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Total variation clustering algorithms have proved to be a strong tool for partitioning graphs. However, it is difficult to apply these algorithms to big data sets because of non-linear time complexity. We use a sampling algorithm based on spanning trees and Nagamochi-Ibaraki index to sparsify the graphs as a preprocessing step. This sampling algorithm, being compatible with total variation structure, gives results close to that of running the partitioning algorithm on the original graph while boosting up the speed of the clustering algorithm significantly. (Received September 08, 2013)