





NPTEL ONLINE CERTIFICATION COURSE

INTRODUCTION TO INTERACTION DESIGN

Lecture 12 Data Analysis

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Data Analysis





Data analysis is the process of examining and interpreting data using statistical and logical methods to identify patterns, relationships, and trends. It involves collecting, cleaning, processing, and transforming data into information that can be used to make informed decisions or gain insights into a particular subject or phenomenon.







The process of data analysis typically involves the following steps:

- 1. Defining the research question or problem
- 2. Collecting data
- 3. Cleaning and processing data
- 4. Exploring and visualizing data
- 5. Analysing data
- 6. Interpreting and presenting results





Qualitative and Quantitative Approach of Data Analysis





Quantitative Approach of Data Analysis

Quantitative data is numerical data that can be measured and analyzed using mathematical or statistical methods. It involves collecting data that can be quantified or expressed in numerical form, such as age, height, weight, income, or test scores.





Qualitative Approach of Data Analysis

Qualitative data is non-numerical data that is descriptive and subjective in nature. It involves collecting data that cannot be expressed in numerical form, such as opinions, beliefs, attitudes, behaviours, or experiences.





First Steps in Analyzing Data

	Usual raw data	Example qualitative data	Example quantitative data	Initial processing steps
Interviews	Audio recordings. Interviewer notes. Video recordings.	Responses to open- ended questions. Video pictures. Respondent's opinions.	Age, job role, years of experience. Responses to close-ended questions.	Transcription of recordings. Expansion of notes. Entry of answers to close-ended questions into a spreadsheet
Questionnaires	Written responses. Online database.	Responses to open- ended questions. Responses in "further comments" fields. Respondent's opinions.	Age, job role, years of experience. Responses to close-ended questions.	Clean up data. Filter into different data sets. Synchronization between data recordings.
Observation	Observer's notes. Photographs. Audio and video recordings. Data logs. Think-aloud Diaries.	Records of behavior. Description of a task as it is undertaken. Copies of informal procedures.	Demographics of participants. Time spent on a task. The number of people involved in an activity. How many different types of activity are undertaken.	Expansion of notes. Transcription of recordings.



• Interviews

• Questionnaires

• Observations





Basic Quantitative Analysis

Two basic quantitative analysis techniques that can be used effectively in interaction design are **averages** and **percentages**.

There are three different types of averages:

- Mean
- Median
- Mode





Basic Quantitative Analysis







	Social media	use				
User	More than once a day	Once a day	Once a week	Two or three times a week	Once a month	Number of errors made
1		1				4
2	1					2
3			1			1
4	1					0
5				1		2
6		1				3
7	1					2
8		1				0
9					1	3
10	1					2
11				1		1
12			1			2
13		1				4
14		1				2
15						1
16				1		1
17		1			1	0
18		1				0
Totals	als 4 7	7	2	3	2	30
					Mean	1.67
					(to 2	decimal places)



Basic Qualitative Analysis

Qualitative data can be collected using various methods, such as interviews, focus groups, observations, case studies, or document analysis. The data is usually recorded in the form of text, audio, or visual recordings and analyzed using techniques such as content analysis, grounded theory, or thematic analysis.





Qualitative data can be analyzed inductively, that is, extracting concepts from the data, or deductively, in other words using existing theoretical or conceptual ideas to categorize data elements.

Identifying themes (thematic analysis) takes an *inductive approach*, while categorizing data takes a *deductive approach*.





Three basic approaches to qualitative analysis are discussed in this section: **identifying themes**, **categorizing data**, and **analyzing critical incidents**.

Critical incident analysis is a way to isolate subsets of data for more detailed analysis, perhaps by identifying themes or applying categories.





Identifying Themes

Thematic analysis is considered an umbrella term to cover a variety of different approaches to examining qualitative data. It is a widely used analytical technique that aims to identify, analyze, and report patterns in the data (Braun and Clarke, 2006).

A *theme* is something important about the data in relation to the study goal.





A common technique for exploring data, identifying themes, and looking for an overall narrative is to create an *affinity diagram*.







Categorizing Data

"The screen is very difficult to read. I keep forgetting what I just read. I cannot retain the information. The text is small and some letters do not have clearly defined edges. I get a headache."

Interface Problems

Verbalizations show evidence of difficulty in seeing particular aspects of the interface.

Content Problems

Verbalizations show evidence of dissatisfaction about aspects of the content of the electronic text.





Critical Incident Analysis

Critical incident analysis (CIA) is a structured method for examining and reflecting on significant events or experiences that have occurred in a particular situation or context. It involves examining these events in detail to identify the factors that contributed to the outcome and to explore how the situation could have been managed differently.



Critical Incident Analysis

- 1. Identifying the critical incident
- 2. Describing the incident
- 3. Identifying the factors that contributed to the incident
- 4. Reflecting on the incident
- 5. Identifying opportunities for improvement





Which Kind of Analytic Framework to Use?

Framework	Data	Focus	Expected outcomes	Level of granularity
Conversation analysis	Recordings of spoken conversations	How conversations are conducted	Insights into how conversations are managed and how they progress	Word-level, or finer, for instance, pauses and inflection
Discourse analysis	Recordings of speech or writing from individuals or several participants	How words are used to convey meaning	Implicit or hidden meanings in texts	Word, phrase, or sentence-level
Content analysis	Any form of "text" including written pieces, video and audio recordings, or photographs	How often something is featured or is spoken about	Frequency of items appearing in a text	A wide range of levels from words, to feelings or attitudes, to artifacts or people



Interaction analysis	Video recordings of a naturally- occurring activity	Verbal and non-verbal interactions between people and artifacts	Insights about how knowledge and action are used within an activity	At the level of artifact, dialogue, and gesture
Grounded theory	Empirical data of any kind	Constructing a theory around the phenomenon of interest	A theory grounded in empirical data	Varying levels, depending on the phenomenon of interest
Systems- based frameworks	Large-scale and heterogeneous data	Large-scale involving people and technology, such as a hospital or airport	Insights about organizational effectiveness and efficiency	Macro-level, organizational level



Tools to Support Data Analysis

Nvivo Dedoose Statistical Analysis Software (SAS) Statistical Package for the Social Sciences (SPSS)





Interpreting and Presenting the Findings

Structured Notations Using Stories Summarizing the Findings







Thank You

