ECE 559 Project #5



You are to construct a GA to search for the optimal solution of an instance of the *Minimum Graph Bisection Problem*, which is a constrained optimization problem known to be NP-complete.

**Problem Formulation**: Let *G*=(*V,E*) be an undirected graph with vertex set *V* and edge set *E*. A *bisection* partitions *V* into two subsets *V*1 and *V*2. The *cost* of the bisection is the number of edges

(*i* , *j*) ∈*E* where *i* ∈*V*1 and *j* ∈*V*2. The goal is to find a bisection where

1. V1 ∪ V2 = V
2. V1 ∩ V2 = ∅
3. |V1| = |V2|
4. The bisection cost is minimized

**Project Requirements**: The fitness of a solution *x* is given by



where *c* is the bisection cost and *ρ* is a penalty that decreases the fitness if constraint #3 above is violated. (The amount of the penalty depends on the degree of the constraint violation.) *A* and *B*

are user selected.

The file [here](http://www.ece.pdx.edu/~greenwd/graph.txt) tells where the edges are in a 40-node graph.

You do not have to provide pseudo-code for the GA, but you do have to give a complete description of your GA. (Enough detail so I could duplicate what you did.)

Plot the fitness versus generations for the best of 20 independent runs.