Human Computer Interaction
CE 382

Course Instructor: Vincent M. Nofong, Ph.D.

July 9, 2024

Introduction

Outline

- Who I am
- Course Information and Outline of CE 382
- Expected Learning Outcomes
- Rules
- Chapter Two: Establishing Requirements

Introduction

About me

- Name: **Vincent M. Nofong, PhD**
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- Personal Website: https://vincentnofong.com/
- Uni website: https://www.umat.edu.gh/staffinfo/staffDetailed.php?contactID=385
- Office hours (Working days): **09:00 am - 16:00 pm GMT**
- Research interest: **data mining, trend prediction, classification, bioinformatics, artificial intelligence, machine learning**

Introduction

Course Information (CE 382)

- Credit hours: **3**
- Attendance: **10%**
- Continuous Assessment: **30%**
  - Quizzes - two or three
  - Group assignment - one (application development)
  - Group presentations
- End of Semester: **60%**

Introduction

Course Outline (CE 382)

1. Interaction Design
2. Establishing Requirements
3. Prototyping
4. Data Gathering and Analysis
5. Cognitive Aspects of Design
6. Social and Emotional Interactions
7. User Interfaces
8. Evaluations

Introduction

Expected Learning Outcomes (CE 382)

Students should understand and be able to:

1. Explain the characteristics of good and bad interaction design and use them to evaluate HCIs
2. Explain the characteristics of users that influence HCI and use them to inform user interface development
3. Explain, analyze and develop interaction evaluations
4. Explain and develop requirements for interaction design
5. Construct interactions using evaluation-based iterative process for directing the design of user interfaces.

Introduction

Reference Materials

1. Preece, J., Rogers, Y. and Sharp, H. (2023), Interaction Design: Beyond Human-Computer Interaction, John Wiley & Sons Ltd, Hoboken, U.S.A., 6th Edition, 716 pp. - slides are based on this reference
2. Lazar, J., Feng, J. H. and Hochheiser, H. (2017), Research Methods in Human-Computer Interaction, Morgan Kaufmann, Burlington, U.S.A., 2nd Edition, 560 pp.
3. Shneiderman B., Plaisant C., Cohen M. and Jacobs, S. (2016), Designing the User Interface, Pearson Publishers, 6th Edition, 616 pp.

Introduction

Rules

1. Feel free to ask questions in class, unless they are too "personal".
2. Students should not be late for lectures or practicals.
3. Students should attend all lectures and practicals.
4. **In case you are unable to attend lectures or will be late, send me an email - at least 30 minutes before lectures.**
5. Students should do and submit all assignments before the given deadline.
6. Unless otherwise permitted, students should not use their mobile phones in class - note usage of Laptops/Desktops is permitted.

HCI CE 382
Chapter Four: Data Gathering and Analysis

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Data Gathering and Analysis

Capturing Data: Methods and Considerations

- Multiple Data Capture Options: Notes, audio, video, and photographs can be used individually or combined.
- Consider the nature of the information to be captured and the research goals.
- Determine which method(s) best align with the research objectives and offer the most comprehensive data.
- Challenges and Advantages:
  - Notes: Ideal for capturing textual info, but lack visual context.
  - Photographs: Provide visual representation, but limited in capturing dynamic interactions.
  - Audio: Ideal for capturing spoken conversations and verbal nuances.
  - Video: Rich visual and auditory info, but requires more storage & processing.

Data Gathering and Analysis

Interviews

- Interviews are a valuable research method for gathering data.
- **Unstructured** interviews offer flexibility and richness but lack replicability.
- **Structured** interviews provide replicable results but may sacrifice richness.
- **Semi-structured** interviews strike a balance between richness and replicability.
- **Focus groups** involve group interviews to encourage interactive discussions and diverse perspectives.
- Select the interview method based on the research goals and the desired level of structure.

Data Gathering and Analysis

Interview Questions

- Interview questions can be categorized as **closed** or **open-ended**.
- **Closed questions** have a predetermined answer format, while **open questions** allow for more diverse responses.
- Closed questions are easier to analyze, but open questions provide richer insights.
- When formulating interview questions, avoid:
  - Long questions
  - Compound sentences — split them into two
  - Jargon and language that the interviewee may not understand
  - Leading questions that make assumptions, E.g., "why do you like . . . ?"
  - Unconscious biases, for instance, gender stereotypes

Data Gathering and Analysis

Running the interview

- **Introduction**: Introduce yourself, state the interview goals, address ethical considerations, request recording, and present the informed consent form.
- **Warm-up**: Begin with easy and non-threatening questions to establish rapport.
- **Main body**: Present questions in a logical order, addressing the desired topics.
- **Cooling-off period**: Include a few easy questions towards the end to defuse tension.
- **Closure**: Thank the interviewee, signal the end of the interview (e.g., switching off the recorder).

Data Gathering and Analysis

Doing Interviews Remotely

- Remote interviews and focus groups using digital conferencing systems like Teams and Zoom, along with collaboration platforms such as Miro, are commonly used.
- Advantages:
  - Participants are in their own environment and feel more relaxed.
  - Participants don't have to travel, saving time and effort.
  - Participants don't need to worry about their attire.
  - Remote interviews offer increased anonymity for sensitive issues.
  - Participants have the freedom to leave the interview at any time.

Data Gathering and Analysis

Enriching The Interview Process

- Incorporating props in the interview process, such as personas, prototypes, and scenarios, enhances engagement and deepens insights.
- These tools provide a tangible and relatable context for discussions, helping to elicit valuable information from the interviewees' perspectives.

Data Gathering and Analysis

Questionnaires

- Questionnaires are a valuable data collection method that uses closed and open-ended questions.
- Closed questions are easier to analyze and can be processed using computer software.
- Online dissemination of questionnaires allows for reaching large populations efficiently.
- However, sampling can be challenging when the size of the target population is unknown, as is often the case in online evaluations.

Data Gathering and Analysis

Questionnaire Design Tips

- **Question Order**: Be mindful of the impact of question order, as it can influence participant responses.
- **Tailored Versions**: Create different versions of the questionnaire for different target populations, ensuring relevance and engagement.
- **Clear Instructions**: Provide clear and concise instructions on how to complete the questionnaire to minimize confusion.
- **Length Considerations**: Assess the length of the questionnaire and consider if it may be too long.
- **Layout and Pacing**: Pay attention to the layout and pacing of the questionnaire to maintain participant interest and ensure a smooth completion experience.

Data Gathering and Analysis

Question and Response Formats

- Closed-ended Responses:
  - **Radio Buttons**: Choose a single response from a predefined list.
  - **Check Boxes**: Select multiple responses from a predefined list.
  - **Rating Scales**: Assign ratings on a numerical or descriptive scale.
  - **Likert Scales**: Measure agreement or disagreement on a statement using a range of response options.
  - **Semantic Differential Scales**: Rate concepts based on opposing adjectives or dimensions using a scale.
- Open-ended Responses:
  - Allow participants to provide unrestricted and personalized answers, without predefined options.

Data Gathering and Analysis

Encouraging a Good Response (1/2)

- **Clarify the Purpose**: Clearly communicate the objective of the study to participants, ensuring they understand its importance and relevance.
- **Ensure Anonymity**: Assure participants that their responses will remain anonymous, fostering a sense of confidentiality and encouraging honest feedback.
- **Careful Questionnaire Design**: Develop the questionnaire thoughtfully, considering the clarity and flow of questions.
- **Short Version Option**: Offer a condensed version of the questionnaire for participants with limited time, increasing the likelihood of their participation.

Encouraging a Good Response (2/2)

- **Prompting Messages**: Send follow-up reminders or prompts to participants who have not yet completed the questionnaire, gently encouraging their response.
- **Incentives**: Consider providing incentives, such as vouchers or small rewards, to motivate participants and show appreciation for their participation.
- **Response Rate Expectations**: While a response rate of around 40% is generally acceptable, lower response rates are common in practice and should be taken into account when analyzing the data.

Data Gathering and Analysis

Administering Questionnaires (1/2)

- **Timeline Planning**: Establish a clear timeline for questionnaire administration, considering the start and end dates, as well as any intermediate milestones.
- **Design Offline**: Begin the questionnaire design process offline, outlining the structure, content, and response formats before moving to an online platform.
- **Program/Complete Online Template**: Transfer the questionnaire design to an online survey tool or platform, ensuring all questions, response options, and skip logic are accurately implemented.

Data Gathering and Analysis

Administering Questionnaires (2/2)

- **Test the Survey**: Conduct thorough testing of the survey to ensure it functions as intended. Verify that question branching, skip patterns, and response validation work correctly.
- **Test with a Group**: Validate the survey's clarity and effectiveness by piloting it with a group of individuals who are not part of the actual survey population. Seek their feedback and make necessary improvements.
- **Participant Recruitment**: Develop a strategy for participant recruitment, whether through random sampling, targeted invitations, or other appropriate methods. Ensure the chosen sample is representative of the desired population.

Data Gathering and Analysis

Observation: Direct Observation in the Wild

Conducting observations of users in their natural environments.

- Structuring Frameworks: Utilizing frameworks or protocols to guide the observation process.
- Degree of Participation: Observing users passively or actively participating in their activities.
- Ethnography: Employing ethnographic methods to gain deep insights into users' behaviors, cultures, and contexts.

Data Gathering and Analysis

Observation: Direct Observation in a Controlled Environments

Conducting observations in controlled settings, such as usability labs or simulated environments.

- Think-Aloud Technique: Prompting users to verbalize their thoughts and actions during the observation.

Data Gathering and Analysis

Observation: Indirect Observation

Tracking users' activities without direct physical presence.

- Diaries: Requesting participants to keep diaries or journals documenting their experiences or activities.
- Interaction Logging, Web Analytics, and Data Scraping: Collecting data on user interactions and behaviors through digital platforms.
- Remote Collection of Video and Photographs: Utilizing remote technologies like drones to capture visual data.
- Wearable Sensors and Social Media: Leveraging wearable devices or monitoring users' activities through social media platforms.

Data Gathering and Analysis

Adapting the techniques for different participants

Visual representation of a Likert scale for children

GPS tracker on a cat

Data Gathering and Analysis

Quantitative and Qualitative Data Analysis

- Quantitative Data
  - Expressed as numbers.
  - Focuses on size, magnitude, or amount.
  - Allows for numerical analysis.
- Qualitative Data
  - In the form of words and images.
  - Captures the nature of elements.
  - Analyzed through themes, patterns, or stories.

Data Gathering and Analysis

Quantitative and Qualitative Data Analysis

- Quantitative Analysis
  - Utilizes numerical methods.
  - Aims to measure and quantify data.
  - Focuses on numerical relationships.
- Qualitative Analysis
  - Explores the meaning and context.
  - Identifies themes and patterns.
  - Emphasizes the narrative and descriptive aspects.
- Data Manipulation
  - Exercise caution when manipulating data and numbers.
  - Consider the appropriate treatment based on the data type and research objectives.

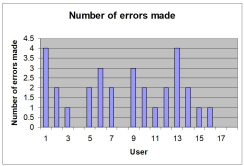
Data Gathering and Analysis

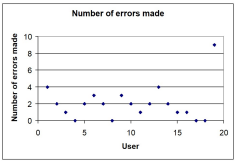
Basic Quantitative Analysis (1/2)

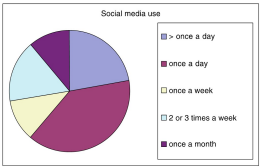
- Averages:
  - Mean: Sum of values divided by the number of data points.
  - Median: Middle value of the data when ranked.
  - Mode: Value that appears most frequently in the data.
- Percentages:
  - Expresses a proportion or relative amount.
  - Useful for comparing parts to the whole.
- Cautions in Data Interpretation:
  - Exercise caution to avoid misleading interpretations.
  - Consider the context and potential biases in the data.

Basic Quantitative Analysis (2/2)

- Graphical Representations:
  - Provide an overview of the data.
  - Enhance visual understanding and comparison.







- Remember:
  - Choose appropriate analysis techniques for accurate interpretation and meaningful insights.
  - Use graphs and visualizations effectively to communicate data patterns.

Data Gathering and Analysis

Basic Qualitative Analysis

- Recurring Patterns or Themes
  - Identify recurring patterns or themes within the data.
- Categorizing Data:
  - Categorization involves organizing data into meaningful groups.
  - The categorization scheme can be emergent, developing as analysis progresses, or pre-specified based on prior knowledge or research objectives.
- Critical Incidents:
  - Focus on critical incidents that highlight key events or moments of significance.
  - By examining critical incidents, researchers gain valuable insights and understanding.

Data Gathering and Analysis

Presenting Findings

- **Support Claims with Data**: Ensure your claims are backed by solid evidence from your data analysis.
- **Tailor Presentation to Audience**: Consider the audience, purpose, and research methodology when deciding how to present findings.
- **Graphical Representations**: Utilize graphs and visualizations to effectively convey information.
- Additional Techniques:
  - **Storytelling**: Use narratives to create engaging and relatable scenarios.
  - **Summarization**: Provide concise summaries of the research findings.

Data Gathering and Analysis

Tools for Data Analysis

- Spreadsheets: User-friendly with basic graphing capabilities.
- Statistical packages (e.g., SPSS): Designed for quantitative analysis.
- Qualitative data analysis tools:
  - Categorization and theme-based analysis.
  - Quantitative analysis of text-based data.
- Notable tools:
  - NVivo (`http://www.qsrinternational.com/`)
  - Atlas.ti (`http://atlasti.com/`)
  - QDA Miner (`https://provalisresearch.com/`)
  - Orange (`https://orangedatamining.com/`)