Module 07 – Maximal Flow

Exploratory Data Analysis

*In this section, you should perform some data analysis on the data provided to you. Please format your findings in a visually pleasing way and please be sure to include these cuts:*

* *Make a visual graph of your data like what we saw for the sample problem*
  + <https://excalidraw.com>
  + <https://mermaid.live>
  + <https://dreampuf.github.io/GraphvizOnline>
  + Powerpoint/Word

Model Formulation

*Write the formulation of the model into here prior to implementing it in your Excel model. Be explicit with the definition of the decision variables, objective function, and constraints.*

* Constraints:
  + *Units of flow <= upper bound*
  + *Units of flow >= 0*
  + *Net flow = supply/demand*

Model Optimized for Maximal Flow

*Implement your formulation into Excel and be sure to make it neat. This section should include:*

* *A screenshot of your optimized final model (formatted nicely, of course)*
* *A text explanation of what your model is recommending, especially any identified bottlenecks*
* *Update your graph from the EDA section to bold/color the links being used (and show how much is going through that link)*

A screenshot of a computer

AI-generated content may be incorrect.

* The maximum flow achieved is 563 units. The total inflow and outflow for each node match, creating no shortfall at any node. Potential bottlenecks is 0 to 1 and 0 to 2 where 0 to 2 is at full capacity. Increasing the capacity from 0 to 2 could improve overall flow. 4 to 6 is also fully utilized creating a potential bottleneck. Lastly 3 to 4 is not being used which could be an inefficient path.
* A diagram of a network

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**Part III:**

* There are not many bottlenecks in this model the only bottleneck is from 2 to 6 and 3 to 4. 2 to 6 is not being used at all which can be an inefficient path. 3 to 4 is also not being used at all looking at unnecessary capacity. Meaning that an alternative route is preferred. Redistribute flow through this path can relieve congestion in other parts of the model.
* A diagram of a network

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