1. Introduction (Motivação /Contexto)
   1. Outline

This presentation is divided into X parts.

In chapter 2 we will describe the domain of our problem and our approach to solve it. In chapter 3 we will introduce the technologies that are going to be used in this project, this includes Softwares, Libraries and other resources. In chapter 4 we will overview the projects Arquiteture, namely its components and how the problems and goals pointed out will be solved, we’ll also discuss implementation details about each of the components.

In chapter 5 we will talk about the plan delineated in the project proposal and the progress so far.

* 1. Objectivo

Phyloviz (1) is an open source platform that provides analysis of sequence-based typing methods that generate allelic profiles from DNA sequencing, where this project is going to be included.

With the information obtained from these techniques it’s possible to estimate Phylogenetic Trees, which is a representation of the relationships of gene or protein sequences to their ancestral sequences and complementary information.

Phyloviz is available as Desktop application developed in Java, available for all platforms, and online application, Phyloviz-Online (5).

The goal with this project is to provide a solution to be included in Phyloviz-Online platform that uses a Force Direct Layout (6) for phylogenetic trees visualization.

Ter uma solucao phylo online mas que posso ser facilmente integrada numa aplicação ou também correr em aplicação desktop. Porque

1. Problem Description

The project will be built as a cross-platform desktop app, using Electron Js. This solution will be independent from the other modules and it will be developed in Javascript, html & css. The project architecture will be divided into independent modules that can be used separately.

Force Directed algorithm is a graphic algorithm based on a physical model, simulating physical forces among the set of edges and nodes, based on their relative positions, and using forces to simulate movement.

The solution should also include, pie-Chart Graphics, Labels, Filters, Statistics, the possibility to save image state and to collapse and expand specific regions of the graph.

What differs this project from the previous Phyloviz Force Directed Layout implementation:

The expand and collapse feature, it will have the possibility to add complementary data to FDG, save state of a graph, reports and statistics.

1. Technologies

In this chapter we introduce the technologies used in this project, such as softwares, libraries and resources:

* 1. Electron JS

To develop the project, we decided to go with Electron, this software is used to build cross-platform desktop apps with JavaScript, HTML and CSS. This means it can be used for both web applications and desktop applications with the same source code.

Also, Electron in known for its great performance when compared to native applications.

* 1. Graphic Drawing Libraries (D3 vs Sigma vs VivaGraph)

For drawing force directed Graphs we found the 3 libraries to test.

D3, Vivagraph and Sigma. We tried implementing algorithms on all 3 of them, Sigma Js had very little documentation so we decided to discard it right away.

To choose between the other 2 libraries , D3 and Vivagraph performance tests were made as we can see the results in the following table:

Here we can see the type of render supported, if it allows node customization, if it allows to save coordenates/state of graph, latest release, and finally if it has an active community.

After answering this questions we did time tests on graph rendering, for this we tested with simple graph, no customization, simple graph with labels on the nodes, and with a different rendering function. All of them for a small tree, medium tree and big tree up to 20 thousand nodes.

As we can see in the table is clear that the D3 Library is substantially faster in all of the tests.

Newick Tree Parser Library

Express Node Js

4. Arquiteture

4.1 Data Model

5. Progress & Plan