Chapter 8
Data analysis, interpretation and presentation
Overview

- Qualitative and quantitative
- Simple quantitative analysis
- Simple qualitative analysis
- Tools to support data analysis
- Theoretical frameworks: grounded theory, distributed cognition, activity theory
- Presenting the findings: rigorous notations, stories, summaries
Quantitative and qualitative

- Quantitative data – expressed as numbers
- Qualitative data – difficult to measure sensibly as numbers, e.g. count number of words to measure dissatisfaction
- Quantitative analysis – numerical methods to ascertain size, magnitude, amount
- Qualitative analysis – expresses the nature of elements and is represented as themes, patterns, stories

- Be careful how you manipulate data and numbers!
Simple quantitative analysis

• Averages
  – Mean: add up values and divide by number of data points
  – Median: middle value of data when ranked
  – Mode: figure that appears most often in the data

• Percentages

• Graphical representations give overview of data
Visualizing log data

Interaction profiles of players in online game

Log of web page activity
Web analytics
Simple qualitative analysis

- **Recurring patterns or themes**
  - Emergent from data, dependent on observation framework if used

- **Categorizing data**
  - Categorization scheme may be emergent or pre-specified

- **Looking for critical incidents**
  - Helps to focus in on key events
Tools to support data analysis

• Spreadsheet – simple to use, basic graphs
• Statistical packages, e.g. SPSS
• Qualitative data analysis tools
  – Categorization and theme-based analysis, e.g. N6
  – Quantitative analysis of text-based data

• CAQDAS Networking Project, based at the University of Surrey (http://caqdas.soc.surrey.ac.uk/)
Theoretical frameworks for qualitative analysis

• Basing data analysis around theoretical frameworks provides further insight
• Three such frameworks are:
  – Grounded Theory
  – Distributed Cognition
  – Activity Theory
Grounded Theory

• Aims to derive theory from systematic analysis of data
• Based on categorization approach (called here ‘coding’)
• Three levels of ‘coding’
  – Open: identify categories
  – Axial: flesh out and link to subcategories
  – Selective: form theoretical scheme
• Researchers are encouraged to draw on own theoretical backgrounds to inform analysis
Distributed Cognition

- The people, environment & artefacts are regarded as one cognitive system
- Used for analyzing collaborative work
- Focuses on information propagation & transformation
Activity Theory

- Explains human behavior in terms of our practical activity with the world
- Provides a framework that focuses analysis around the concept of an ‘activity’ and helps to identify tensions between the different elements of the system
- Two key models: one outlines what constitutes an ‘activity’; one models the mediating role of artifacts
Individual model

Activity  – Motive

Action  – Goal

Operation  – Conditions
Engeström’s (1999) activity system model

- Tool
- Subject
- Object
- Rules
- Community
- Division of labour
- Transformation Process
- Outcome
Presenting the findings

• Only make claims that your data can support
• The best way to present your findings depends on the audience, the purpose, and the data gathering and analysis undertaken
• Graphical representations (as discussed above) may be appropriate for presentation
• Other techniques are:
  – Rigorous notations, e.g. UML
  – Using stories, e.g. to create scenarios
  – Summarizing the findings
Summary

• The data analysis that can be done depends on the data gathering that was done
• Qualitative and quantitative data may be gathered from any of the three main data gathering approaches
• Percentages and averages are commonly used in Interaction Design
• Mean, median and mode are different kinds of ‘average’ and can have very different answers for the same set of data
• Grounded Theory, Distributed Cognition and Activity Theory are theoretical frameworks to support data analysis
• Presentation of the findings should not overstate the evidence