Evolutionary Computation
Homework

Yong-Hyuk Kim

Kwangwoon University

Description (1/2)

- **We are to partition the nodes of input graph into disjoint (balanced) K subsets such that the cut size is minimized or maximized.**
  - "Cut size" means the number of edges whose end-points are in different subsets.
  - "Balanced" means that the difference between the maximum and the minimum among the cardinalities of K subsets is at most one.
  - For maximization problem, do not consider the balance constraint.

- **Find an optimal solution using genetic algorithms.**

Description (2/2)

- Make experiments for the cases that K is 2 and K is 32 on the given 4 test data with 500 nodes (the total $2x2x4=16$ cases).

- Restrictions: use pure genetic algorithms. Do not use any problem-specific knowledge!

- Time Limit: 60 seconds per one run in CPU 4.2GHz

Format of Input Graph File


```
1 (0.000000,0.000000)   1  429
2 (0.000000,0.000000)   4  58 346 373 465
3 (0.000000,0.000000)   5  94 293 381 431 481
4 (0.000000,0.000000)   3  27 363 458
5 (0.000000,0.000000)   1  471
 ...
495 (0.000000,0.000000)  3  14 337 374
496 (0.000000,0.000000)  2  160 282
497 (0.000000,0.000000)  2  54 465
498 (0.000000,0.000000)  1  421
499 (0.000000,0.000000)  1  334
500 (0.000000,0.000000)  0
```

Format of Final Report (1/2)

- **You should include the following:**
  - 1. GA structure that you used
  - 2. Chromosome design (representation)
  - 3. All parameter sets (selection, crossover, mutation, etc)
  - 4. For each K (= 2 or 32), using each input graph file, run your GA 100 times. Give the table including the best result, the average result, the standard deviation, and the total running time (the table should have the total 2 X 2 x 4 = 16 rows and then the total 16 X 4 = 64 figures). Also, you should mention the details of your computer machine and its CPU clock.

Format of Final Report (2/2)

- **You should also include the following:**
  - 5. For a representative run of GAs, you should give a plotting figure showing the graph of the average and the best qualities in the population according to generations.
  - 6. A full detail of your discussion and (comparative) analysis
  - 7. Print-out of your GA source code w/ proper comments
  - 8. You should submit a compressed file (HW_your-ID.zip) containing the following two files to the web-site (https://klas.kw.ac.kr).
    - Report document
    - Source code

Format of Result Table

	Best	Ave.	Std.	Ave. CPU seconds
Min: A, 2				
Min: B, 2				
Min: C, 2				
Min: D, 2				
Min: A, 32				
Min: B, 32				
Min: C, 32				
Min: D, 32				
Max: A, 2				
Max: B, 2				
Max: C, 2				
Max: D, 2				
Max: A, 32				
Max: B, 32				
Max: C, 32				
Max: D, 32				

Due Date

- **May 21, 2021**
- **Will deduct 30% per one week from your original score**