User-Centred Data Visualization **PSYC0102** Option Module 15 Credits

Academic Session	Date Description Last Updated
2018/19	12-09-2018

Module Convenor:

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Module aims and objectives

Data visualization is a multi-disciplinary subject focussed on the design, implementation and study of systems (often computer-based) to display data through graphic means. Data visualization builds on computer science, human-computer interaction, cognitive psychology, graphics and visual design. As a wealth (or "deluge") of data is made available through the Internet, by governments, companies and private individuals, there is a need to develop tools and techniques to help people make sense and take advantage of this data.

Visualization represents one tool to try and make sense of data. Even though humans have been engaged in data visualization for centuries, the current abundance of data, computational and Internet communication resources open up new and exciting challenges.

The *aim* of this module is to support students in learning theories, tools and methods related to data visualization, with particular emphasis on interactive visualization and user evaluation of visualization systems.

The *objectives* of the module are:

1. To familiarise students with information visualization *theory* and *research*.

2. To equip students with the basic skills required to *design*, *prototype* and *evaluate* information visualization systems.

Module description:

The module is designed to provide an introduction to information visualization to students from a variety of backgrounds, such as computing, psychology or design. Given that the module is meant primarily for students in the HCI MSc programmes, particular emphasis will be given to user-centred design and user evaluation.

In the first three weeks, the focus will be on essential background information: foundations of visual perception and basic concepts and techniques for data representation and analysis. Some of this material may be a refresher for some student groups, while being new for others.

In the subsequent five weeks (week 4 to week 8) the module will centre on a series of visualisations case studies, organised by the type of data visualised (time based, categorical & hierarchical, trees & networks, correlations & differences, maps). In the case studies visualisations will be considered in the *context of their application*, taking into account not only the graphical representation, but also the *display* used to show it to the audience, the *user interaction* (if any), and the *user evaluation*. In the practical sessions, students will be assigned a design brief (with one or more datasets) which they will start to address in class, but will be expected to complete in their own independent project time.

In the penultimate week (week 9) data collection and storage will be addressed, with the practical sessions focussing on examples related to the IoT. No new brief so that students can focus on refining previous projects and prepare for the portfolio preview presentation.

Finally, in week 10 students will be required to present in class a preview of their portfolio.

Module learning outcomes:

Having successfully completed the module, students will be able to:

1. explain fundamental principles of human perception and how they apply to the design of data visualizations or other information displays;

2. apply different methods to visualize data sets;

3. design effective interactive information displays;

4. evaluate different information displays across a range of dimensions.

Module schedule:

Week	Lectures	Practical sessions
01	Foundations of visual perception	Overview of visualization software tools
02	Data characterisation (including stats)	Data analysis and manipulation in Python
03	Coordinate systems	More data analysis and manipulation in Python
04	Time based data	Mini-project 1
05	Categorical & hierarchical data	Mini-project 2
06	Trees & networks	Mini-project 3
07	Correlations & differences	Mini-project 4
08	Maps	Mini-project 5
09	Data acquisition & collection	Arduino or Raspberry Pi examples
10	Student presentations	Student presentations

Assessment:

Assessment method:
Individual portfolio; up to 3000 words; to be submitted after the Easter break. Counting for 90% of module mark.
Portfolio preview presentation: in class presentation on last week of term. Counting for 10% of module mark.

Pass conditions:
Both assessment items must be passed.

Submission requirements:
TBC

Coursework outline:
In the portfolio, each student will need to present evidence demonstrating their achievement of all four modules learning outcomes. Therefore, the portfolio is expected to include various example visualizations produced by the student, as well as critical reflection on the literature and user evaluation of at least one visualization. The design briefs and datasets provided as part of the module practical sessions are designed to serve as seeds for the portfolio development.

The portfolio preview presentation is designed to provide formative assessment before the final portfolio submission.

Note: Module descriptions may be subject to minor alterations due to lecturer availability & changes to regulations.