CS5346 Information Visualization Project Description
Semester 2 AY2023/24

Important Dates:

Proposal submission	Mon, 12 Feb, 10pm*
Project Progress meetings with teaching team	11-15 March*
Project Report submission	Fri 19 April, 10pm**
Project Presentation	Sat 20 April (schedule tbd by 13 April)

*Late penalty for Proposal/meetings – No marks past the deadline

** Late penalty for Poster/Report submission – 10% per day past the deadline

Project Group:

You will work on the term project in 3-person groups. The results of the project will depend on group contributions. Therefore, please make sure you all work well together. Have regular meetings and decide on task allocations early in the project.

Sign up for a group at Canvas-> class and groups by Sun, 28 Jan 10pm. If you are unable to form a group, the tutor will allocate you to a group that has vacancies by early Feb.

Project Topics:

The project constitutes an important and interesting part of this module. The project aims to allow you to examine and explore different aspects of Information Visualization in more depth.

It is extremely important to select an interesting problem with data that some groups of people will care deeply about. We encourage you to choose a project topic from one of the 2 types given at the end of this section. Nonetheless, you may propose a topic if you want to work on an option we have not listed. Choose an option or topic of your interest (e.g., health, education, films) or that some subset of people cares about (e.g., sports data, environment). Consider combining different data sets to produce a new composite data set of special interests. Such a fusion of data often creates a data set that people want to learn.

You will explicitly need to identify an intended "user" as well. No matter what topic you choose, aim to deliver a high-quality project, showcasing unobvious insights. You are encouraged to explore Spatial aspects (involving map visualization), Quantitative aspects, Statistical aspects (e.g., correlation, clusters), and Temporal aspects in your selected dataset(s).

You are free to choose any software and graphics/visualization support library that you want to help build your system. Optionally *consider developing a system that is **web-deployable** so that it can be presented to everyone in the world!*

You can choose to work on ONE of the following project types:

1. **For the "Application enthusiasts":** Choose any target application as the theme. For example, it can be based on a set of Interactive Visualizations representing Trends in Higher Education, Recession Reshaping the Economy, visualizing the carbon dioxide (which is invisible) swirling around in our atmosphere for the entire world, etc.
   It can result in a web-deployed, interesting data story/ a dashboard to depict the most talked-about topic on web news, Twitter, Facebook pages, etc.

   Examples:
   E-commerce dataset https://www.kaggle.com/datasets/thedevastator/unlock-profits-with-e-commerce-sales-data?select=May-2022.csv where one can try creating a visualization dashboard which can show/predict/generate/suggest from which e-commerce site to buy a specific product

   In the past, one of the tutors of CS5346 had collated a few datasets/topics. Here is the collection link for more details
   https://github.com/carola173/information_visualization/blob/main/README.md

   Select the topic that most interests you. The list of datasets we have shared is just some examples and is not exhaustive. Also, in the past few years, we have seen many students using above datasets for their assignments and project.
   You are therefore encouraged to choose datasets beyond the list provided at the above link.

   You are also encouraged to multiple datasets and extend them by processing available columns or adding on with relevant data from other sources. It is useful to merge and compare related ideas and look for interesting conclusions that may emerge from querying across two distinct domains/datasets and find some interesting insights.

   Look at the examples in various papers/Kaggle or other competitions, e.g., like Iron Viz(tableau.com/iron-viz), Information is Beautiful Awards (informationisbeautifulawards.com) and try generating some unique and interesting visualizations to get real-world experience.

2. **For the "Research souls"**:** You can aim for a methodological or theoretical research project – something you are interested in or are pursuing or wish to explore as your M. Comp. or PhD thesis work. This is an opportunity for you to explore the topic with somewhat lower stakes. Develop a new algorithm or a potentially new real-world experience where the visualization technique can be applied with useful properties. For Example: finding an effective way to show complex data like grid maps using visual encodings, visualizing higher dimensional data effectively; in the case of virtual reality, one needs to understand the potential methods that are used

to map the abstract data information onto visual attributes for visualizing the information/scenes; how to use data to generate visual effects specifically Cinematic Presentation of Science, etc. Could also investigate http://ieeevis.org/year/2024/welcome and the past year archives at the link for more trending topics.
**If you choose this type of project, please talk to Prof for understanding the further scope of the research and the possibility to publish the research work!

Details of the Project deliverables:

Note: Revisit the topic of design process covered in the lecture(s). It is expected that you reflect on the process details and apply the relevant concepts at every stage in your project. This document does not repeat the detailed information of design process provided in the lectures.

1. **Proposal (3%):**

For Project Type- 1:

Your proposal should encompass key details, including a list of project members, a description of the topic to be addressed, and information on data sources, characteristics, and dataset description. Additionally, it is essential to include a snapshot of the dataset or provide link(s) to the dataset(s), along with any other pertinent links.

To guide you in crafting a comprehensive proposal, you may also want to consider the following questions. However, please refrain from directly incorporating these questions into the submitted document; instead, use them as prompts to structure your proposal:

- What specific problem does your project aim to address?
- What is the primary data source for your project?
- What are the characteristics of the data you are working with?
- What noteworthy observations can be made about the dataset?
- Who would benefit from gaining a better understanding of this data?
- What specific information or insights would be of interest to this audience?

By addressing these questions thoughtfully, you will be able to create a well-rounded and informative proposal that effectively communicates the scope and significance of your project.

For Project Type- 2:

Your proposal is expected to furnish essential information, commencing with a comprehensive list of project members. Beyond this, it should delve into a detailed description of the chosen topic, elucidating the motivation that propelled your group's decision to focus on this particular subject matter. Furthermore, a succinct and informative abstract (ranging between 1-2 pages) should be included, outlining the specific objectives and intentions of your proposed project.

To enhance the academic rigor and contextual understanding of your proposal, it is imperative to provide a section devoted to references of related work. This should encapsulate a well-curated list of scholarly sources, studies, and relevant literature that contributes to the foundation of your project. By incorporating these elements, your proposal will not only showcase the clarity of your project's scope and objectives but also underscore the academic rigor and contextual grounding that underpins your research endeavor.

2. Work in progress (5%)

Each group is required to schedule a project progress review meeting with the teaching team between March 11th and 15th. It will be an in-person meeting. A schedule will be arranged one week in advance, taking into account the availability of both the student group and the teaching team. Attendance of all members is mandatory for these meetings. The review itself does not adhere to a specific format or presentation requirements; rather, it aims to showcase your group's progress and readiness to address relevant inquiries from the teaching team.

Drawing from past experiences, it has been observed that students who prepare a concise slide deck to document their progress and are equipped to demonstrate their initial work can effectively conclude the discussion within the allocated 20-minute timeframe. This meeting serves as a valuable opportunity not only for showcasing your progress but also for obtaining constructive feedback on your design and implementation (in the case of Project Type-1) or your literature review and method (for Project Type-2).

Additionally, remember that you can seek feedback from the lecturer or tutors at other times as well. Utilize this interaction to enhance the quality of your work and ensure the success of your project.

Your presentation should focus on the progress made in accordance with the 4-step Design process. We anticipate that you have successfully navigated through the initial three stages and are currently engaged in Stage 4. Each group member is expected to have developed preliminary charts for the design solutions. Demonstrating a systematic approach and a comprehensive understanding of each group member's role and anticipated contributions is crucial for achieving the project goals. Please note that the evaluation of individual contributions will play a

pivotal role in determining marks for each group member. Therefore, it is imperative that the distinctive efforts and impact of each member are clearly established in the presentation.

3. **Report (~14%)**:

   For Project Type- 1:

   This comprehensive report serves to explain various facets of our project, providing details and insights into the following key areas:

   - Documentation of group members and a comprehensive breakdown of responsibilities assigned to each member.

   - A detailed exploration of the purpose behind the visualizations crafted, explaining the target audience and the datasets employed to extract valuable insights for users.

   - An in-depth description of data attributes, accompanied by a curated list of queries designed to guide users in extracting meaningful information from the visualizations.

   - A comprehensive showcase of various design ideas considered during the project's development, with a particular emphasis on the evolution leading to the final set of visualizations.

   - A succinct yet informative overview of the methodology adopted for data processing and visualization, providing a behind-the-scenes glimpse into our systematic approach.

   - For each visualization, meticulous documentation of visual encoding strategies employed, complemented by representative images to enhance clarity and understanding.

   - A systematic breakdown, offering a step-by-step elucidation of the creation process for at least three key visualizations, showcasing your commitment to transparency and clarity in execution.

   - Reflective insights, justifications, and any additional pertinent information pertaining to the choices made in chart selection, offering a deeper understanding of the decision-making process.

     This report encapsulates not only the tangible outcomes of our project but also the meticulous thought processes, collaborative efforts, and methodical approaches that underscore our commitment to excellence.

For Project Type- 2:

This represents a versatile and expansive option, affording groups the flexibility of crafting their report in a format akin to a publishable paper, such as the IEEE conference style format. Groups choosing this option are encouraged to collaborate closely with the teaching team to meticulously outline and develop the report, ensuring it adheres to scholarly standards and effectively communicates the depth of their research.

In essence, the report is envisioned to include detailed group information, offering insights into the strategic division of tasks among group members. Furthermore, it extends beyond the surface to articulate the overarching purpose of the project and the motivational factors that steered the group's focus in that particular direction.

Integral to the report is a robust literature review that contextualizes the project within the broader academic landscape. It then meticulously details the methodology adopted to address the research question, providing a roadmap that highlights the group's methodological rigor.

Moving forward, the report navigates through the intricacies of the design and implementation of the solution, providing a granular understanding of the thought processes and decisions that shaped the project's trajectory. Subsequently, it engages in a comprehensive analysis of the project's outcomes, offering valuable insights into the implications and significance of the findings.

In a forward-looking manner, the report concludes with thoughtful recommendations for further work, creating a seamless bridge between the culmination of the current project and potential avenues for future exploration. In essence, this comprehensive report not only stands as a testament to the group's scholarly depth but also as a valuable contribution to the academic discourse, aligning with the standards of publishable papers in esteemed conferences like IEEE.

4. **Poster:** Create an A1 (or A0) size poster. Your poster should have a title, names of group members, and module code CS5346 S2 AY2023/24.

   For Project Type 1: *It should show (but not limited to) the insights, typically through the selected visualizations. This is an opportunity for your group to be creative.*

   For Project Type 2: *It should show (but not limited to) methodology and outcome.*

   You do not need to print the poster. Submit a softcopy of the poster. There is no separate mark allocation for the poster. *3 marks will be deducted from total project*

marks on non-submission of the poster. 1 mark will be deducted if the poster does not follow the above description.

Craft a captivating visual representation of your project by creating an A1 (or A0) size poster. Infuse this poster with essential components, including a title that succinctly encapsulates the essence of your project, the names of contributing group members, and the module code (CS5346 S2 AY2023/24) for clear identification and context.

For Project Type 1, unleash your group's creative prowess on the canvas of the poster. Showcase, though not confined to, the insights gleaned from your project, using carefully selected visualizations that speak volumes about your findings. This is not just a canvas; it's a platform for your group to express its creativity and present a visually compelling narrative of your research journey.

Conversely, if you're working on Project Type 2, your poster should act as a visual summary, highlighting key elements of your methodology and outcomes. Use this space to provide a glimpse into the structured process your group followed and the noteworthy results you achieved. Let the poster serve as a window into the depth and significance of your project.

Remember, the submission process involves providing a softcopy of the poster; physical printing is not required.

While there isn't a separate mark allocation for the poster, it holds substantial weight in the overall project assessment. Failure to submit the poster will result in a deduction of 3 marks from the total project marks, underscoring the importance of this visual representation. Additionally, adherence to the stipulated description is crucial; deviating from the provided instructions will result in a deduction of 1 mark.

Ensure your poster not only meets but surpasses expectations, becoming a visually compelling testament to your group's dedication and the noteworthy achievements of your project.

Further, please note that your poster will be on display at the NUS library for a few weeks, inviting public views. This unique opportunity allows your project to be showcased to a broader audience, providing a platform for public engagement and interaction with your research insights.

5. **Present your work (~8%):**

   Each project group is required to present or demonstrate their project progress to the lecturer/TA, providing an in-depth overview of the work accomplished.

   Attendance of all group members is mandatory during the presentation or demonstration session, ensuring a comprehensive representation of the collective effort.
   Project groups are expected to utilize their laptops for the session, facilitating seamless integration of visuals and content during the presentation or demonstration.

   Project groups have the option to enhance their presentation by creating an optional video lasting 5 minutes or less. This video should provide a detailed explanation of the visualizations, complete with audio narration. For this extra effort, a project group stands to earn up to 2 bonus marks. To facilitate accessibility, the video should be publicly posted, such as on platforms like YouTube. This not only ensures convenience but also allows for a broader audience to engage with and appreciate the group's work.

   This multifaceted approach to presentation and demonstration emphasizes both live engagement and the potential for a supplementary video component, offering project groups the opportunity to showcase their project comprehensively. The video, in particular, serves as a creative outlet and could potentially earn bonus marks, underscoring the value placed on innovative and engaging project presentations.

Submission

Project Proposal Submission (Deadline: Mon, 12 Feb, 10 pm):
Upload your proposal in the Canvas-Assignment-Project Proposal folder with the file named GroupNumber_Proposal.pdf. For example, if your group is assigned number 7, please name your file 7_Proposal.pdf.

Project Report Submission (Deadline: Friday, 19 Apr, 10 pm):
Upload your report in the Canvas-Assignment-Project Report folder with the filename GroupNumber_Report.pdf.

Poster Submission (Deadline: Friday, 19 Apr, 10 pm):
Upload your poster in the Canvas-Assignment-Project Poster folder and ensure the filename follows the format GroupNumber_Poster.pdf.

Video Submission for Bonus Marks:
Project groups opting to prepare a supplementary video for their project are encouraged to upload it to a public channel such as YouTube. To seamlessly integrate this video into your project presentation, include the link or QR code just below or

next to the title of your poster. The effort put into creating a video could potentially earn your group up to 2 bonus marks.

Presentation or Demo (Scheduled for 20 Apr):
The live presentation or demonstration is scheduled to take place on 20 Apr. Specific time slots for the actual demo will be communicated approximately one week before the scheduled date.

Code or Additional Information Submission:
Should further information, including code or visualization files, github or any deployed application links be required from any group, a separate set of instructions will be issued. Groups will be notified about the submission date, which will follow their scheduled demo date.

Criteria for grading

The assessment of your project will be a comprehensive evaluation of its overall quality, taking into account all milestones and components to determine the final mark for the project.

For **Project Type 1**, the evaluation process will meticulously consider the following criteria during the assessment of reports and demos:

Effectiveness of Visualization:
Does the visualization serve as an impactful and meaningful representation of the underlying data?

Queries:
Does the visualization cater to a variety of analytical queries, showcasing its versatility and utility? Queries should be meaningful, relevant - mapped to dataset and project goals; categorised **e.g.** exploratory or explanatory or confirmatory; statistical, temporal, etc;

Creativity and Novelty:
Does the visualization display creativity, offering fresh and interesting queries seeking insights into the data?

Interactivity:
Does the work include an interactive element within the visualization, enhancing user engagement?

Demonstration Effectiveness:
Was the live demonstration an effective presentation, providing a clear and illustrative overview of the project and its components?

Clarity in Communication:
Does the demonstration effectively communicate the problem and solution, ensuring accessibility to individuals unfamiliar with the project?

For **Project Type 2**, the evaluation process for reports and presentations will consider the following factors:

Research Problem Exploration:
Does the project delve into an intriguing and significant research problem?

Literature Review and Research Question:
Is there a genuine effort in conducting a literature review and in formulating a well-defined research question?

Methodology and Approach:
Is the methodology and approach adopted by the group both reasonable and systematic in addressing the research question?

Outcome Analysis:
Is the analysis of the project's outcome both novel and convincing, showcasing a depth of understanding? Does the work present a compelling and innovative solution to the identified problem?

Reference Appropriateness:
Does the work include appropriate and well-cited references, demonstrating a sound foundation in existing literature?

It is imperative for each group member to contribute significantly in alignment with their respective abilities. The project's grade will be a collective group score, ensuring equal recognition for all group members. However, evaluators reserve the right to make individual adjustments to group members' scores based on their perceived contributions, either upward or downward, to acknowledge exceptional strengths or weaknesses in individual performance within the group effort, as objectively as possible. This ensures a fair and nuanced evaluation that reflects the varied contributions of each member.
