**Advanced Algorithms in Facility Location – Project Assignment Three**

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**Topic chosen:**

Topic 1. (UG) Visualization example: generate a random path graph with uniform vertex weights. Write an application that illustrates the pruning process in the sorted matrices algorithm for computing the p-center problem. Your application should allow one to choose the number of nodes on the path.

**Compilation instructions and library usage**

To run the program, simply type “python 4110q1.py.” Once the program starts, you will be asked the following:

* “# of nodes for the graph” (n):int
* “the # of facilities” (p): int

To run successfully, please ensure that you have the following libraries installed in your environment:

* networkx
* numpy
* matplotlib.pyplot

The program makes use of the following additional libraries:

* math
* random

**Program Correctness**

This program will return the maximum distance of a vertex from any of the facilities, and the vertex with the facility. To illustrate the pruning process, the program shows the following for each iteration:

* The node that is currently being evaluated
* The candidate node to select as center
* The centers being evaluated
* Nodes stored in the node pointer
* If the current node is being pruned

This program can compute the optimal p-center when the p value is one. However, when the p value is higher than 1, it was not able to output the best result for the p-center.

**Challenges**

We had challenges with implementing a method to position the p number of facilities to keep the maximum distance minimal. Since we could only move the facility one at a time, we were not able to arrange the facility properly when several facilities are required to move at the same time in order to have a lower maximum distance.