Cutting a Tree into a Forest: A Weighted Edge Algorithm

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In many industries, data is collected to see how things change over time or how things may or may not relate to each other. Networks can be formed from this data where the nodes represent the industry specific areas of interest (such as S&P 500 sector indicies in financial engineering, or areas of the brain in neurology) and the edges are assigned weights that correspond to a relation, distance, or change over time between its endnodes. The network can then be reduced to either a minimum or maximum spanning tree based on the weights of the edges, and such a spanning tree will retain characteristic properties of the original network. If a predetermined threshold value k is chosen, the tree can be decomposed into components such that the sum of all the edge weights of each component is less than the threshold value. To minimize the loss of network information, we want to remove the minimum number of edges necessary to yield such a forest. In this talk, we present a polynomial time algorithm for cutting a weighted spanning tree into a forest such that each tree of the forest has total weight less than a predetermined threshold value k.

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