Visualizing NEES Activities
Using Web Services and Object Relational Mapping
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Introduction

Efficient visualization of data is one of the best ways to communicate information clearly and effectively.

The activities page on the NEEScentral website provided information about upcoming research in 3 different ways: a site list, an activities map (shown in Figure 1 below), and an experiment list.

Methods

In its beginning stages, the map was hosted on a remote server for testing and debugging.

Debugging methods included the Google Code Playground (a visual code testing environment for Google API developers), the Google Map discussion board, and firebug (a web development tool that can inspect, edit, and monitor live in a webpage.)

Once the 15 sites and upcoming experiments were added to the map, the different methods of database querying were researched in hopes of adding data from the NEES metrics page.

In order to incorporate this information into one streamlined application, a Google Map was created to visualize the 15 NEES sites and their corresponding activities, experiments, and statistics.

Site status and the list of upcoming experiments were retrieved in XML format via the Web services provided by NEEScentral for accessing site activities.

In order to access this data, the XML page is parsed using an XML DOM (XML Document Object Model) which creates the document attributes as a tree so its content can be easily extracted.

In order to update these statistics, the XML page is updated using an external tool such as Propel. In addition, my paper on this topic will also be posted on the NEEScentral website.

Results

Figure 1: Existing NEES Activities Map

Figure 2: Google Map Application of the NEES Activity Sites

Figure 3: infoWindow of Upcoming Experiments

• Figure 2 shows the current google map of the NEES Activity Sites, which stays consistent with the prior NEES Activities Map by using the same marker colors and scroll over action.

• Added information about an individual site's location, experiment status, and future experiments, are displayed using the infoWindow class shown above.

• If a site has upcoming experiments, the site's info window will contain a hyperlink to the number of experiments.

• When clicked, another infoWindow will open, like the one shown in Figure 3, displaying information about upcoming experiments.

• The upcoming experiment information and site status is routinely updated using an XML page.

• The NEES metrics page displays information about past NEES experiments. Eventually, these statistics will be added to the google map.

• Since this data is fairly complex in nature, an object relational mapping framework such as Propel, could be used for easier access to the NEEScentral database.

Conclusion

The main result of this project was finding the right tools to visualize the NEES activities page effectively. Web services, such as google maps, are useful for the presentation layer, like plotting the NEES activities. However, more complex queries, like extracting data from the NEES Metrics page, require using a richer interface such as Propel.

The debugging process correlates directly with the complexity of the query. While the Google Maps API is easy to implement and manipulate, its vague syntax makes it difficult to debug. In contrast, Propel is a complex object relational mapping framework which is time-consuming to master. This is partly why incorporating the NEES metrics data is a work in progress. However, Propel's detailed documentation syntax make easier to analyze and debug.

The NEEScentral website contains a variety of information about the NEES experiment sites. In order to effectively visualize this information into one application, several different web programming tools are needed: an external mapping API (Google Maps), a simple document object model (XML DOM parser), and complex database queries (propel). By using a variety of tools, the NEES Activities are being brought together in visually pleasing application, incorporating upcoming experiments, activity status, and site statistics.

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References


Further Information

For further information on this project, the map application will be available on the NEEScentral.