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The Fiedler Vector and Tree Decompositions of Graphs

In the 1970's Fiedler initiated a study of the second smallest eigenvalue of the Laplacian matrix L of a graph and the corresponding eigenvector(s). These "Fiedler" vectors have become spectacularly successful in revealing properties of the associated graph. A tree decomposition \mathcal{T} of a graph $G = (V, E)$ is an associated tree whose nodes are subsets of V and whose edge set respects the structure of G . Tree decompositions have been used in the analysis of complex networks. This talk reports on an algorithm developed by students at BYU for obtaining a tree decomposition by means of Fiedler vector(s) of G .