MONASH University
Information Technology

**FIT3020
Information visualisation**

Unit Guide

Semester 2, 2010

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FIT3020 Information visualisation - Semester 2, 2010

Chief Examiner:

Mr Matthew Butler
Lecturer
Phone: +61 3 990 47163

Lecturer(s) / Leader(s):

Berwick

Mr Matthew Butler
Lecturer
Phone: +61 3 990 47163

Introduction

Welcome to FIT3020 Information Visualization for Semester 2, 2010. This 6 point unit is elective to the Bachelor of Information Technology and Systems (Multimedia Applications Major) degree program in the Faculty of IT. The unit has been designed to provide you with an understanding of how and what information can be extracted from large amount of data, and how deeper understandings can be created when the right methods and tools are employed. It gives special emphasis on creating interactive visualisations, with a particular focus on the domains of physical sciences, social sciences, and geospatial data in GIS.

Unit synopsis

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).

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, color, 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 color 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.

Contact hours

2 hrs lectures/wk, 2 hrs laboratories/wk

Unit relationships

Prerequisites

Completion of 12 points at level 2 from FIT

Teaching and learning method

Teaching approach

Timetable information

For information on timetabling for on-campus classes please refer to MUTTS,
http://mutts.monash.edu.au/MUTTS/

Tutorial allocation

On-campus students should register for tutorials/laboratories using the Allocate+ system:
http://allocate.its.monash.edu.au/

Unit Schedule

Week	Date*	Topic	Study guide	References/Readings	Key dates
1	19/07/10	Information Visualisation Introduction: A History of Information Visualisation, and an Information Visualisation Primer	Online Reading List on MUSO/Moodle	Online Reading List MUSO/Moodle	Please note - there will be no tutorial in Week 1
2	26/07/10	Tufte's Design Principles, Visual Design Principles	Online Reading List on MUSO/Moodle	Online Reading List MUSO/Moodle	
3	02/08/10	Types of Data: Quantitative, Qualitative, and Links Between Data Sets	Online Reading List MUSO/Moodle	Online Reading List MUSO/Moodle	
4	09/08/10	Information Visualisation Techniques 1: Data Ink, Chart Junk and Aesthetics	Online Reading List on MUSO/Moodle	Online Reading List MUSO/Moodle	
5	16/08/10	Information Visualisation Techniques 2: Colour, Layering and Separation	Online Reading List on MUSO/Moodle	Online Reading List MUSO/Moodle	Assignment 1 - Info Vis Analysis Report and Presentation
6	23/08/10	Information Visualisation Techniques 3: Micro/Macro readings, and Small Multiples	Online Reading List on MUSO/Moodle	Online Reading List MUSO/Moodle	

7	30/08/10	Information Visualisation Techniques 4: Narratives, and Misleading with Data	Online Reading List on MUSO/Moodle	Online Reading List MUSO/Moodle	Assignment 2 - Initial Proposal
8	06/09/10	Domains and Case Studies 1: Physical Sciences	Online Reading List on MUSO/Moodle	Online Reading List MUSO/Moodle	
9	13/09/10	Domains and Case Studies 2: Social Sciences	Online Reading List on MUSO/Moodle	Online Reading List MUSO/Moodle	
10	20/09/10	Domains and Case Studies 3: Maps and GIS	Online Reading List on MUSO/Moodle	Online Reading List MUSO/Moodle	
Mid semester break					
11	04/10/10	Maps and GIS continued	Online Reading List on MUSO/Moodle	Online Reading List MUSO/Moodle	
12	11/10/10	In Class Presentations of Visualisation Projects	Online Reading List on MUSO/Moodle	Online Reading List MUSO/Moodle	Assignment 2 - Info Vis Application and Presentation
13	18/10/10	Exam Revision	Review	Review	

*Please note that these dates may only apply to Australian campuses of Monash University. Off-shore students need to check the dates with their unit leader.

Unit Resources

Prescribed text(s) and readings

There are no prescribed textbooks for this unit, though students should familiarise themselves with the recommended texts listed below. These will be placed on hold in the library. Additionally, weekly readings (links, pdfs, websites) will be posted online ahead of tutorials

Recommended text(s) and readings

Key recommended texts:

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

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

Supplementary Recommended texts:

Chen, C. (1999). *Information visualization and virtual environments.* London: Springer-Verlag.

Chen, C. (2004). *Information visualization: Beyond the horizon* (2 ed.). London: Springer-Verlag.

Kraak, M.J. and Ormeling, F.J. Cartography : visualization of geospatial data, Prentice Hall, 2003

Ware, C. (2004). *Information visualization: Perception for design* (2 ed.). San Francisco: Morgan Kaufmann

Required software and/or hardware

This unit will overview a wide range of Information Visualisation applications, many of which operate on the web. However, for assignment 2, students will be creating their own prototype application using a combination of software with which they are already familiar with such as Photoshop, Flash, Dreamweaver, Maya, and also Google SketchUp.

Students will be using Google SketchUp Pro (with extra features, especially importing and exporting) in class, but to familiarise themselves with the product and tutorials, the basic version of Google SketchUp is free to download at http://sketchup.google.com/

Equipment and consumables required or provided

Students studying off-campus are required to have the minimum system configuration specified by the Faculty as a condition of accepting admission, and regular Internet access. On-campus students, and those studying at supported study locations may use the facilities available in the computing labs. Information about computer use for students is available from the ITS Student Resource Guide in the Monash University Handbook. You will need to allocate up to **n** hours per week for use of a computer, including time for newsgroups/discussion groups.

Study resources

Study resources we will provide for your study are:

- Weekly detailed lecture notes outlining the learning objectives, discussion of the content, required readings and exercises;
- Weekly laboratory tasks and exercises with sample solutions provided one to two weeks later;
- Assignment specifications and sample solutions;
- A sample examination and suggested solution
- Discussion groups;
- This Unit Guide outlining the administrative information for the unit;
- The unit web site on MUSO, where resources outlined above will be made available.

Assessment

Overview

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

Faculty assessment policy

To pass a unit which includes an examination as part of the assessment a student must obtain:

- 40% or more in the unit's examination, and
- 40% or more in the unit's total non-examination assessment, and
- an overall unit mark of 50% or more.

If a student does not achieve 40% or more in the unit examination or the unit non-examination total assessment, and the total mark for the unit is greater than 50% then a mark of no greater than 49-N will be recorded for the unit.

The unit is assessed with two assignments and a three hour closed book examination. To pass this unit, a student must :

- attempt both assignments and the examination
- obtain 40% or more in the unit's examination and
- obtain 40% or more in the unit's non-examination assessment and
- obtain an overall unit mark of 50% or more

If a student does not achieve 40% or more in the unit examination or the unit non-examination assessment then a mark of no greater than 44-N will be recorded for the unit.

Assignment tasks

Assignment coversheets

Assignment coversheets are available via "Student Forms" on the Faculty website:
http://www.infotech.monash.edu.au/resources/student/forms/
You MUST submit a completed coversheet with all assignments, ensuring that the plagiarism declaration section is signed.

Assignment submission and return procedures, and assessment criteria will be specified with each assignment.

- **Assignment task 1**

    Title:
    Assignment 1 - Information Visualisation Domains and Applications
    Description:
    In this assignment you are to write a research report of 2000 words, accompanied with referenced images, on an information visualization 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 end using either novel or more established visualisation techniques.

This report will form the basis for a short 5-10 minute presentation to the class in week 5 that illustrates your key findings.

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

Weighting:
20% (presentation 5% and report 15%)

Due date:
Week 5 Tutorial

• Assignment 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 dataset.

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%)

Due date:
Week 12 Tutorial

• Assignment 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. Student 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)

Due date:

Ongoing. Comments are expected to be made weekly.

Examination

- **Weighting:** 40%
  Length: 2 hours
  Type (open/closed book): Closed book

See Appendix for End of semester special consideration / deferred exams process.

Due dates and extensions

Please make every effort to submit work by the due dates. It is your responsibility to structure your study program around assignment deadlines, family, work and other commitments. Factors such as normal work pressures, vacations, etc. are not regarded as appropriate reasons for granting extensions. Students are advised to NOT assume that granting of an extension is a matter of course.

Students requesting an extension for any assessment during semester (eg. Assignments, tests or presentations) are required to submit a Special Consideration application form (in-semester exam/assessment task), along with original copies of supporting documentation, directly to their lecturer within two working days before the assessment submission deadline. Lecturers will provide specific outcomes directly to students via email within 2 working days. The lecturer reserves the right to refuse late applications.

A copy of the email or other written communication of an extension must be attached to the assignment submission.

Refer to the Faculty Special consideration webpage or further details and to access application forms: http://www.infotech.monash.edu.au/resources/student/equity/special-consideration.html

Late assignment

Assignments received after the due date will be subject to a penalty of 5% per day, including weekends. Assignments received later than one week (seven days) after the due date will not normally be accepted. In some cases, this period may be shorter if there is a need to release sample solutions.

This policy is strict because comments or guidance will be given on assignments as they are returned, and sample solutions may also be published and distributed, after assignment marking or with the returned assignment.

Return dates

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

Appendix

Please visit the following URL: http://www.infotech.monash.edu.au/units/appendix.html for further information about:

- Continuous improvement
- Unit evaluations
- Communication, participation and feedback
- Library access
- Monash University Studies Online (MUSO)
- Plagiarism, cheating and collusion
- Register of counselling about plagiarism
- Non-discriminatory language
- Students with disability
- End of semester special consideration / deferred exams