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Random_Min_Cut

Algorithm:

1.Pick a random edge

2.contract edge(combine u and v into a supernode)

3.remove self loop

4.repeat until 2 supernodes remain.

Method:

First, the graph is taken as input in the form of an edge list stored in a vector of pairs, and from this edge list an adjacency list is constructed. A Disjoint Set Union (DSU) data structure is initialized using parent and rank arrays, where each node is initially its own parent. An edge is then selected and the two endpoints of that edge are checked using the find operation to determine their representative parents. If they belong to different sets, the unite operation is applied to merge them into a single supernode using union by rank. While merging, the adjacency lists of both nodes are combined, and the parent array is updated to reflect the new supernode. During this process, any self-loops created (edges whose endpoints have the same parent) are ignored and not added back to the adjacency list. After each successful merge, the total node count is reduced. This contraction process is repeated until the desired number of nodes or supernodes is reached, resulting in a simplified graph without self-loops.