

Analyzing Biological Networks

Students: Jose Altamirano, Mojeed Ashaleye, Ralph Calixte, Austin Escobar, Rebeca Gonzalez, Adeel Hye, Alexis Loriga, Daniel Milanes

Mentor: Ananda Mondal, Raihanul Bari Tanvir

Instructor/Faculty: Seyedmasoud Sadjadi, Florida International University

PROBLEM

- Cytoscape is a bioinformatics software that allows researchers to graph networks and interact with them by using built-in and third-party plugins to add functionality to the program.
- The focus of the project is to expand on the algorithms implemented in the CyFinder plugin, as well as fixing bugs, UI, and edge-case errors to improve the overall functionality of the plugin.

CURRENT SYSTEM

- The current system design of the CyFinder plugin allows a user to run several algorithms on imported networks either within the Cytoscape interface or the CLI of the SubgraphFinder module.
- Through the duration of the project, two new classes with various functionalities—InfomapAlgorithm and MapEquation—were implemented.

REQUIREMENTS

Software:

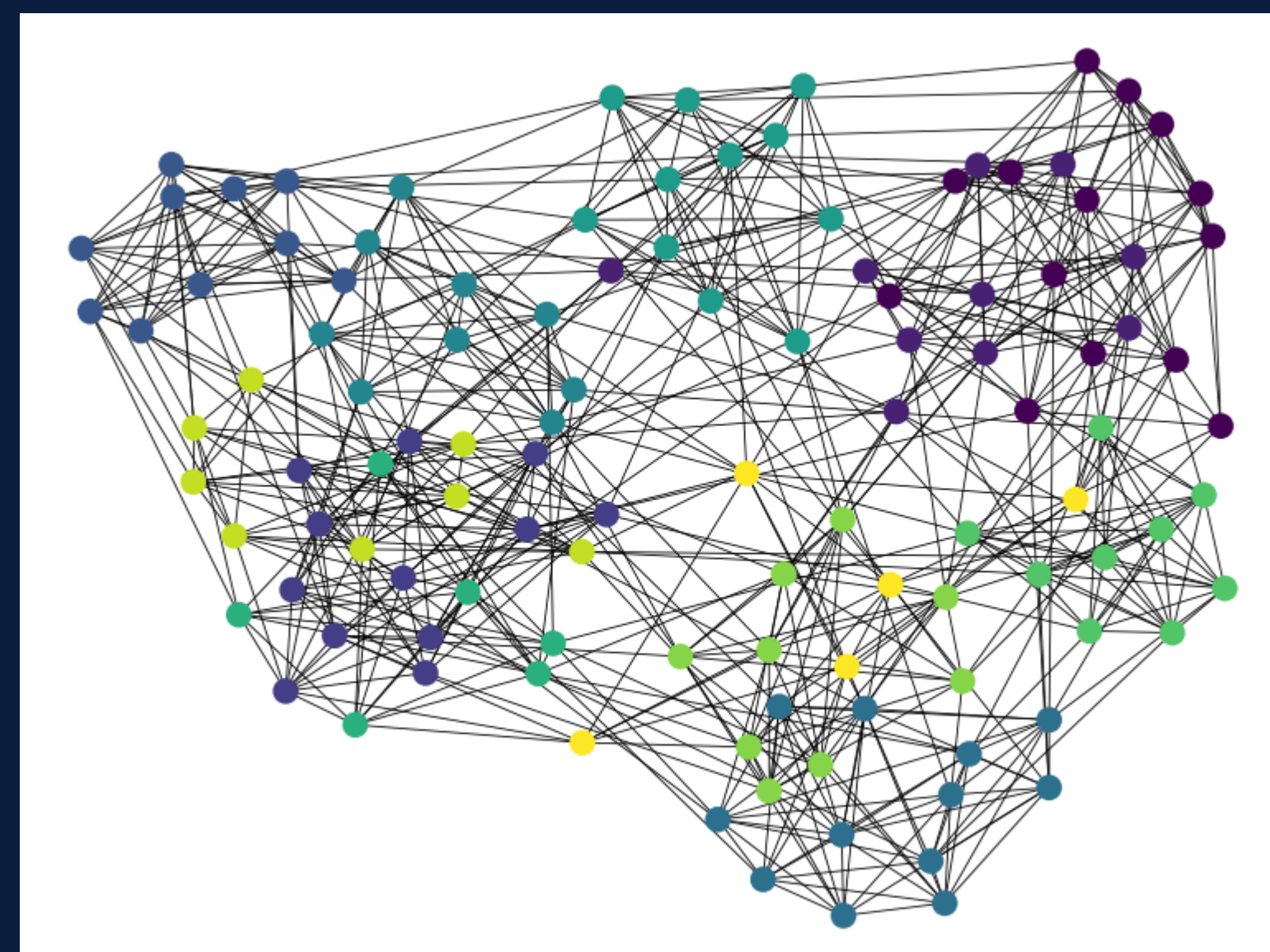
- Java 11.0 Maven
- Apache Ant
- Cytoscape 3.9
- Any IDE that supports Java



Version Control:

- GitHub

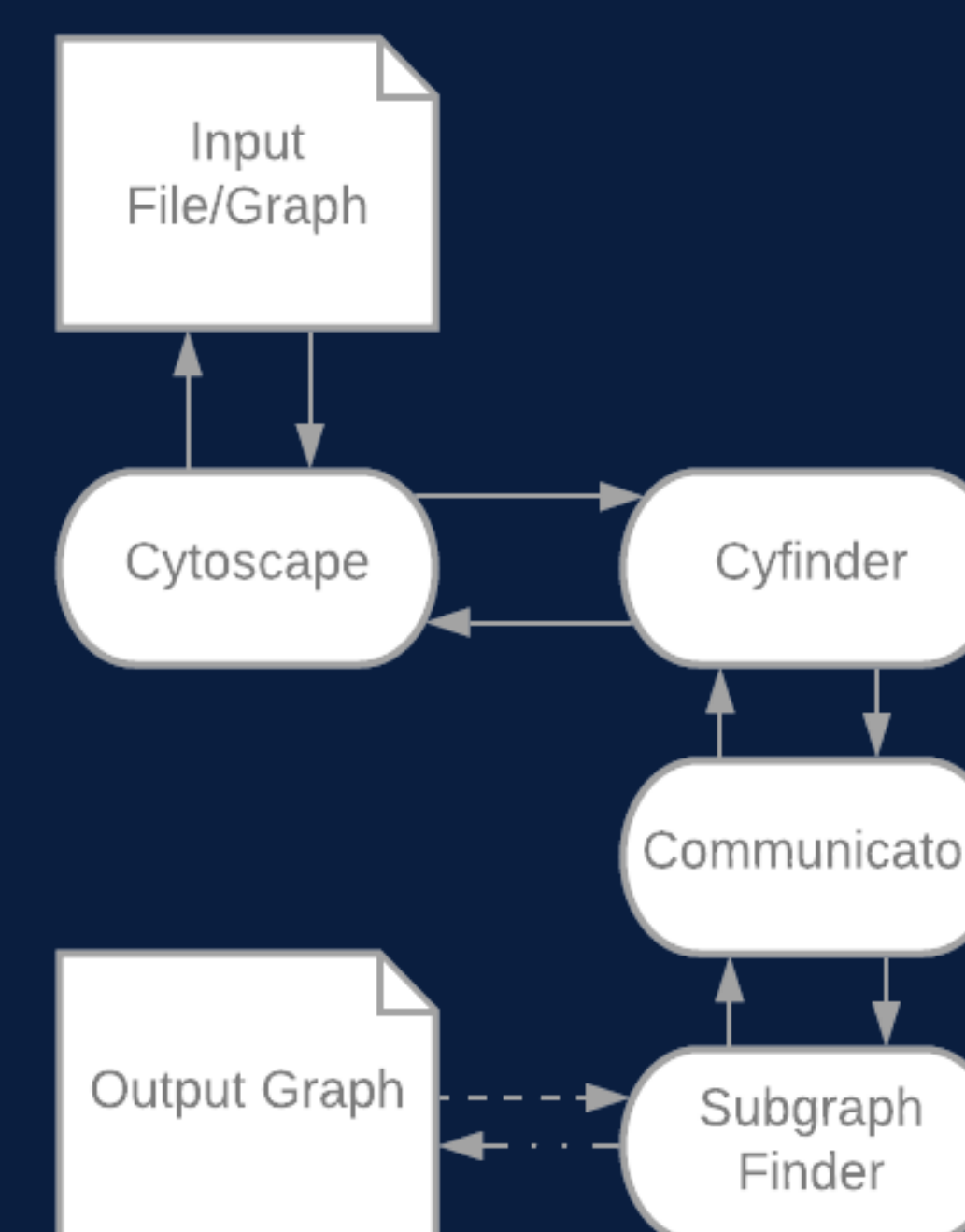
VERIFICATION



A community graph (above) and its representation in the Infomap class (below)

c	z	No	80	176	No Balance	No main
c	s	No	80	897	No Balance	No main
c	r	No	80	751	No Balance	No main
c	j	No	80	881	No Balance	No main
c	r	No	80	891	No Balance	No main
c	p	No	80	580	No Balance	No main
c	g	No	80	418	No Balance	No main
c	r	No	80	333	No Balance	No main
c	s	No	80	761	No Balance	No main
c	h	No	80	760	No Balance	No main
c	d	No	80	542	No Balance	No main
c	s	No	80	497	No Balance	No main
c	i	No	80	682	No Balance	No main
c	x	No	80	832	No Balance	No main
c	r	No	80	651	No Balance	No main
c	n	No	80	353	No Balance	No main
c	q	No	80	475	No Balance	No main
c	s	No	80	612	No Balance	No main
c	h	No	80	468	No Balance	No main
c	g	No	80	263	No Balance	No main
c	q	No	80	684	No Balance	No main
c	f	No	80	521	No Balance	No main
c	x	No	80	913	No Balance	No main
c	o	No	80	663	No Balance	No main
c	n	Yes	80	19	No Balance	No main
c	u	Yes	80	27	No Balance	No main
c	j	Yes	80	9	No Balance	No main
c	w	No	80	183	No Balance	No main
c	g	No	80	283	No Balance	No main
c	v	No	80	243	No Balance	No main
c	e	No	80	644	No Balance	No main
c	n	No	80	658	No Balance	No main
c	n	No	80	256	No Balance	No main

SYSTEM DESIGN



SUMMARY

- Partial contribution to the logic behind the random walker function of the Infomap Algorithm.
- Partial contribution to research regarding the map equation and its associated functions.

IMPLEMENTATION

- **Java 11.0** - The language used for the project.
- **Apache Ant** – Responsible for building the module that contains the logic for CyFinder.
- **Cytoscape 3.9** - The tool used to present the biological networks.
- **Github** - The site used for hosting the project.

REFERENCES

Rosvall, M., Axelsson, D. & Bergstrom, C. The map equation. *Eur. Phys. J. Spec. Top.* **178**, 13–23 (2009).
<https://doi.org/10.1140/epjst/e2010-01179-1>