

## Results:

For the first part of our project, we successfully implemented a Vertex and Graph class. In the Vertex class, we were successfully able to store the names of the articles, its neighbors, and map an index to the corresponding vertex. In the Graph class, our main execution occurs in the default constructor Graph(). This is where we parse the files and initialize our global variables.

Here are pictures to demonstrate our functionality of our graph:

Regarding our algorithms, we have a functional BFS algorithm between two nodes. The BFS returns the shortest path of articles- represented by vertices- that are in between any two articles based on their edges. We used the BFS algorithm to implement Landmark's Path. Additionally, we have successfully implemented a function to detect cycles within our graphs, and Kosaraju's algorithm to detect strongly connected components.

### Print Neighbors

```
Print Neighbors
=====
ID of article: 3933
article name: Euphorbia aprica
neighbors are:
3871 Euphorbia
507612 Taxonomy
512235 Species complex
727224 Madagascar
833254 Shrubland
833261 Habitat
833262 Forest
833394 Endemism
842650 Euphorbiaceae
845238 Eudicots
846596 Plant
What would you like to do next?
pN

Print Neighbors
=====
ID of article: 3838
article name: Jacques Dsir Leandri
neighbors are:
1478778 Corsica
What would you like to do next?
```

Here is a picture of our main algorithms at work:

### BFS

```
=====
BFS
=====
ID of first article: 92
Henry Geiger

ID of second article: 44
Missouri Route 185

Starting BFS...
size of path: 7

path:
92 Henry Geiger
597128 Abraham Maslow
279122 United States
38864 Yellowstone National Park
38877 Harry Yount
279593 Washington County, Missouri
44 Missouri Route 185
```

### Landmark

```
=====
Landmark
=====
ID of first category: 23
Glover, Missouri

ID of second category: 858
Bostrychoplites cornutus

ID of third category: 81
Missouri Route 151

Starting BFS...
size of path: 12

path:
23 Glover, Missouri
279122 United States
267270 Dallas
842005 Washingtonia filifera
861 Bostrychidae
858 Bostrychoplites cornutus

858 Bostrychoplites cornutus
851 List of beetles of Great Britain
889129 Coccinellidae
244646 Massachusetts
1401951 Henry Knox
287803 Knox County, Missouri
81 Missouri Route 151
```

### Cycle Detection

```
=====
Cycle Detection
=====
ID of first article: 292
Erotylidae
Finding Cycle for chosen article...
Size of Cycle Path: 8
292 Erotylidae -> 510719 Cycad -> 12162 Oliver Sacks -> 1061601 Internet Movie Database -> 1061372 The Godfather -> 961384 Best & Co. ->
616146 Gorham -> 31317 Henry Stephen Gorham -> 292 Erotylidae
```

Interestingly, while we applied these algorithms in the wiki dataset, we learned the graph is an extremely strongly connected graph. We discovered this by implementing Kosaraju's algorithm.