

Project (Research) for Graph algorithms course (GAL)
Max-Flow Min-Cut theorem
(Use in multicast networks)

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Abstract

In my presentation I discuss one of the most common problem in graph theory - maximum flow in undirected graph. Each edge has a capacity indicating maximum flow through it, the task is to determine maximum flow from „source“ to „sink“ node. Simply, the theorem states, that in flow network, the maximum amount of flow passing through is equal to the minimum capacity that when removed in a specific way from the network causes the situation that no flow can pass from the source to the sink. Basic Ford-Fulkerson algorithm is mentioned, finding augmenting paths is briefly discussed and then this theory is shown in most common scope of use – networks.

Networks can be observed as graphs with given capacity for the lines and connections. I will describe maximum possible information flow through multicast network and later on show the influence of switching and coding to finally establish a game. This game can be studied by game theory and its algorithms, it is played between the player of „links“ and player of „routes“ and for single-source multicast networks two max-flow min-cut theorems are introduced.

These are network switching for soft-links and network coding for hard-links. I finish by demonstrating how the switching gap is limited.

In the end, the ideas for further study is given with possible overlap to fields of informatics other than just graph theory.