



Google Summer of Code 2009
Gephi, network exploration software



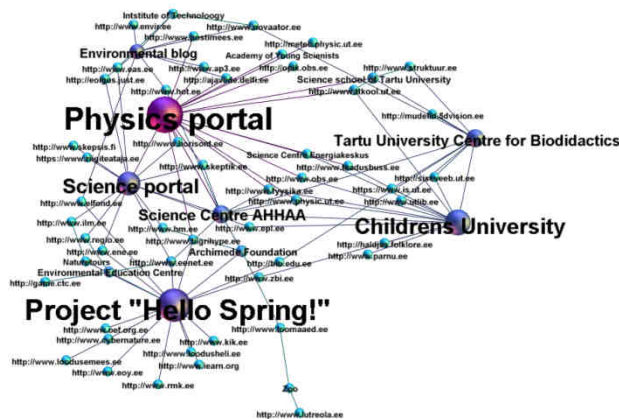
Call for Student Applications

Profile: BSc/MS/PhD in Computer Science and Complex Networks

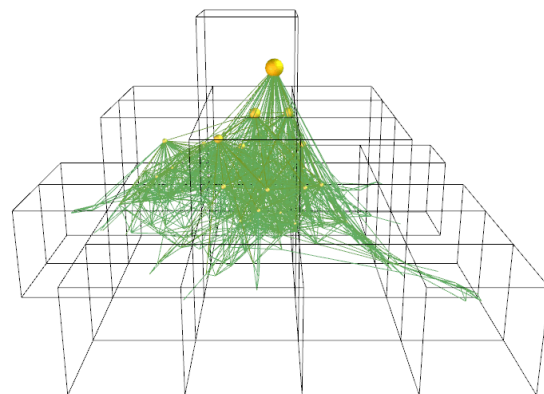
Overview

Gephi is an open source software for graph and network analysis. It uses a 3D render engine to display large networks in real-time and to speed up the exploration. Gephi brings a complementary way to statistical analysis to discover, extract and classify new patterns in network structures and data. Our goal is to set networks in the hands of the most, as a tool for understanding the world and revealing its organization.

Google Summer of Code (GSoC) is a global program that offers student developers stipends to write code for various open source software projects, fund over a three month period (4500USD per student). Through this, accepted student applicants are paired with a mentor from the participating projects, thus gaining exposure to real-world software development scenarios and the opportunity for employment in areas related to their academic pursuits.



Gephi: Graph of websites in science education



Gephi: 3D network

Idea #1 Shader engine

Required skills: Java, OpenGL, GLSL

This proposal is an experimental work about drawing large networks using GPU Shaders technology to improve performances and scalability. The aim is to create a basic 3D engine using suggested technologies and use it for drawing as many nodes and edges as possible.

Existing Gephi 3D engine is intended to be used with old hardware and so don't profit from GPU revolution. Basically the engine draw only very basic shapes (sphere or cube for nodes and lines for edges), but a LOT of them. Drawing millions of objects, even if it is the same object is currently far from possible.

Shaders technologies have interesting features for our topic. For instance Geometry Shaders and (Pseudo-) Instancing techniques enhance performance when duplicating objects. Other techniques could be explored to reduce the amount of needed vertices or computing.

Complete description: http://gephi.org/google-soc/Gephi-google_soc1.pdf

Idea #2 Network algorithms and statistics

Required skills: Basic graph theory, Java

This proposal focuses on network analysis, through statistics and various algorithms. Though Gephi focus on powerful and easy-to-use exploration features, it is not enough to understand and classify all networks. Classical results like graph density, clustering coefficient or the number of weakly connected components help to recognize pattern and in general find features in network structure and data. Hence we propose to implement some of these algorithms in Gephi statistical module:

- Watts Strogatz Clustering Coefficient
- Pagerank
- HITS
- Network Diameter
- Node Betweenness Centrality
- Average Shortest Path

Implementing these algorithms will convey good overview on classical graph algorithms and some knowledge about fascinating results (like Watts-Strogatz Small Worlds model). Execution and results visualization tests will use native Gephi features.

A flexible architecture is able to host statistics algorithms and coding into needs only little programming experience. Moreover we will offer mentorship to get into existing interfaces. Existing documentation, resources and source code already exist on Internet for all of these algorithms.

Complete description: http://gephi.org/google-soc/Gephi-google_soc2.pdf

Idea #3 Vectorial preview

Required skills: Java, SVG basics

Gephi is able to export its network as SVG or PDF format. Using vectorial drawings for graph have many benefits like infinite zooming or clear shapes. The aim of this proposal is to develop a preview module in Gephi for seeing how the output will exactly looks like with the given parameters.

Whereas the embedded 3D engine is designed for efficient network exploration the vectorial export concentrate on clarity, readability and outstanding design. This module has many different settings like edge thickness, arrow size, white borders around labels, node border and so on. In the vein of WYSIWYG editors we would like to see direct setting change on a Vectorial Preview window. The module must be scalable to support large networks.

To resume there are two requirements, previewing the network exactly how it will looks-like in output and support huge graphs efficiently.

Technically the aim is to display the network exactly as it will be when opening the SVG, PDF or EPS in a postscript editor (Inkscape, Adobe Illustrator). This can be done with different approach, the student will have to compare and choose the most suitable.

Complete description: http://gephi.org/google-soc/Gephi-google_soc3.pdf

Eligibility

In order to participate in GSoC, the student applicant must be enrolled in or accepted into an accredited institution including, but not limited to, a college, university, masters program, PhD program or undergraduate program. Students who are not currently enrolled in, but have been accepted into, one of the aforementioned programs by April 20, 2009 are eligible to participate. Upon request, students must provide Google with an official transcript, letter confirming acceptance or enrollment, or other documentation approved by Google from their accredited institution in a timely manner. Students must be 18 years of age or older by April 20, 2009, to be eligible to participate in Google Summer of Code 2009. Students must be eligible to work in their country of residence throughout the duration of the Program.

Application Instructions

Students can submit their applications via the [Google Summer of Code 2009](#) site from March 23 - April 3, 2009. The best applications received are generally from students who took the time to interact and discuss their ideas before submitting an application, so make sure to check out our ["Ideas" list](#) and our [forum](#).

What should a student do: <http://gephi.org/forum/topic.php?id=408>

Evaluation Criteria

Only one student can work per application. We will choose students according to their skills and motivation. Current proposals don't require deep understanding of existing code; candidates shall concentrate more about proposals description, resources or publications. Once accepted, mentors will fill out mid-term and final evaluations for their students via the Google Summer of Code 2009 site.

How to contact us

- Through our forum: <http://gephi.org/forum>
- By e-mail: gsoc@gephi.org

Resources

- Gephi at GSoC (<http://socghop.appspot.com/org/show/google/gsoc2009/gephi>)
- Ideas (<http://gephi.org/google-summer-of-code-2009/>)
- How to join (<http://gephi.org/forum/topic.php?id=408>)
- Advices for students (<http://code.google.com/p/google-summer-of-code/wiki/AdviceforStudents>)
- Terms of Service (<http://socghop.appspot.com/document/show/program/google/gsoc2009/tos>)
- Gephi gallery (<http://www.flickr.com/photos/gephi/>)

Additional note

Gephi will officially be presented at the 3rd Int'l AAAI Conference on Weblogs and Social Media (ICWSM) conference: <http://www.icwsm.org>