Data Structures and Algorithms (INFO-F413)
Assignment 1: Karger's Algorithm

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Karger's Algorithm for Minimum Cut

A simple version of Karger's algorithm was described during today's lecture. Briefly, given a graph on n vertices, it follows the following simple steps:

1. for i in $\{1, 2, \ldots, n-2\}$:
   (a) pick an edge e at random
   (b) contract e
2. output the set of edges connecting the two remaining vertices

We proved that this procedure computes a minimum cut with probability at least $2/(n(n-1))$. The figure on the next page illustrates this process.

Your Work

Write a program that implements Karger's algorithm and use it to verify the claim on its success probability.
Requirements:

1. The source code of a program performing the above task, in your favorite programming language.
2. A short experimental comparison of the observed success frequency vs. the above lower bound on a well-defined family of sufficiently large graphs, with justifications and comments on the results.

You are encouraged to experiment on various, meaningful families of graphs. In particular, random graphs may give biased results.

Further Readings

Karger, David (1993). "Global Min-cuts in RNC and Other Ramifications of a Simple Mincut Algorithm". Proc. 4th Annual ACM-SIAM Symposium on Discrete Algorithms. (available at people.csail.mit.edu/karger/Papers/mincut.ps.gz).

Deadline

Thursday October 19, 2017.

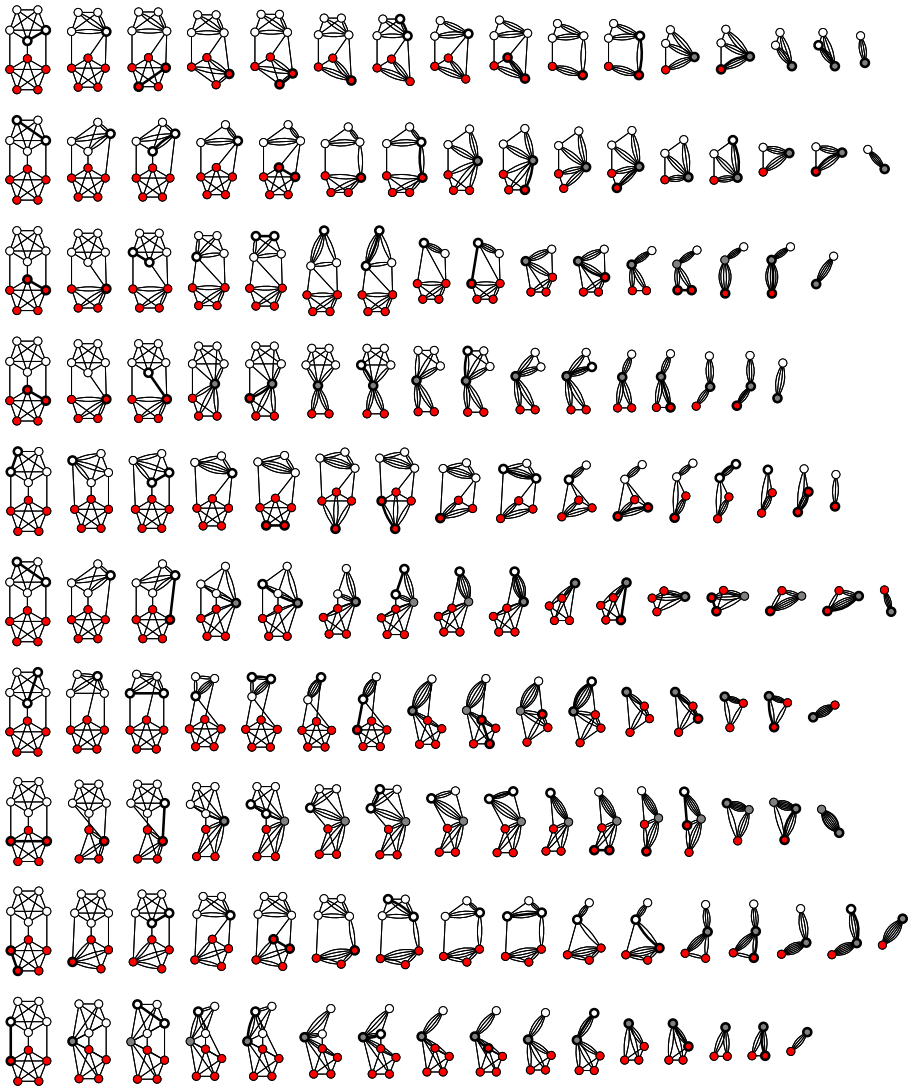

Figure 1: 10 repetitions of Karger's contraction algorithm (Thore Husfeldt – Creative Commons).