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Mappy – 15-112 Term Project Design

In my program Mappy, I wanted to tackle the problem of creating nice visualizations out of graph-based and similar data. There are many nice graph visualization programs available but there do not seem to be many that operate with force-directed graph algorithms to create nice animations based off a physical model. In order to solve this problem, Mappy models individual nodes as electrons, which all have repulsive forces on each other. In order to prevent nodes from flying away from each other infinitely, they also repel the walls. Mappy also treats the edges as springs connecting nodes, so that two nodes that are connected by an edge will be pulled closer together than normal. Mappy also allows for different sized nodes, with larger nodes not only appearing larger on screen but also providing a greater amount of repulsion. Edge thickness can also be edited, with thicker edges having stronger pull on the nodes they are connected to.

In order to implement this in Python, I created a class for Nodes and a class for Edges. Each node is represented by a (unique) name, location, and size. Nodes also have velocity and acceleration values which are recalculated at each step in order to determine how the node moves, as well as color values to edit their appearance on the actual visual. Edges are represented by a “to” node and a “from” node (although for all practical purposes it doesn’t matter which node is the “to” and which is the “from”), as well as a thickness value.

The user interface allows the user to edit and manipulate the data. They can add, edit, and delete edges and nodes in order to build the dataset that they wish to look at. They can also edit the appearance of the nodes by changing their colors, allowing them to group items they believe are related with similar or the same colors. Another important feature of the user interface is the ability to click and drag nodes. This is useful if the user wants to place a certain node in a certain area and see how the rest of the data re-shapes around that placement. The user can also click the “Shake It Up!” button to give each node a random acceleration, which randomly re-shapes the visualization.

A final important feature of Mappy is the ability to save and revisit data. The program uses JSON to dump the node and edge data into a file which can be re-opened and read by the program to load previous data sets. This allows the user to save a project and come back to it later, or to share it with other people.

Mappy was heavily based on/built off Graff, a hackathon project by Adriel Luo, Diao Zheng, and Bryan Lee Yang. The source code for this can be found here: https://github.com/diaozheng999/Graff