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ANALYSIS OF ALGORITHMS 2
PROJECT 3 REPORT

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1) Formulate the problem properly as a Network Flow problem. Visualize your network by stating flow values.

To apply the network flow algorithms, the graph in that problem is formulated with these rules:

1) The Source node and Sink node are also constructed with Reviewer and Publication nodes.
2) The Source node has the edges to Reviewer nodes, Reviewer nodes have edges to Publication nodes and Publication nodes have edges to Sink node.
3) The Source node edges to Reviewer nodes has the capacity of the time that a Reviewer have, since all Reviewers are done if their times are finished.
4) The capacity of edges between Reviewer nodes and Publication nodes is always 1, since any Reviewer can review any Publication in a single time slot.
5) The capacity of the edge between Publication nodes and the Sink node is the number of Reviewers that any Publication needed. (For example Journal needs 2 review)

The network in the sample input file is visualized in the figure below.

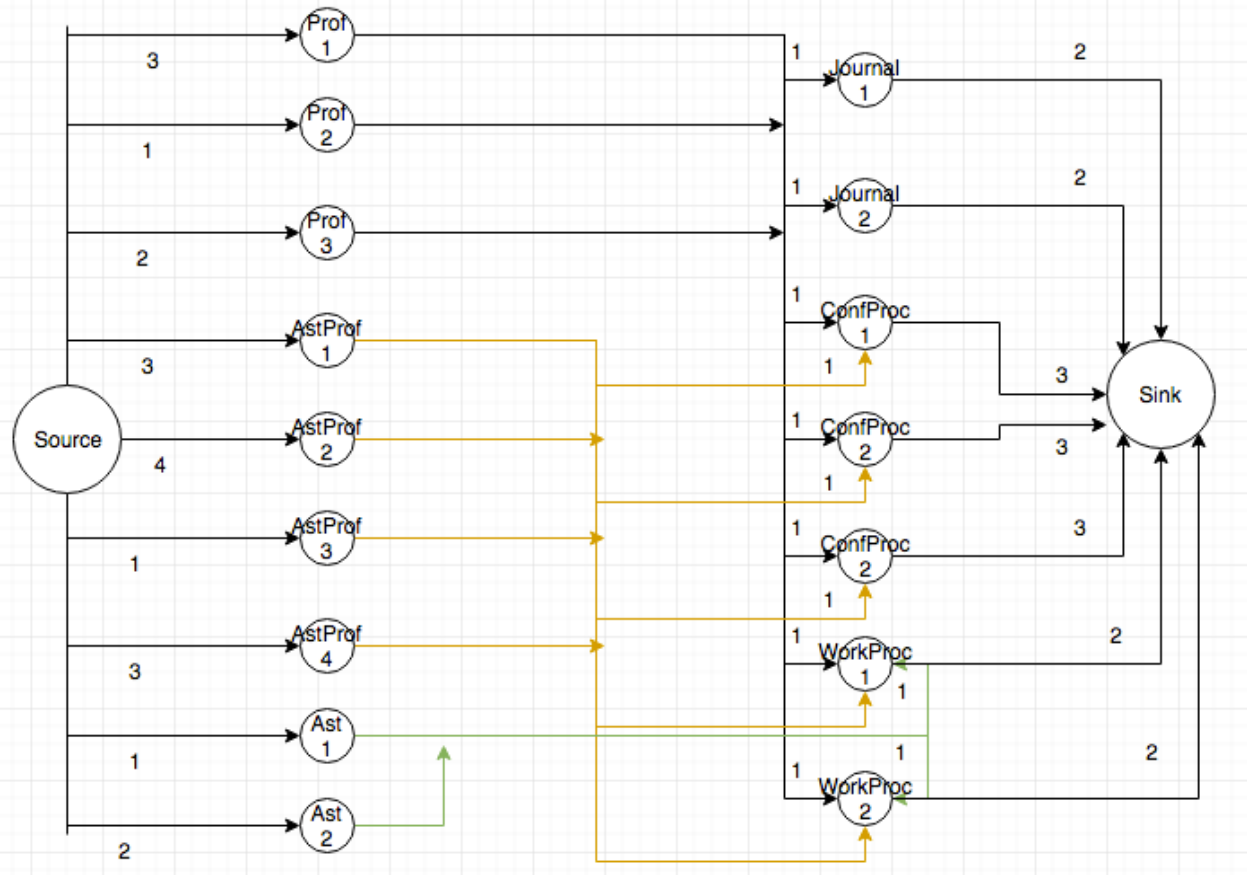

Figure: Network Flow Diagram

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2) Describe the method that you implemented for the task allocation problem in detail and give the complexity of the algorithm in big O notation.

In this project the task allocation includes 2 missions which are basically:

1) Finding the path in the graph
2) Matching Reviewer nodes with Publication nodes using the path and forming the results

For the first mission I have implemented BFS (Breadth-First Search) algorithm. The algorithm basically does what is supposed to do explained in the lecture slides. The only difference is it uses discovered array as an integer array and fill the indexes with the parent node numbers. The marking of each unvisited node is -5. Additionally the Source node has the index value -1 which means that it has no parent node. That information and the array are used in the other method namely “adjustFlow”.

For the second mission I have implemented the algorithm “adjustFlow” which is only terminated if the funciton “bfs” returns false. The algorithm traverses the indexes of the array that is adjusted in “bfs” by starting to look at the last index and traverses the parent each time until it reaches the Source node and terminated with the -1 value. When traversing the nodes it checks each time whether the node is a Publication node or a Reviewer node and writes the output file aacordingly. The flow will be calculated and the capacities of the edges are subtracted with respect to that value.

Since each algorithm uses adjacency matrix to check the values the big O notation of the algorithm is O(V^2), where V corresponds to number of nodes.