**Reviewer's report**

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

Version: 0 Date: 24 Jan 2017

Reviewer: Alfred Ultsch

**Reviewer's report:**

The authors introduce a new method of ant colony optimization called epiACO for the task of identifying epistatic interactions. The authors claim that the problem of identifying epistatic interactions can be converted into detecting the SNP combinations with a larger value of a fitness function (Svalue) introduced by them.

However, it remains unclear why an ant colony optimization algorithm is necessary for this task. The authors should discuss why a common standard conjugate gradient algorithm (e.g. used for large data sets in NeRV [Venna et al., 2010]) cannot solve this problem.

In the first chapter of the paper, a many uncited claims are made which are not verifiable by the reader, please provide citations for the following lines (page 1: 41-41,53-54; page 2: 1-2,3-4,7-8,18-20,28)

It is not obvious why for comparison the methods AntMiner, IACP, AntEpiSeeker and MACOED are chosen and why other methods are disregarded (e.g. SNPRuler).

Please provide detailed explanations or compare with all described methods.

In the methods chapter 2.,1, I suggest the reading of [Martens et al., 2011] about ACO and correct the text accordingly. Also please explain why the constants θ and ζ are necessary and how a user could choose them appropriately. Also explain the number of ants chosen.

In the results section the evaluation criterion is not plausible. Please explain why you do not measure for example sensitivity and specificity or other common measures (accuracy, balanced
Accuracy) instead of introducing a new quality measure. If it is a common measure for these kind of problems, please provide citations.

Looking at the figures, I assume that all methods and models used are deterministic yielding always to the same result. If they are stochastic (e.g. ACO hybrids), please provide an estimation of the variance of the power measure.

Please provide a software package on a site in english where the software package can be downloaded. Please state the programming language and operation system for the package.

Please provide in the discussion and reference, where the self-adaptation parameter q_0 is introduced in the epiACO algorithm.


Level of interest

Please indicate how interesting you found the manuscript:

An article whose findings are important to those with closely related research interests

Quality of written English

Please indicate the quality of language in the manuscript:

Not suitable for publication unless extensively edited

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