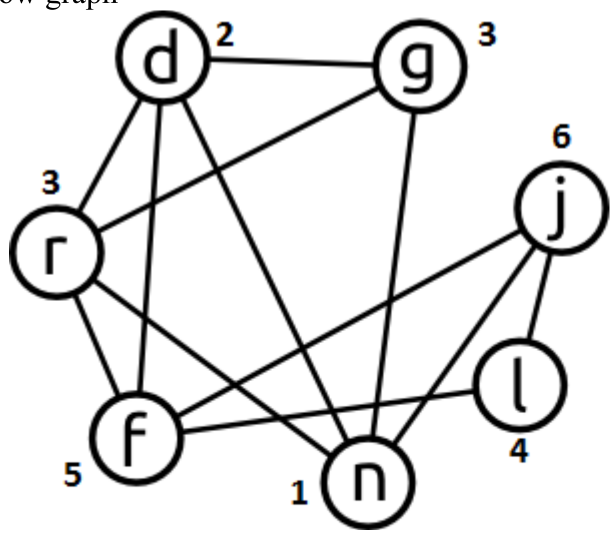
(Due 04.01.2020 at 23:59, electronic submission only, to cse.cse482@gmail.com)
Implement genetic algorithm for Minimum Weighted Vertex Cover Problem (MWVCP). In MWVCP, you are required to find the vertex cover of a given graph such that the sum of the weights of the nodes is the minimum. A vertex cover of a graph is "a set of vertices such that each edge of the graph is incident to at least one vertex of the set" [1].

For instance, for the below graph



the nodes d,r,f,n and l form a vertex cover (may not be the minimum) with a weight sum of 15. For this assignment, three random graphs with densities 0.03, 0.15 and 0.3 are given. The format of the graph files is as follows:

Number of nodes

Number of edges

List of node weights (format: X W where W is the weight of node X)

List of edges (format: X Y which indicates an edge from node X to node Y)

Your program should get five inputs as command-line arguments:

a. Name of the graph file
b. Number of generations
c. Population size
d. Crossover probability
e. Mutation probability

For each of the given three graphs, your program should generate 100 and 400 generations with a population of size 100 and 200. For selection of parents, you are required to implement the binary tournament selection method. For crossover, you should use 1-point crossover operator with a probability of 0.5 or 0.9. Finally, for the mutation, bitwise mutation operator should be used with a probability of 1/n (n:number of nodes in the graph) and 0.05. Any desired repair function can be used (you should also report details of your repair function).

For each of the three graphs, you should run your program 16 times (once for each of the above parameter configurations). You should submit fully commented source code along with a report containing one table for each graph and discussion of the results and the effect of parameters. The format of the table should be as follows:

Name of the Graph File					
	Crossover Pr.	0.5		0.9	
# Generations	Pop. Size \ Mut. Pr.	1/n	0.05	1/n	0.05
100	100				
	200				
400	100				
	200				

You should also include a Generation Number (from 0 to 400, 0 being the initial generation) vs. Average Fitness of the corresponding population (after repairing) graph for each of the following configurations to your report:

1. File: 030.txt, # Generations: 400, Pop. Size 100, Crossover Prob. 0.5, Mutation Prob. 0.05.
2. File: 030.txt, # Generations: 400, Pop. Size 200, Crossover Prob. 0.5, Mutation Prob. 0.05.
3. File: 030.txt, # Generations: 400, Pop. Size 100, Crossover Prob. 0.9, Mutation Prob. 0.05.
4. File: 030.txt, # Generations: 400, Pop. Size 200, Crossover Prob. 0.9, Mutation Prob. 0.05.
5. File: 030.txt, # Generations: 400, Pop. Size 100, Crossover Prob. 0.5, Mutation Prob. 1/n.
6. File: 030.txt, # Generations: 400, Pop. Size 200, Crossover Prob. 0.5, Mutation Prob. 1/n.
7. File: 030.txt, # Generations: 400, Pop. Size 100, Crossover Prob. 0.9, Mutation Prob. 1/n.
8. File: 030.txt, # Generations: 400, Pop. Size 200, Crossover Prob. 0.9, Mutation Prob. 1/n.