



Knight Foundation School of Computing and Information Sciences

Fall2022 Senior Design Project

CyFinder

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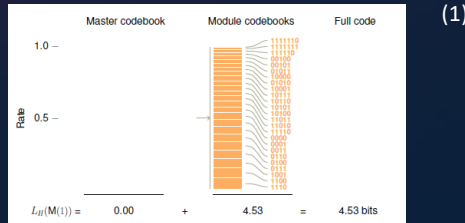
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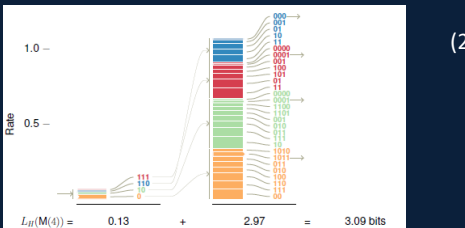
PROBLEM

Cytoscape is a bioinformatics software that allows researchers to graph networks and interact with them by using built in & third-party plugins to add functionality to the program. The current design of the CyFinder project is a plugin that gives users the ability to perform many types of clustering, pathfinding, and other algorithms over these complex biological networks. The focus of the project is to expand on the algorithms implemented in the CyFinder plugin, adding more community detection algorithms as well as fixing bugs, UI, and edge-case errors to improve the overall functionality of the plugin.

VERIFICATION



The per step description length is 4.53. We cannot capture the higher order structure of a network.

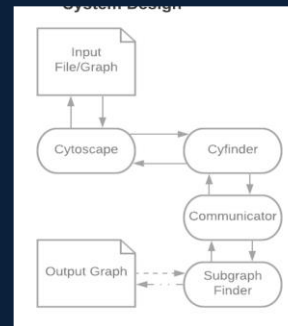


After using the Map Equation we can compress the description length down to an average of 3.09 bits per step.

CURRENT SYSTEM

The current system design of the CyFinder plugin allows a user or researcher to take imported graphs, either directed or undirected and use them either within the Cytoscape interface or the implemented Command Line Interface within the Subgraph Finder project. It has multiple community detection algorithms like Luvian Algorithms. In expanding the current System, we implemented the Infomap Algorithm(only on the backend of the CyFinder plugin), that is a network clustering algorithm based on the MapEquation.

SYSTEM DESIGN



SUMMARY

- Understand the Map Equation and how can be implemented in our project.
- Find the implementation of the different variables and function of the Map Equation and how the equation should be coded.
- Review code to check the implementation for the map equation was correct.

REQUIREMENTS

Software

- Java
- Maven
- Eclipse
- Cytoscape
- GitHub



Version Control:

GitHub:

<http://www.github.com>

IMPLEMENTATION

- Java 13.0 : Main Language on entire project
- Maven: Combined logic with the GUI to generate JAR
- Apache Ant: Responsible for building the module that contains

The logic of CyFinder

- Cytoscape API: Tools required for Cytoscape integration
- Cytoscape 3.9: Core Software

REFERENCES

- Infomap - Network community detection using the Map Equation framework. (n.d.-b). [mapequation.org](https://www.mapequation.org/infomap/). Retrieved November 26, 2022, from <https://www.mapequation.org/publications.html>
- Rosvall, M., Axelsson, D., & Bergstrom, C. T. (2010). The map equation. Retrieved November 26, 2022, from <https://www.mapequation.org/publications.html>
- Rita, L. (2021a, December 14). Infomap Algorithm - Towards Data Science. Medium. <https://towardsdatascience.com/infomap-algorithm-9b68b7e8b86>



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