UTSA CS 4593: CS-CURE

Course-based Undergraduate Research Experience in CS

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Week 13:
Refining & Analysis

UTSA CS-CURE

Week 13

- Objectives:
    - Understand how to organize, refine, & analyze a research project
    - Understand how the peer review process works in CS

- Deliverables:
    - Activity 8 worksheet (*in-class Thursday)*
    - Research Paper Draft (*due Saturday)*

Evaluating Your Research Journey

Self-Assessment

Evaluating your research journey

- What stage of the research process are you currently in?
- Have you collected all of the data you require?
    - If not, what are the challenges?
- Have you encountered any unexpected results or technical difficulties?

Identifying Roadblocks

Evaluating your research journey

- Common challenges:
    - Data collection issues (e.g. insufficient data, technical problem with acquisition)
    - Unexpected results that don’t align with hypothesis
    - Difficulty interpreting or analyzing data
    - Time management challenges in completing research tasks
    - Scope creep (*research expanding beyond your initial focus)*

Refocusing Research

Evaluating your research journey

Problem:

Time management challenges

Consider:

Develop a revised project timeline.

Set deadlines for each task.

Prioritize critical tasks.

Consider additional resources.

Refocusing Research

Evaluating your research journey

Problem:

Scope creep

Consider:

Focus on a specific aspect of the initial research question.

Outline potential areas for future exploration beyond the current project.

Refocusing Research

Evaluating your research journey

Problem:

Unexpected results

Consider:

Refine the research question to better algae with the findings.

Conduct additional analysis to understand the cause.

Refocusing Research

Evaluating your research journey

Problem:

Data collection issues

Consider:

Explore alternative sources.

Leverage data collection tools.

Strengthening Your Data

Strengthening Your Data

Evaluating research progress

- Evaluate your data quality
- Consider enhancing data collection
- Explore visualizations for your data

Evaluating Data Quality

Evaluating research progress

- For accurate analysis, **quality data** is critical.
- Ensure the quality of the source.
- **Assess the quality** of the data:
    - Look for the potential of **biases.**
    - ***Accurate*** data correctly represents the real world.
    - ***Complete*** data includes only relevant and whole datapoints.
    - ***Consistent*** data adheres to defined standards for seamless analysis.

Enhancing Data Collection

Evaluating research progress

- Expand on **data sources**:
    - Public datasets (*Kaggle, UCI ML Repository, NAAIR pilot, …)*
    - Web scraping* & APIs
    - Simulations
- Brainstorm ways to **streamline the data collection process**, if inefficient & causing delays in research.

Refine Your Research Focus

Identifying Emergent Themes

Refine your research focus

- Finding themes in the research can:
    - Complement your research questions
    - Identify novel insights
    - Contribute to your research community

Identifying Emergent Themes

Refine your research focus

- In **quantitive data**, identifying themes is a data analysis exercise.
- In **qualitative data**, identifying themes requires extra steps:
    - Code the data (*not programming code!) - categorize segments of text (e.g. label interview transcripts, user feedback).*
    - Look for patterns
    - Refine the codes

Refining research questions

Refine your research focus

- Evaluate the significance of the theme
- Align themes with your research goals
- Reinforce the focus on the project - do not expand the scope to broadly

Individual Projects:
Research Paper Draft

Research Paper Draft

Checklist

- Abstract
- Introduction
- Data
- Experiments / Evaluation
- Revisions

Research Paper Draft

In-class time for project

Wrap-Up

Tuesday

- Objectives:
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See you Thursday!

Activity 8:
Peer Review

Wrap-Up

Thursday

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See you next week!