

Graphs

1. Company Background

Dr. Owen Hildreth is an Assistant Professor in the Department of Mechanical Engineering at the Colorado School of Mines. His primary research is on nanometer to centimeter-scale additive manufacturing technologies. He has written numerous MacOS applications for custom data-collection and visualization as part of his research.

2. Project Description

Current methods of data visualization on OS X based platforms isolate data into individual files spread throughout the file system. This impedes the analysis, discovery, and comparability of a user's data. To address this issue, Dr. Hildreth wrote a database-backed graphing program while in Graduate School. Originally titled "GraphBase," this tool deconvoluted data organization from the file system and provide a graphical database solution for data organization and visualization. It is kind of like iTunes, but instead of organizing and playing music files, it organized and "played" data.

To decouple the graphing UI from the database, the program leverages DataGraphs framework and UI, users simply make a DataGraph file once and use that as a template for their data. The program allows the user to assign default DataGraph and parse templates to "folders" and users can also set different DataGraph and parse templates to individual files.

This program was written for OS X 10.6 and last updated for 10.8. Many of the APIs used have been deprecated and the program needs to be re-written using modern API, modern languages (Swift), and modern UI. I'm looking for a team interested in learning Swift and macOS API to make a new and improved graphing program for my lab.

Required features:

- hierarchal source list
- list view of all data files in the selected source folder and within all children folders
- graph view using DataGraph framework
- inspector pane with following inspectors
 - current data and folder inspector
 - parse editor and inspector
 - graph template importer and inspector
 - raw data
- be able to import
 - individual files
 - folders w/ sub-folders
 - DataGraph files as graph templates
 - parse templates
- intelligently assign default graph and parse templates
 - e.g. assign based upon current folder defaults
 - if importing folders w/sub-folders, import graph and parse template files and assign those as defaults for that folder and sub-folder
- use Paintcode to generate code-based UI icons when possible
- be able to parse files with 50,000+ lines of data quickly
- Open in DataGraph from relevant locations (graph template, data, graph)
- Reveal in Finder for selected files
- Feature parity with existing program

Stretch Goals:

- cache parsed and graphed files for quicker loading of large files
 - must first check to ensure that existing data, parse template, and graph templates haven't been updated since last cache
 - must include preference panel on caching options
 - current size of all caches
 - empty cache button
 - selection tool for determining minimum file size for caching
 - must include button for turning on/off caching feature
 - cache data under `~\Application Support\H-Nano\App Name`
- add "Watch Folder" that automatically adds files and folders to the program whenever relevant files/folders are added within the watched folder
 - must include list of watched folders in preference pane
 - ability to remove a watched folder without removing the data from the program
- add options for viewing graphs if multiple data files are selected
- add tab bar for viewing multiple graphs

This project is an excellent opportunity for students to create a graphing program with immediate real-world applications. Students will get experience with Swift and macOS API.

2.1 Deliverables

1. Final design report (mandatory for all teams)
2. Working application for designing boxes that meets the specifications listed above.

2.2 Summary

Develop a data visualization program for automatically parsing and graphing 2D data.

3. Desired Skill Set

Curious, self-motivated, students interested in making useful applications. Experience writing applications for macOS, iOS, or the Swift programming language is a plus.

4. Preferred Team Size

3-5 students

5. Internship Opportunity

Lab research opportunities continuing application within Hildreth's lab.

6. Location for Work

Off-site and on-site at Colorado School of Mines.