CS2D7 Data Visualisation
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Lecture 5

Evaluating Visualisations Workshop
Today

- *It is difficult to create an evaluation model that gives an objective judgement of the chosen criteria. Two users in front of the same visualization could express completely different and contrasting judgements.*

- “the usefulness of a graph can be evaluated only in the context of the type of data, the question the designer wants the readers to answer, and the nature of the audience” (Stephen M Kosslyn, Graphic Design for the mind and eye)
Challenge

• Asking the right questions
• Choosing the right methods
• Obtaining an appropriate sample of participants
Kirk’s Three Principles of Good Visual Design

1. Good data visualization is **TRUSTWORTHY**
2. Good data visualization is **ACCESIBLE**
3. Good data visualization is **ELEGANT**
5 criteria (Mazza)

- **Functionality** – does the visualisation fulfil all of the requirements of the specification?
- **Effectiveness** – does the visualisation provide users with a better knowledge of the data?
- **Efficiency** - does the visualisation provide users with information more rapidly?
- **Usability** – is interaction with the visualisation simple and intuitive
- **Usefulness** – does the visualisation serve a purpose?

Mazza (2009), Introduction to Information Visualization, Springer Link
4 criteria (Beautiful Visualisation (2010))

• **Informative** – successfully conveys information
• **Efficient** – simple, focussed, clear, straightforward
• **Aesthetic** – Axes, layout, shape, colours, lines + typography used appropriately
• **Novel** – creative and interesting

Evaluating visualisations

• Specification of requirements
  • Know your goals
  • What is the story?

• Evaluation
  • Does the visualisation meet the requirements?
  • Is it e.g. functional, effective, efficient, usable and useful?
Methods

- Adopted from HCI
- Analytic Methods
  - **Heuristic evaluation** - evaluator verifies whether the visualization is compliant with a set of principles (heuristics)
  - Cognitive walkthrough – evaluator defines a series of possible scenarios of use and simulates behaviour of a user performing predetermined tasks
- Empirical Methods
  - **Experiments that make use of functioning visualizations and involve users**
  - Divided into quantitative and qualitative studies
Quantitative methods

• Controlled experiments – evaluate a system property by verifying a series of hypotheses (requires systematic manipulation of conditions).

• Users are asked to carry out a task and measurements are taken.

• Performance must be numerically measurable e.g. grade of accuracy, time taken to answer a question.
Hypothesis - Lecturers of an online course that use the proposed visualisation have a better knowledge of which students

1. Are more active in posting messages on the forum
2. Read all messages but don’t actively participate in discussions
3. Neither read nor write messages in the forum

compared to lecturers who use the traditional interfaces provided with the e-learning system
What are we measuring? (dependent variables)

• Knowledge of students who are more active in initiating new threads of the discussion
• Knowledge of the students who have read the majority of messages without consistently taking part in posting new messages
• Knowledge of students who have contributed to neither the reading or writing of messages in the forum
What are we changing?

• **Access to the visual representation**

  • Split users into two groups – one group uses interfaces provided with the e-learning system, the other group uses same interfaces + visualisation.

  • Both groups perform same operations.

  • Performance against the dependent variables is measured
Qualitative methods

• Collecting qualitative data from test users
• Analyse from the users point of view
• Methods include user observations, interviews, questionnaires, focus groups
Evaluating Visualisations

• Get into groups of 2 or 3 and choose a case study
  – Do a heuristic evaluation
  – Devise a set of principles (heuristics)
• How does the visualisation score
• Be ready to feedback to the rest of the class

We have provided a few example checklists
Case Studies

4. https://selfiecity.net/#selfiexploratory
6. One of your own choosing
Lab

- Geographic Data

Tomorrow morning

- Presentation and Influencing Factors