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User Interface Assignment

1. **Software overview and focus group feedback for primary function**

The software program being developed by my team is designed to visualize data from a research experiment involving mice. As part of a project for my Software Engineering class, the finished software will be delivered to a group of university researchers. The researchers need a method of converting their data into two main types of visualizations: heat maps and vector (line path) maps; the creation of these visualizations is the primary goal of the software. The finished software should be able to load data from a file, convert data into data structures for internal use by the program, generate both static and animated visualizations of the data, and export the visualizations as images.

Primary function: Load data set from a file

The following are comments from a focus group. Members are identified as FGM (Focus Group Member) 1 – 4.

1. How will you interact with this feature?

- FGM 1: Click on the File button.
- FGM 2: Drag the icon of a file to load into the software.
- FGM 3: There would be a button that said load File. Then choose which file, similar to adding an attachment to an email.
- FGM 4: Click on a load File button.

2. What should you be able to do?

- FGM 1: Click a File button, wait for about a second for the software to respond.
- FGM 2: Ability to see the file that was selected in the software.
- FGM 3: When activating the loading process, expect feedback that confirms the file has been loaded, and indication of file path.
- FGM 4: Interact with the file selected to choose specific range, assuming the data is continuously logged. May want to inspect individual data records. Look at the data associated with one particular tag or reader.

3. What should you not be able to do?

- FGM 1: Don't click on (the File button) like crazy
- FGM 2: Prevent the user from deleting the file from the software.
- FGM 3: Prevent using up the computer's memory, prevent loading from wrong folders. Consider the implications of memory and current work when loading a new file into a session that currently has a data set loaded.

- FGM 4: Should not be uninterruptable and should not allow other unauthorized users to delete a data set that has been loaded.

4. What is important to you when considering this function?

- FGM 1: That it should work.
- FGM 2: Doesn't introduce security issues (virus, malware)
- FGM 3: To be able to rename the selected file from within the software.
- FGM 4: The software should indicate real-time progress.

User model summary:

The software should be able to recognize when the user wants to load a file, either by utilizing a specific “Load File” button or allowing file drag-and-drop functionality. Once initiated, this activity should start fairly quickly, and the software should provide real-time feedback and also allow the user to load a range of data from within a file. During the load file activity, the software should disable certain GUI controls, protect the selected file from being deleted, prevent the consumption of all a computer's memory, and allow the user to halt the operation at any time. Users consider completeness, security, file renaming ability, and real-time feedback to be important regarding the load file functionality.

2. **Software functionality prioritization**

The following is a list of activities that the software needs to perform, prioritized based on importance; higher placement on the list equates to higher priority. Certain items are more important than others due to their essential roles in the software and the dependency relationships between items. For example, the user will not be able to load a data set file without a graphical interface to facilitate that action, which is why a functioning scaffold of the GUI must be created beforehand. Items with an “[E]” next to their labels are more essential to the primary functionality of the software than items without an “[E]”. The items marked as essential comprise the software's core capabilities, while the items not marked embellish the range of capabilities provided by essential items. This can be observed in the relationship between item 8, an essential activity, and item 16, which adds additional functionality to the activity in item 8.

1. Functioning scaffold of the Graphical User Interface [E]
2. Load file from file system [E]
3. Parse the data within the selected file into data structures [E]
4. Choose to generate either a static (immediate generation) or dynamic (animated over time) visualization of the data [E]
5. Generate default configuration heat maps of the parsed data [E]
6. Generate default configuration vector maps of the parsed data [E]
7. Generate default configuration overlay of heat and vector maps of the parsed data [E]
8. Export the generated visualization as an image file [E]
9. Save the current state of the software in a file that represents the software's state [E]
10. Load a previous session of the software from a file [E]
11. Select which mice to visualize and their colors as they will appear in the visualization
12. Select a starting and ending data entry to bound the visualization generation
13. Use media transport controls (Play, Pause, Restart) to control the visualization generation

14. Select the rate at which dynamic visualization generation (animation) should happen
15. Delete previous sessions of the software from within the GUI
16. Choose image quality and dimensions settings when exporting visualizations

3. **Prototype of interface screens in the software**

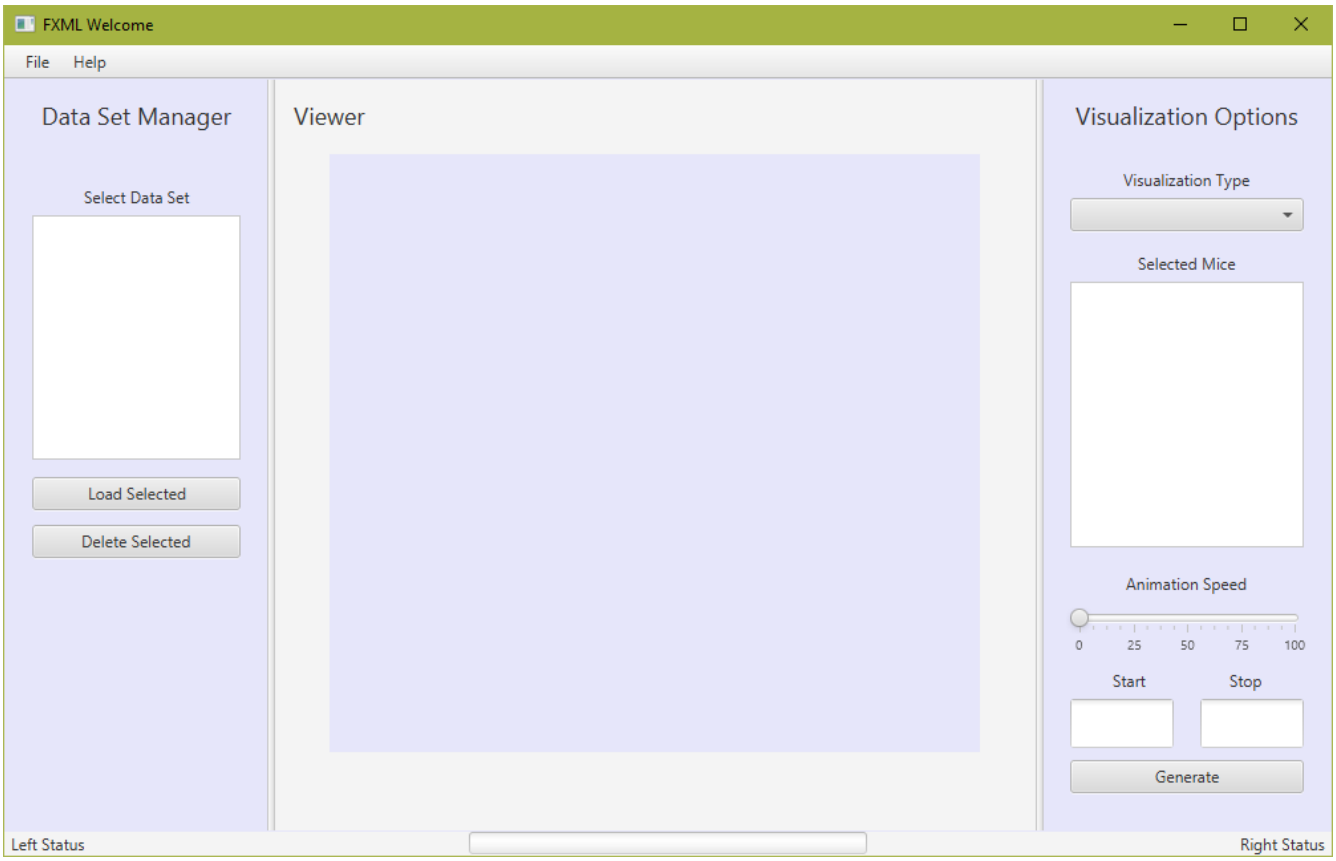

Figure 1. Prototype of the user interface

4. **Prototype focus group feedback for primary function**

The following are comments from the same focus group previously interviewed. These comments are about the interactions with the software, based on the user interface prototype in Figure 1, that detail the actions needed to be taken in order to accomplish the primary function (Load data set from a file) from section 2 of this paper.

- FGM 1: You click on the File button and the software displays a file chooser for selecting a file
- FGM 2: You click on the File button and select the file from the file chooser.
- FGM 3: You select a file in the Select Data Set window and click the Load Selected button. Otherwise, if the file desired does not appear in the Load Selected window, click the Help button to learn how to select a file. Also, the software should give guidance regarding the allowable types of files able to be selected for use by the system.
- FGM 4: Once loaded, the system should be able to evaluate certain events/trends evident in the data.

Based on the comments from the focus group, the current user interface prototype roughly matches user expectations for the activity of loading a file. Most members of the focus group visually searched for GUI controls in the software that looked like they were associated with file load and save operations.

5. **Refine the user interfaces**

Although the prototype interface was able to be interpreted by the focus group, it could use several improvements. The prototype would better fit the user model if ambiguity regarding the functionality associated with certain GUI elements is eliminated or reduced. This could possibly be rectified by relabeling the GUI controls with better descriptors and by providing the user with a brief explanation of a GUI control when it is hovered over. Also, the System could make available a quick reference guide that is able to be opened in a second window for the purpose of providing instructions about how to load a file (and perform other software actions). These changes will be discussed with the other members of the implementation team before being pursued.