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.*

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)*

*Minimum:*

A math equations on a white background

AI-generated content may be incorrect.

* *Constraints*

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AI-generated content may be incorrect.

*A screenshot of a computer

AI-generated content may be incorrect.*

* *A text explanation of what your model is recommending, especially any identified bottlenecks*

*My model identifies a maximum flow of 609 units through the network, efficiently distributing flow from Cherry Cordial Cove to Twizzler Tunnels and back. The flow is balanced at each node, ensuring feasibility, but some paths carry zero flow, indicating potential congestion or underutilization. Chewy Cherry Chews Channel (419 units), Twizzler Tunnels (609 units), and Honeycomb Highlands (287 units) are high-traffic areas that could become bottlenecks if demand increases. To optimize, consider increasing capacity constraints on key links, rerouting flow to balance loads, and assessing alternative paths to prevent future congestion.*

* *Update your graph from the EDA section to bold/color the links being used (and show how much is going through that link)*

A diagram of a network

AI-generated content may be incorrect.

Model with Stipulation

* *Using a copy of the network show how many units reach each node*
* *Identify the nodes that are underutilized and those that are at capacity with different colors*

*A diagram of a network

AI-generated content may be incorrect.*

* *Write a brief statement on what would help increase the optimal solution*

To improve the optimal solution, increase the capacities of the existing edges to allow for greater flow or shorter paths. Consider adding new edges or nodes to create more direct connections and potentially bypass bottlenecks. Optimize the selection of edges by using algorithms that prioritize efficiency based on the specific problem being addressed.