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KL Partitioning Software – DUE 11/17/2015 at midnight
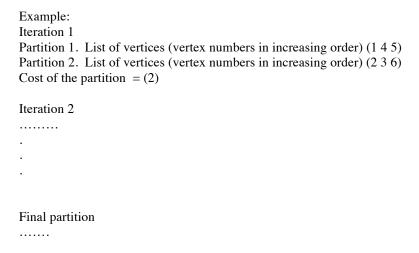
Your K-L software

1.   Programming assignment is Kernighan-Lin algorithm (as presented in their paper (handout). C or $C^{++}$is preferred but Python is OK. You CAN NOT use partitioning software from the internet. Please use only your own code (no subroutines from other sources). The input file format is given below. Please start with random partition such as: (1, ..., n) vertices in Partition 1 and (n+1, ...2n) vertices in Partition 2. If the number of vertices is odd add one dummy vertex. Your output file should include, a value of the cut of the initial partition, and for each iteration step (after groups of vertices to be exchange are chosen), a list of vertices in both partitions, and a value of the cut after each complete pass. At the end it should include lists of vertices in the final partition and the final value of the cut. A list of vertices in each partition should be organized in an increasing order of vertex labels.

2. Input file format:

The input benchmark files are provided in the Chaco input file format. The initial (0th) line of the file contains two integers, representing the number of nodes and the number of edges in the graph. Each following (nth) line contains the list of nodes that share an edge with the nth node, separated by spaces.

The following example represents a complete graph on 6 vertices in this format.
6 15
2 3 4 5 6
1 3 4 5 6
1 2 4 5 6
1 2 3 5 6
1 2 3 4 6
1 2 3 4 5

The output of your program should give vertices belonging to Partition 1 and to Partition 2 and the cost (a value of the cut) of the partition, for all major iteration steps.

Example:
Iteration 1
Partition 1. List of vertices (vertex numbers in increasing order) (1 4 5)
Partition 2. List of vertices (vertex numbers in increasing order) (2 3 6)
Cost of the partition = (2)

Iteration 2
………
.
.
.

Final partition
…….

3. You need to submit, on D2L, an electronic copy of a typed report (short one) that includes:

    a.   at least two of your own examples on which you tested your program.
    b.   hand generated results and computer generated results for your examples.
    c.   Computer generated results for the KL Class Example (VERY Important).
           The class example will be available in D2L few days before the project deadline.

           Please remember to included in your program output:
           1.   For each iteration:
                a.   Iteration number
                b.   Partition 1. A List of vertices in increasing order
                c.   Partition 2. List of vertices
                d.   Cost of the partition
If I do not see these data on in your report – the report will not be accepted.

    4.   You will also submit to D2L
          a.   a source code,
          b.   a make file (if in C or C++),
          c.   a compiled version of your software,
          d.   a generated by your program output-file for the class example.

Submit only the final properly working version of your program. Make sure I can open and read all your files. Please include also README file with information how to compile and how to run your program. If you plan to use other (than C, C++ or Python) programming languages you need to get my permission by October 15, 2015. You will need to show me how your program runs.