A History of Information Visualisation & Information Visualisation Primer	
2	Types of Data: Quantitative, Qualitative & Links Between Data Sets	
3	Information Visualisation Techniques 1: Types of Visualisations	
4	Information Visualisation Techniques 2: Aesthetics & Colour	
5	Information Visualisation Techniques 3: Narratives, Micro/Macro Readings & Misleading with Data	
6	Information Visualisation Techniques 4: Designing Static & Dynamic Visualisations	Assignment 1 - Info Vis Analysis Report due Week 6 Tutorial
7	The Current Info Vis Landscape & Reading Visualisations	Assignment 2 - Initial Visualisation Major Project Proposal due Week 7 Tutorial
8	Information Visualisation Contexts 1: Business	
9	Information Visualisation Contexts 2: Education & Social Sciences	
10	Information Visualisation Contexts 3: Scientific	
11	Information Visualisation Contexts 4: Maps & GIS	Assignment 2 - Info Vis Major Project due Week 11 Tutorial
12	Revision & In Class Presentations of Visualisation Projects	Assignment 2 - Presentation of Info Vis Major Project in Week 12 Tutorial
	SWOT VAC	No formal assessment is undertaken SWOT VAC
	Examination period	LINK to Assessment Policy: http://policy.monash.edu.au/policy-bank/academic/education/assessment/assessment-in-coursework-policy.html

*Unit Schedule details will be maintained and communicated to you via your learning system.

Teaching Approach

Lecture and tutorials or problem classes

This teaching and learning approach provides facilitated learning, practical exploration and peer learning. Both lectures and tutorial classes will rely heavily on student participation in the discussion of information visualisation principles and case studies.

Assessment Summary

Examination (2 hours): 40%; In-semester assessment: 60%

Assessment Task	Value	Due Date
Assignment 1 - Information Visualisation Domains and Applications	20%	Report due Week 6 Tutorial
Assignment 2 - Information Visualisation Prototype Application	30% (proposal 5%, application submission 20% and presentation 5%)	Proposal due Week 7 Tutorial, Major Project submission Week 11 Tutorial, and Presentation to class in Week 12 Tutorial
Weekly Contribution to Discussion	10% (overall for the whole semester)	Ongoing. Comments are expected to be made weekly.
Examination 1	40%	To be advised

Assessment Requirements

Assessment Policy

Faculty Policy - Unit Assessment Hurdles
(http://intranet.monash.edu.au/infotech/resources/staff/edgov/policies/assessment-examinations/assessment-hurd

Academic Integrity - Please see resources and tutorials at
http://www.monash.edu/library/skills/resources/tutorials/academic-integrity/

Assessment Tasks

Participation

- **Assessment task 1**

  Title:
  Assignment 1 - Information Visualisation Domains and Applications
  Description:
  In this assignment you are to write a research report of 2500 words, accompanied with referenced images, on an information visualisation application domain area of your choice. Examples will be provided in the formal assignment brief.

  Your report should provide insight into the information needs of the domain, and the data available. The report should then address the way in which the visualisation translates the information into a comprehensible form and how it achieves this using either novel or more established visualisation techniques.

  A full brief, including examples, will be provided on the unit website, as will detailed assessment criteria.
  Weighting:
  20%
  Criteria for assessment:
  Students will be assessed on a number of criteria:

  - Quality of research
  - Analysis and synthesis of material
  - Consistency in format and presentation
  - Writing style
  - Bibliography and referencing

  Further detail on the assessment criteria is available on the assignment specification.
  Due date:
  Report due Week 6 Tutorial

- **Assessment task 2**

  Title:
  Assignment 2 - Information Visualisation Prototype Application
  Description:
  In this assignment, you are to build an information visualisation prototype application that allows basic visual manipulation of a data set.

A series of key objectives will be presented in the assignment brief, however the core data set and domain that is the focus of the developed information visualisation is negotiated between lecturer and student. The visualisation will be expected to meet key criteria such as interactivity, insight into data difficult to obtain without the use of info vis techniques, domain specific purpose, and innovation.

Students will be required to present their working prototype to the class in week 12 in a short presentation of 5-10 minutes.

A full brief, including examples, will be provided on the unit website, as will detailed assessment criteria.

Weighting:

30% (proposal 5%, application submission 20% and presentation 5%)

Criteria for assessment:

Students will be assessed on a number of criteria:

- The prototype application being well suited to the chosen domain
- Clear purpose for the visualisation
- Good application of design principles discussed throughout the semester
- Good and accurate use of domain data
- Demonstration of sound HCI principles in the interaction design
- Innovative approach to the visualisation

Due date:

Proposal due Week 7 Tutorial, Major Project submission Week 11 Tutorial, and Presentation to class in Week 12 Tutorial

- **Assessment task 3**

Title:

Weekly Contribution to Discussion

Description:

All students will be expected to contribute to online discussion of information visualisation examples. Each week an example information visualisation will be presented along with a number of key discussion questions. Students will be expected to provide small insights each week to demonstrate their understanding of the relevant information visualisation techniques. Comments will be considered on criteria such as quality of insight, relating back to discussed info vis theories, and critiques of success.

A full description will be provided on the unit website, as will detailed assessment criteria.

Weighting:

10% (overall for the whole semester)

Criteria for assessment:

Students will be assessed on a number of criteria:

- Application of Information Visualisation principles
- Quality of the critical analysis conducted
- Responding to other students comments in a constructive manner
- Frequency of contributions

Full details will be posted on the unit website.

Due date:

Ongoing. Comments are expected to be made weekly.

Examinations

- **Examination 1**

Weighting:
40%
Length:
2 hours
Type (open/closed book):
Closed book
Electronic devices allowed in the exam:
None

Learning resources

Reading list

There are no mandatory text books for this unit, however the following texts provide a valuable resource to your study:

Key recommended texts:

Tufte, E. R. (1990). Envisioning information, Cheshire, Connecticut, Graphics Press

Supplementary recommended texts:

Chen, C. (2004). Information visualization: Beyond the horizon (2nd Edition). London: Springer-Verlag. ***Electronic Resource**

Dykes, J., Dykes, MacEachren, A.M. and Kraak M. J. (2005), Exploring Geovisualization, Elsevier ***Electronic Resource**

Suda, B. (2010), A Practical Guide to Designing with Data, Five Simple Steps

Tufte, E. R. (1997) Visual explanations : images and quantities, evidence and narrative, Cheshire, Connecticut, Graphics Press

Tufte, E. R. (2001). The Visual Display of Quantitative Information, Cheshire, Connecticut, Graphics Press

Tufte, E. R. (2006) Beautiful Evidence, Cheshire, Connecticut, Graphics Press

Ware, C. (2004). Information visualization: Perception for design (2nd Edition). San Francisco: Morgan Kaufmann ***Electronic Resource**

Monash Library Unit Reading List (if applicable to the unit)
http://readinglists.lib.monash.edu/index.html

Faculty of Information Technology Style Guide

Feedback to you

Examination/other end-of-semester assessment feedback may take the form of feedback classes, provision of sample answers or other group feedback after official results have been published. Please check with your lecturer on the feedback provided and take advantage of this prior to requesting individual consultations with staff. If your unit has an examination, you may request to view your examination script booklet, see http://intranet.monash.edu.au/infotech/resources/students/procedures/request-to-view-exam-scripts.html

Types of feedback you can expect to receive in this unit are:

- Informal feedback on progress in labs/tutes
- Graded assignments with comments
- Solutions to tutes, labs and assignments

Extensions and penalties

Submission must be made by the due date otherwise penalties will be enforced.

You must negotiate any extensions formally with your campus unit leader via the in-semester special consideration process: http://www.monash.edu.au/exams/special-consideration.html

Returning assignments

Students can expect assignments to be returned within two weeks of the submission date or after receipt, whichever is later.

Assignment submission

It is a University requirement (http://www.policy.monash.edu/policy-bank/academic/education/conduct/student-academic-integrity-managing-pla for students to submit an assignment coversheet for each assessment item. Faculty Assignment coversheets can be found at http://www.infotech.monash.edu.au/resources/student/forms/. Please check with your Lecturer on the submission method for your assignment coversheet (e.g. attach a file to the online assignment submission, hand-in a hard copy, or use an online quiz). Please note that it is your responsibility to retain copies of your assessments.

Online submission

If Electronic Submission has been approved for your unit, please submit your work via the learning system for this unit, which you can access via links in the my.monash portal.

Recommended Resources

While the unit does not focus on particular technologies, several technologies will be discussed and used for the creation of visualisations. Two key software resources are Google Sketchup (http://sketchup.google.com/intl/en/) and Google Earth (http://www.google.com/earth/index.html).

Other Information

Policies

Monash has educational policies, procedures and guidelines, which are designed to ensure that staff and students are aware of the University's academic standards, and to provide advice on how they might uphold them. You can find Monash's Education Policies at: www.policy.monash.edu.au/policy-bank/academic/education/index.html

Key educational policies include:

- Student Academic Integrity Policy and Student Academic Integrity: Managing Plagiarism and Collusion Procedures ; http://www.policy.monash.edu/policy-bank/academic/education/conduct/student-academic-integrity-policy.h
- Assessment in Coursework Programs; http://www.policy.monash.edu/policy-bank/academic/education/assessment/assessment-in-coursework-po
- Special Consideration; http://www.policy.monash.edu/policy-bank/academic/education/assessment/special-consideration-policy.ht
- Grading Scale; http://www.policy.monash.edu/policy-bank/academic/education/assessment/grading-scale-policy.html
- Discipline: Student Policy; http://www.policy.monash.edu/policy-bank/academic/education/conduct/student-discipline-policy.html
- Academic Calendar and Semesters; http://www.monash.edu.au/students/dates/
- Orientation and Transition; http://intranet.monash.edu.au/infotech/resources/students/orientation/
- Academic and Administrative Complaints and Grievances Policy; http://www.policy.monash.edu/policy-bank/academic/education/management/complaints-grievance-policy.h

Faculty resources and policies

Important student resources including Faculty policies are located at http://intranet.monash.edu.au/infotech/resources/students/

Graduate Attributes Policy

http://www.policy.monash.edu/policy-bank/academic/education/management/monash-graduate-attributes-policy.ht

Student Charter

www.opq.monash.edu.au/ep/student-charter/monash-university-student-charter.html

Student services

The University provides many different kinds of support services for you. Contact your tutor if you need advice and see the range of services available at http://www.monash.edu.au/students. For Malaysia see http://www.monash.edu.my/Student-services, and for South Africa see http://www.monash.ac.za/current/.

Monash University Library

The Monash University Library provides a range of services, resources and programs that enable you to save time and be more effective in your learning and research. Go to www.lib.monash.edu.au or the library tab in my.monash portal for more information. At Malaysia, visit the Library and Learning Commons at http://www.lib.monash.edu.my/. At South Africa visit http://www.lib.monash.ac.za/.

Disability Liaison Unit

Students who have a disability or medical condition are welcome to contact the Disability Liaison Unit to discuss academic support services. Disability Liaison Officers (DLOs) visit all Victorian campuses on a regular basis.

- Website: http://www.monash.edu/equity-diversity/disability/index.html
- Telephone: 03 9905 5704 to book an appointment with a DLO; or contact the Student Advisor, Student Commuity Services at 03 55146018 at Malaysia
- Email: dlu@monash.edu
- Drop In: Equity and Diversity Centre, Level 1, Building 55, Clayton Campus, or Student Community Services Department, Level 2, Building 2, Monash University, Malaysia Campus