Reviewer’s report

Title: epiACO - A Method for Identifying Epistasis Based on Ant Colony Optimization Algorithm

Version: 1 Date: 07 Apr 2017

Reviewer: Edward Keedwell

Reviewer's report:
The authors have clearly addressed my comments from the previous review. However, this has highlighted some issues with the approach which were not present before.

1. The performance of the algorithm is only comparable in most cases to the other approaches. Table 2 is very clear and I thank the authors for replacing Table 2-4 with this, but the overall results are very similar to the other ACO approaches and are beaten by BOOST both in terms of accuracy and computational time for most models. Whilst I understand that stochastic approaches have a place here for larger datasets, the results aren't demonstrably better than existing stochastic approaches.

2. I am still concerned about the parameter settings. The other algorithms have been set to default values, but it is not clear what motivates the values for the authors approach. 25 iterations (particularly with 200 ants) is a very small number and raises two issues, one of convergence and one of contribution. The authors should provide some evidence that the approach has converged after 25 iterations, line graphs of the optimisation would help here, as would convergence metrics (e.g. standard deviation of ant paths). Also, the authors should consider how much contribution the ant system is making here as 25 iterations with 200 ants would suggest that the ACO component is engaging in near random search. An experiment to validate or disprove this could be conducted whereby the ACO component was replaced with a simple random search and the results examined.
3. The real-world case study is interesting and would provide good evidence that the algorithm is able to scale to real-world data sizes. However, the results are not presented well (p-values would be much better to see here, rather than svalues), and the majority of genes do not seem to be related to the real-world problem, or are not investigated in enough detail to allow that to happen.

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