Carchidi Count User Manual

Welcome to the Carchidi Count User Manual! This guide will detail instructions on how to set up our Carchidi Count calculator and visualization tool.

Installation and Setup

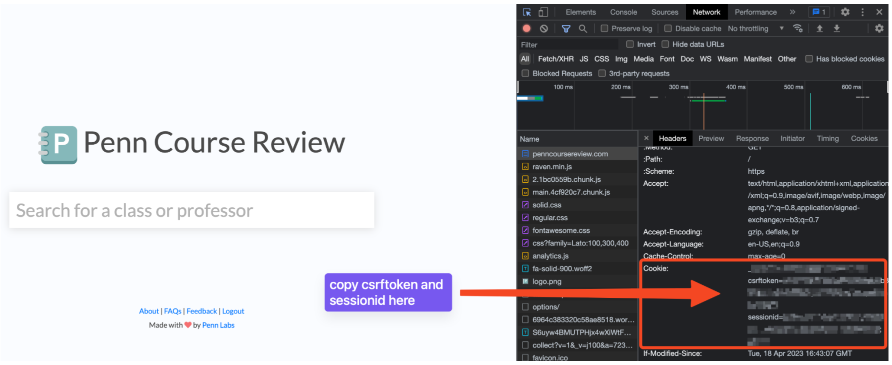
Open the provided `CarchidiNumber` directory in IntelliJ or your favorite Java IDE. Be sure to use the included `pom.xml` file to ensure that the correct dependencies are installed and the versions are correct. We are using Java 8 with AdoptOpenJDK version 1.8. In addition, we use the `json` library with Maven coordinates `org.json:json:20220924`. (These should be automatically configured.)

If you want to create new visualizations (one has been provided using Michael A. Carchidi as a starting node), you'll also need a recent Python installation. We recommend using a Python virtual environment:

- `python3 -m venv env`
- `source env/bin/activate`
- `pip3 install -r requirements.txt`

Potential Issues with the Penn Course Review API

It is possible that there may be authentication issues with the Penn Course Review API. As a workaround, it may be necessary to change the pre-configured `csrftoken` and `sessionid` cookies in `PCRParser.java`. This can be done by going to penncoursereview.com and copying the requisite cookies from the network tab in the developer panel. This shouldn't be a problem but we'll note it here just in case—please let us know if there any issues arise.


Penn Course Review
Search for a class or professor
About | FAQs | Feedback | Logout
Made with ♥ by Penn Labs
Elements Console Sources Network Performance
Preserve log Disable cache No throttling
Filter Invert Hide data URLs
All Fetch/XHR JS CSS Img Media Font Doc WS Wasm Manifest Other Has blocked cookies
Blocked Requests 3rd-party requests
100 ms 200 ms 300 ms 400 ms 500 ms 600 ms
Name
penncoursereview.com
raven.min.js
2.1bc0559b.chunk.js
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solid.css
regular.css
fontawesome.css
css?family=Lato:100,300,400
analytics.js
fa-solid-900.woff2
logo.png
options/
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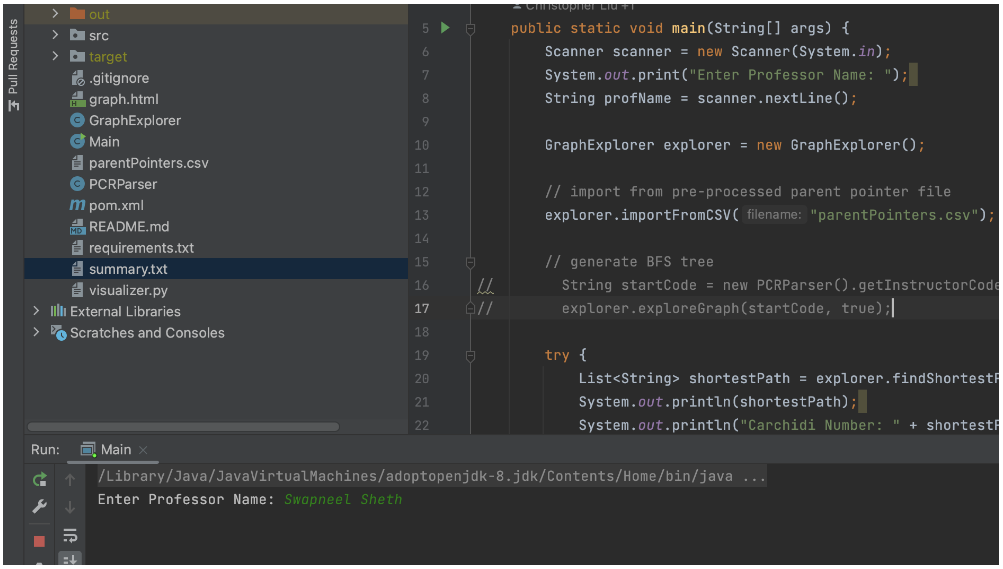
S6uyw4BMUTPHjx4wXiWtF…
collect?v=1&_v=j100&a=723…
favicon.ico
Headers Preview Response Initiator Timing Cookies

copy csrftoken and sessionid here

```
:Path:             /
:Scheme:           https
Accept:            text/html,application/xhtml+xml,application
                   /xml;q=0.9,image/avif,image/webp,image/
                   apng,*/*;q=0.8,application/signed-
                   exchange;v=b3;q=0.7
Accept-Encoding:   gzip, deflate, br
Accept-Language:   en-US,en;q=0.9
Cache-Control:     max-age=0
Cookie:            _[redacted]
                   csrftoken=[redacted]
                   sessionid=[redacted]
If-Modified-Since: Tue, 18 Apr 2023 16:43:07 GMT
```

Basic Usage

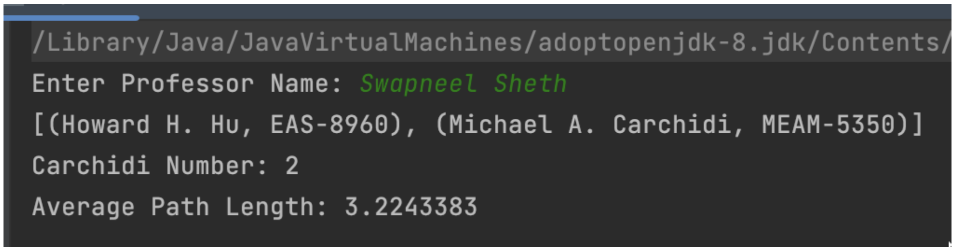
The program entry point is in `Main.java`. If you run the program as-is, you'll be prompted to enter the name of a professor. Note that the professor's name must be exactly as listed in Penn Course Review (Robert W. Ghrist, for example).



```java
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter Professor Name: ");
        String profName = scanner.nextLine();

        GraphExplorer explorer = new GraphExplorer();

        // import from pre-processed parent pointer file
        explorer.importFromCSV( filename: "parentPointers.csv");

        // generate BFS tree
//        String startCode = new PCRParser().getInstructorCode
//        explorer.exploreGraph(startCode, true);

        try {
            List<String> shortestPath = explorer.findShortestP
            System.out.println(shortestPath);
            System.out.println("Carchidi Number: " + shortestP
```

```
/Library/Java/JavaVirtualMachines/adoptopenjdk-8.jdk/Contents/Home/bin/java ...
Enter Professor Name: Swapneel Sheth
```

Upon hitting enter, the program will print the shortest path from Michael A. Carchidi to your provided professor, where two professors share an edge if they have both taught the same course. It will then print the professor's Carchidi Number (the length of the path) as well as the average distances across all professors.



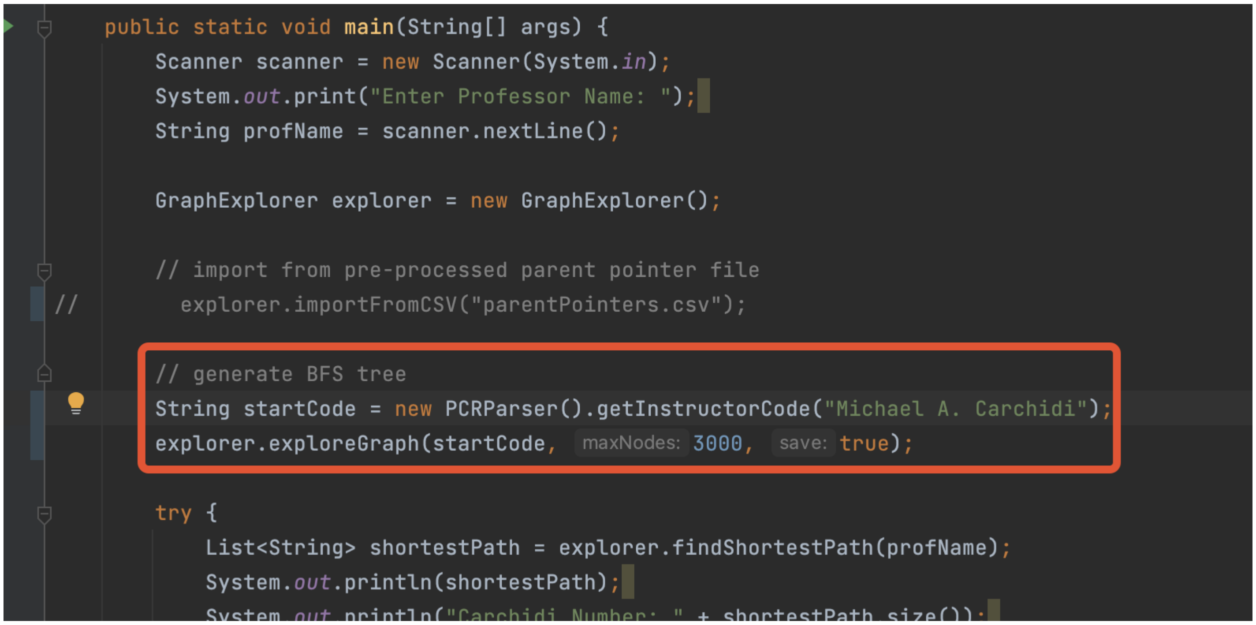
```
/Library/Java/JavaVirtualMachines/adoptopenjdk-8.jdk/Contents/
Enter Professor Name: Swapneel Sheth
[(Howard H. Hu, EAS-8960), (Michael A. Carchidi, MEAM-5350)]
Carchidi Number: 2
Average Path Length: 3.2243383
```

This means that the shortest path from Swap to Carchidi is of length 2: Swap and Howard Hu both taught EAS 8960 and Howard Hu and Michael Carchidi both taught MEAM 5350.

Interestingly, the average Carchidi Number (among the ~8000 closest professors) is 3.224, which is slightly bigger than the average Bacon Number and slightly smaller than the average Erdős number.

Advanced Customization

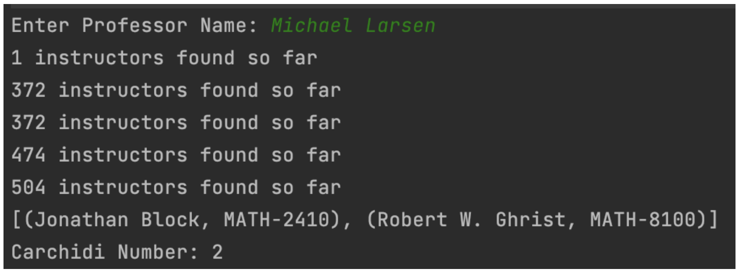
You may find that you wish to start the BFS traversal from a different professor (perhaps to see how the average distances change). In that case, you can create a new BFS tree from scratch using the `GraphExplorer.exploreGraph` method, which is currently commented out.



```
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);
        System.out.print("Enter Professor Name: ");
        String profName = scanner.nextLine();

        GraphExplorer explorer = new GraphExplorer();

        // import from pre-processed parent pointer file
//        explorer.importFromCSV("parentPointers.csv");

        // generate BFS tree
        String startCode = new PCRParser().getInstructorCode("Michael A. Carchidi");
        explorer.exploreGraph(startCode, maxNodes: 3000, save: true);

        try {
            List<String> shortestPath = explorer.findShortestPath(profName);
            System.out.println(shortestPath);
            System.out.println("Carchidi Number: " + shortestPath.size());
```

To change the starting professor, simply replace Michael A. Carchidi with a different name (again, this must be exactly as listed in Penn Course Review).

Note that this may take a *long* time (a few hours) to complete for an entire BFS traversal. If you'd like to truncate the traversal at a set number of professors, you can add an additional parameter, `maxNodes`, to `exploreGraph`, which will stop searching after the specified number of professors has been found. You can also choose whether to save the BFS tree that you've generated with the `save` parameter, which will save the parent pointers of each node in the BFS tree to `parentPointers.csv` (this will overwrite the given BFS tree).



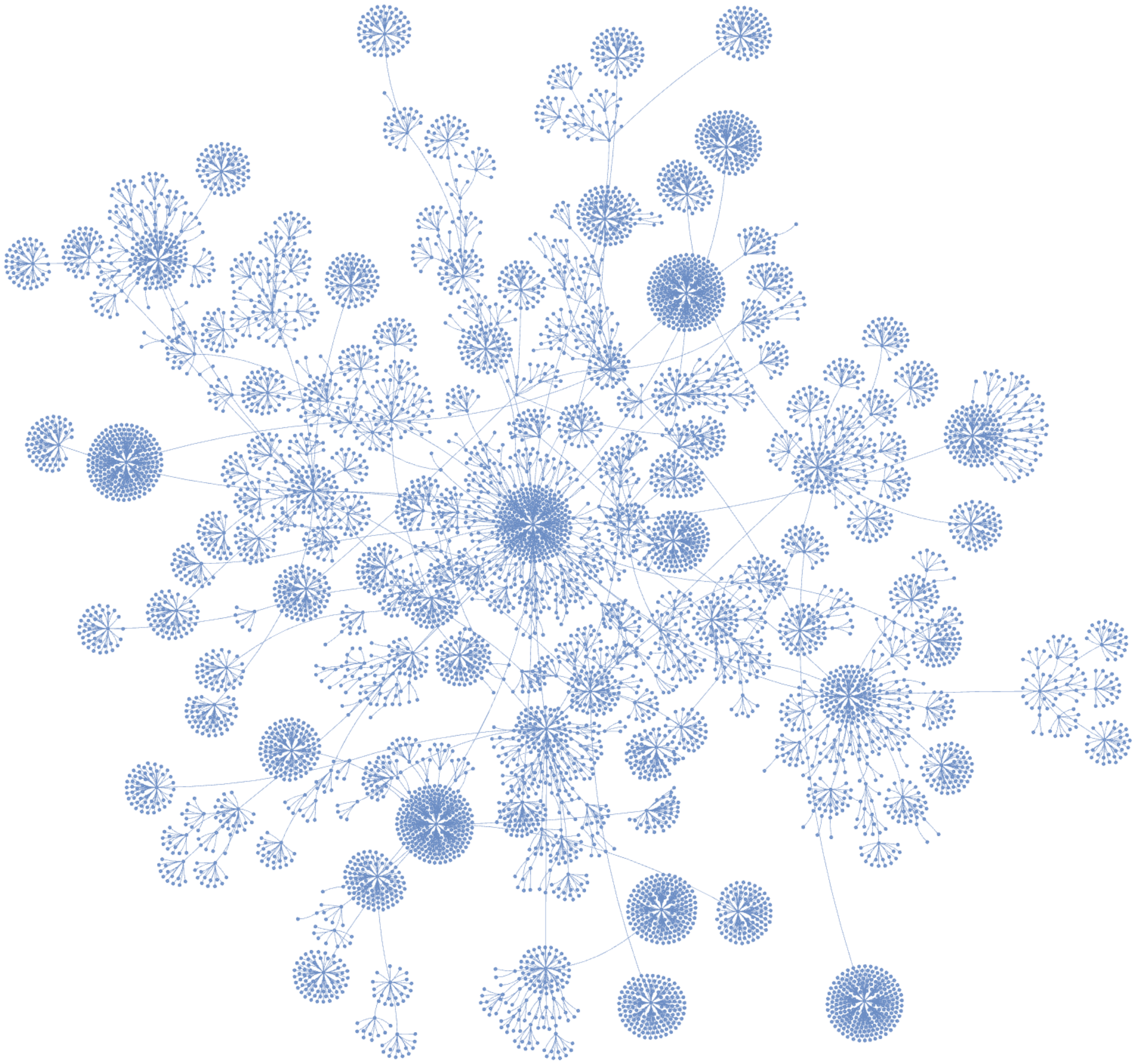
```
Enter Professor Name: Michael Larsen
1 instructors found so far
372 instructors found so far
372 instructors found so far
474 instructors found so far
504 instructors found so far
[(Jonathan Block, MATH-2410), (Robert W. Ghrist, MATH-8100)]
Carchidi Number: 2
```

This traversal showed that Michael Larsen has a "Ghrist Number" of 2. When generating a new graph, the current number of instructors found is printed periodically so you don't have to sit waiting at an empty screen for 5 hours.

Visualization Tool

To simply view the pre-generated visualization of the BFS tree, visit `graph.html` in a web browser to see the interactive graph. Note that it will take a few minutes for the graph to load since there are a lot of nodes.

To create a new visualization, run `python3 visualizer.py` using the command line (make sure you've installed all of the dependencies from `requirements.txt`). The visualizer will draw from `parentPointers.csv`, which will either be the one we gave you or a new one that you've saved (see previous section).



The BFS tree graph starting from Carchidi (up to ~8000 nodes)