FIT3020
Information visualization

Unit Guide

Semester 2, 2009

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FIT3020 Information visualization - Semester 2, 2009

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Introduction

Welcome to FIT3020 Information Visualization for Semester 2, 2009. 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 when the right methods and tools are employed. It gives special emphasis on the visualization of geospatial data.

Unit synopsis

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 visualization 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 visualization. The unit will examine in detail the visualization 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:

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

At the completion of this unit students will have developed attitudes that enable them to critically select from the range of available visualization techniques and apply the one that is best for the domain at hand.

At the completion of this unit students will have the skills to:

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

At the completion of this unit students will have further developed the teamwork skills needed to work as a member of a project team.

Contact hours

4 contact hrs/week (comprising 2 hrs lecture, 2 hrs tutorial) plus 8 hrs/week of self-directed study, project/assignment work.

Unit relationships

Prerequisites

12 points of second year FIT study

Relationships

FIT3020 is an elective unit in the Multimedia Application major of the Bachelor of Information Technology and Systems degree.

Teaching and learning method

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.cc.monash.edu.au/

Unit Schedule

Week	Topic	Study guide	References/Readings	Key dates
1	Information Visualisation Introduction: Displaying Quantitative Information	Online Reading List on MUSO/Moodle	Online Reading List MUSO/Moodle	Please note - there will be no tutorial in Week 1
2	Information Visualisation Techniques	Online Reading List on MUSO/Moodle	Online Reading List MUSO/Moodle	
3	Tufte's Design Principles, Visual Design Principles	Online Reading List MUSO/Moodle	Online Reading List MUSO/Moodle	
4	Perception, Memory and Colour	Online Reading List on MUSO/Moodle	Online Reading List MUSO/Moodle	
5	Visual Illusions - Misleading with Visualisation	Online Reading List on MUSO/Moodle	Online Reading List MUSO/Moodle	Assignment 1 - Info Vis Analysis Report and Presentation
6	Animation and Visualisation	Online Reading List on MUSO/Moodle	Online Reading List MUSO/Moodle	
7	3D Visualisation Applications	Online Reading List on MUSO/Moodle	Online Reading List MUSO/Moodle	
8	Maps, Models and Symbols - Visualisation Applications	Online Reading List on MUSO/Moodle	Online Reading List MUSO/Moodle	
9	Geographic Information Systems Overview	Online Reading List on MUSO/Moodle	Online Reading List MUSO/Moodle	
10	Mapping, Measurement and Spatial Modelling	Online Reading List on MUSO/Moodle	Online Reading List MUSO/Moodle	
Mid semester break				
11	Localised Cartographies and the Virtual Model	Online Reading List on MUSO/Moodle	Online Reading List MUSO/Moodle	
12	Exam preparation and Revision	Review	Online Reading List MUSO/Moodle	Assignment 2 - Info Vis Application Prototype and Presentation
13	No lecture	Review	Review	

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 (ie Photoshop, Flash, Dreamweaver, Maya), and 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

Practical Assignments: 60%; Examination: 40%

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 44% then a mark of no greater than 44-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 Applications
  Description:
  In this assignment you are to write a research report of 1500-2000 words, accompanied with referenced images, on an information visualization application domain area of your choice, e.g, business, history, agriculture, environmental management, state and local government or census information, defense and intelligence, transportation, telecommunication, etc.

  Your report should 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.

Weighting:
20% (presentation and report)

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, based on a defined mapping area, using Google Sketchup Pro. The maps and datasets will be provided.

The resulting models, still images or animations will need to be assembled into a format that enables the viewer/user to compare and contrast the information interactively. To do this, you can use Adobe Flash or any webpage editing software of your choice (ie you can create a Flash interactive or a basic website with interactive features).

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

Weighting:
40% (application submission and presentation)

Due date:
Week 12 Tutorial

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