SIGMOD 2010 RWE Review on Paper "GAIA: Graph Classification Using Evolutionary Computation"

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1 Experiment Overview

In this report, we will provide some analysis on the repeatability and workability on the source codes provided by the authors of SIGMOD 2010 paper "GAIA: Graph Classification Using Evolutionary Computation". According to the comments from the primary reviewer, the second reviewer only runs a simple re-evaluation on the experiments listed in the paper.

Based on the source codes and running scripts provided by the authors, we have set up some experimental environment on a Red hat Linux Operating system (CentOS 5.0) equipped on IBM x255 server with four Intel Xeon MP 3.0 GHz CPU, 18G DDR memory and six 73.4GB Ultra320 SCSI hard disks. All the programs are compiled with GCC 4.4.3 and each process is handled by a single core at any time.

2 Summary from Primary Reviewer

In this section, we give a brief summary on the RWE results by the primary reviewer on this paper.

The primary reviewer has successfully repeated all the provided experiments and observed some faster results, due to the difference on hardware. He is only unsatisfied with the organization of the presentation of the documents and organization of the experimental binaries. Given his comments, I simply tried all the scripts and test if different copies of the program can run simultaneously to accelerate the computation.

3 Repeatability

All the experiments can be easily repeated, following the instructions in the readme file. Some of the results, e.g. in Table 3 and Table 4, are presented below. While it is a little bit slower than the reported numbers, the trends are almost identical to the original results in the paper. Considering the faster results from the primary reviewer, I reason this phenomenon by the difference of environment settings.

s	Normalized accuracy	Average runtime (sec)
1	0.7294	4.1310
3	0.7327	4.4148
5	0.7304	4.5006
7	0.7296	4.5528
10	0.7305	4.4114
30	0.7313	4.0123
50	0.7297	4.0746
70	0.7304	3.9083

Tab. 3. Normalized accuracy and average runtime of single-GAIA with different values of s, where n=4 (unbalanced chemical datasets).

n	Normalized accuracy	Average runtime (sec)
1	0.7043	2.5595
2	0.7209	3.2402
4	0.7312	4.5228
8	0.7336	5.9045
16	0.7387	8.3200
32	0.7363	12.4597

Tab. 4. Normalized accuracy and average runtime of single-GAIA with different values of n, where s=10 (unbalanced chemical datasets).

An important observation is that all the running time reported in the tables concerns the computation of the algorithm in a single run. Because of the randomized nature, it is necessary to run the program many times to reach a stable and reliable result. Therefore, the runtimes in the tables above do not reflect the true running time of the complete algorithm. In the workability tests, the second reviewer tries to apply some parallelism strategy on the given program to solve the problem.

4 Workability

Although each single run of the program finishes in a reasonable length of time, the total computation of the algorithm remains expensive, due to the multiple runs needed

to reduce the random effects on the results. The program provided by the authors, unfortunately, only executes the scripts in a sequence. Therefore, I tried to run multiple identical copies of the program at the same time to accelerate. This test turns out to be difficult, because the program generates huge number of temporary files in the same directory, leading to conflicts between the runs. I believe this probably hinders the real use of the program. If the authors can provide a better version for easier parallelism, it will be much more practical for real applications.

4 Conclusion

While all the experiments can be smoothly repeated with the given program and scripts from the author, the computation of the complete scheme remains time-consuming. A simple parallelism strategy fails to overcome the complexity issue. But I believe a better parallelized implementation will not be difficult for the authors to release.