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## pm-02: Initial Design

*This is a group assignment*

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### Purpose:

The purpose of this assignment is to solidify your project topic and begin the design process for your visualization tool.

### Tasks:

Please review the [Project Overview](#) document for a refresher on final project expectations. The requirements listed there must be met unless you have explicit approval from the instructor to do a differentiated project.

#### 1. Final Paper Formatting (11 points)

As part of your final project, you will turn in a paper detailing your visualization tool. Start your paper by setting up proper formatting. You will use the same template you would use for a visualization research paper, the VGTC conference template. This template is available in several formats:

- **Overleaf LaTeX template**
  - Overleaf is an online, collaborative, LaTeX editor. A free account lets you [collaborate by link sharing, similar to Google Docs](#).
  - You can find the VGTC template on Overleaf [here](#).
  - This is the recommended template for easy formatting and collaboration. If you have never used LaTeX before it can be a bit overwhelming. If that is the case, please go to office hours so we can help you set up your document and give you tips for effectively using Overleaf. (If you would prefer, you can also Google just about anything you need to know.)
- **Latex Template**
  - A LaTeX template is available [here](#).
  - In order to use this template, you must have LaTeX software installed locally, and you will need a plan for managing collaborative writing.
- **Word Template**
  - A Word template is available [here](#).
  - If you use this template, you will need a plan for managing collaborative writing.

Please use one of the above templates to properly format your work. Points will be deducted for improper formatting including, but not limited to, incorrect citations, incorrect reference lists, incorrect section headers, incorrect spacing, etc. For reference, [here is an example of paper with the desired formatting](#).

Once you have your formatting set up, please add a title for your project, your names, and the following section headers: Abstract, Introduction, Related Work, Use Case, Data, Design Process, Final Design, Discussion, Conclusion.

#### 2. Data Abstraction (25 points)

##### a) Choose Data

Find data to visualize. You must choose data that is immediately available to you (in other words, reaching out to someone to ask for data and waiting for a response is not compatible with the timeline of this project), and that does not violate any privacy or security concerns.

You may use one dataset or multiple datasets, as long as you end up with at least 200 rows and 5 columns of data to work with. Your dataset(s) will need to be small enough to be stored in the browser (unless you would like to use an API or database backend, however these are outside of the scope of this class, so you would need to implement them on your own), so we recommend keeping them to less than 2,000 rows and 50 columns. If you find a dataset you like that is larger than this, you can still use it, but pick a subset of it to work with.

**b) Assess and Explore Data**

Assess your data. Who collected it? Are there any biases or ethical considerations related to it?

Explore your data. You can use whatever tools you are comfortable with (ex. Excel, Python, Tableau). As you explore, pay attention to:

- Missing values
- Unexpected values
- Outliers
- Attributes that you would like to visualize, but are not included in the data
- Inconsistent or messy data (ex. A categorical attribute with values like “Monday”, “Mon”, and “Monday”)
- Biases in the data

**c) Clean and Process Data**

Perform any necessary data cleaning and pre-processing. You may use whatever tool you are most comfortable with (ex. Excel, Python). If you would like to add any new, derived attributes to your data now is the time to generate them. If you noted any missing or unexpected values, messy data, or biases, now is the time to fix these issues, if possible.

**d) Record**

In the Data section of your paper, add several paragraphs that explain:

- Where your data comes from (who collected it), with a link to the original dataset(s)
- Biases or ethical considerations for your data
- The data cleaning you performed, and any new, derived attributes you added to the data

**e) Abstract**

Perform a data abstraction of your final, clean dataset. To do this, you should identify what each row (i.e. item) of your data represents, and the type of each attribute. Include this abstraction as an appendix to your paper titled Data Abstraction.

### 3. Task Abstraction (33 points)

**a) Refine Use Case**

Revisit the use case you came up with for your visualization. Finalize the use case and add it to the Use Case section of your paper. For detailed instructions on writing a use case, check pm-01.

**b) Identify Domain Tasks**

Based on your use case, identify at least two domain tasks that your visualization will support. Remember, domain tasks are not visualization specific. They should be general tasks that the end user from your use case needs to perform.

**c) Record**

Start the Abstract and Introduction for your paper. The Abstract should, at a high-level, describe the domain tasks your visualization will support, and explain why it is important to support these tasks.

The Introduction should similarly describe the domain tasks your visualization will support and why it is important to support them, but in more detail than the Abstract. In addition, your Introduction should briefly describe the end user for your visualization, and the data you will visualize.

**d) Abstract**

For each domain task, perform a task abstraction. In other words, identify what visualization specific task(s) your visualization will need to support. You may use any of the visualization task taxonomies we have covered in class (Tamara Munzner's, Amar et al.'s, or the Data Viz Project's) for this. Include the abstraction as an appendix to your paper titled Task Abstraction.

## 4. Visual Encoding (30 points)

**a) Find Similar Work**

Before you start designing your visual encoding, check for similar work by others. Identify 2 peer-reviewed papers that can inform your project work. You should look within venues such as IEEE VIS, TVCG, CHI, EuroVis, or CGF. You can search these through Google Scholar, [IEEE Xplore](#), or the [ACM Digital Library](#).

Once you have two papers, add them to the Related Work section of your paper. In that section, briefly recap each paper and explain how the work presented in the paper will inform your visualization. For example, did one include a visualization technique that you think you could extend to be useful for your use case or area of interest? Did you find a paper describing a specific visualization tool made for a context similar to your use case that you can use to inform your work?

As you write Related Work, be sure to cite your sources. Correct formatting of citations will be built into the template you use and should match the style in [this example](#). That example is also a good place to look if you want to better understand the type of prose expected in a related work section.

**b) Sketch**

Keeping in mind your data and visualization tasks, begin to sketch what your visualization will look like. Keep in mind that your final visualization needs to be interactive and include multiple, coordinated views (amongst the other requirements listed in the [Project Overview](#)).

Come up with three rough or partial sketches of your visualization, and one final, polished sketch. The final, polished sketch should include notes or visuals explaining interactive and coordinated elements of the visualization.

Need inspiration? Try looking at [Tableau Viz of The Day](#), [The New York Times](#), [FiveThirtyEight](#), [R Shiny Visualizations](#), [D3 Examples](#), [Flowing Data](#), or [Information is Beautiful](#). (This is not an exhaustive list of places for inspiration, feel free to do your own search as well).

**c) Record**

Add your three rough or partial sketches and your final, polished sketch to the Design Process section of your paper. And some text that explains what each sketch shows and how the rough or partial sketches influenced the final sketch. Also add text that explains the final sketch in more detail including the marks and channels chosen, general functionality, and coordination between views.

## Submission:

Save your document as a PDF and submit it on Gradescope. **Be sure to assign questions to pages appropriately when you submit.**