(Note: Review comments are followed by authors' replies highlighted in yellow)

Rejection from CSDA (24-11-11)

24/11/11

from: Erricos Kontoghiorghes, csda@cfe-csda.org

Ms. Ref. No.: CSDA-D-11-01007 (e413)

Title: An algorithm to construct Monte Carlo confidence intervals for an arbitrary function of probability distribution parameters

Computational Statistics and Data Analysis

Dear Mr. Hristos Tyralis

The Associate Editor had your paper reviewed by a referee. You will see that they are advising against publication of your work. Therefore I must reject it.

For your guidance, I append the reviewers' comments below.

Thank you for giving us the opportunity to consider your work.

For further assistance, please visit our customer support site at http://support.elsevier.com. Here you can search for solutions on a range of topics, find answers to frequently asked questions and learn more about EES via interactive tutorials. You will also find our 24/7 support contact details should you need any further assistance from one of our customer support representatives.

Yours sincerely

Erricos John Kontoghiorges, PhD

Co-editor

Computational Statistics and Data Analysis

Reviewer's comments:

Associate Editor: This manuscript is devoted to show a procedure for interval estimation. According to the comments of the reviewer, the approach does not involve advanced statistics, the explanations are not clear, there are some serious methodological shortcomings and the computational component is not strong enough. Thus, I regret to inform that I cannot recommend this manuscript for publication in CSDA. However, the reviewer is recommending to submit it to a more suitable journal in case that the flaws are solved.

Reviewer #2: They are attached as a pdf file: CommentsToAuthorNov2011.pdf

(Download the file from the EES)

Comments about manuscript entitled "An algorithm to construct Monte Carlo confidence intervals for an arbitrary function of probability distribution parameters".

Manuscript Number: CSDA-D-11-01007

Synthetic opinion.

I don't think the paper is appropriate to be published in CSDA. The paper presents some methodological deficiencies and the computational study is not elaborated enough. I think a journal with lower impact factor would be more appropriate. Next, I am going to list some comments that may be useful for authors. (It is not an exhaustive list, but I think it may be helpful for them).

Some useful comments

• The paper presents some methodological deficiencies.

- The paper was corrected according to the reviewer's comments.

• It is based on results given in textbooks: Casella & Berger, and Ripley. Excellent text- books, but they can't seem appropriate for a journal as CSDA.

- We kept these texts, because we believe that it is not necessary to find another reference for already known results.

• At the beginning of their paper they should be more concise. Most of results given in Sections 2 and 3 are well known in statistical inference. On the other hand, they should highlight "the new" in their paper. At first reading, method given in Section 3 looks like the well-known pivotal method to construct confidence intervals. I think they should highlight "the new", that is: the importance of functions $\lambda(\theta)$ and $\theta(\theta)$ (we cannot have an explicit expression for these functions, so the interest of techniques they propose); and formula (14) to construct confidence intervals.

(Also note an erratum on formula (11), it should be CA=CB)

- A lot of known results in Section 2 have been deleted. The importance of formula (14) has been highlighted in page 2. Formula (11) has been corrected.

• As for methodological deficiencies, note that results on pages 7-8 about the **asymptotic normality** of the maximum likelihood estimator of a parametric function are only true for **regular** distributions.

For instance, if you consider

$f(x) = \exp[-(x-\theta)]$; $x \geq \theta$, $\theta \in R$;

the MLE of θ is $X(1::n) = \min\{Xi\}$, and you don't have a limit distribution normal.

- We mention in the paper that asymptotic results hold for regular distributions.

• Section 3.3, the functions of interest should be $\lambda(\theta)$ and $\theta(\theta)$, isn't it?

- We cannot understand the point of this comment.

• Section 4. Why should Var($\underline{T}$) be a diagonal matrix? It may happens that $\text{Cov}(T_i, T_j) \neq 0$, $i \neq j$.

- The reason is that this is a heuristic method. It works well. Probably in another paper this method could be improved with the use of $\text{Cov}(T_i, T_j) \neq 0$, $i \neq j$.

• I don't like reasons to assume the relation given in formula (18) and reasons for the choice of vectors $\boldsymbol{e}_\lambda$.

- Again it is a heuristic method.

• The computational component is not strong enough.

In their examples, they should include some details about Monte Carlo simulations. For instance, the number of samples of size n they produce and $\delta\theta$ they consider.

- We included details about the choice of δθ and number of simulations.

• In the examples, a guideline or some conclusions would be nice. For instance, if you have got an exact interval, is it "always" (in your simulations) MCCI close to this interval? In other cases, it seems that is close to Bayesian interval, is that a good property? and so on.

- Chapter 5.8 with all results summarized was added.

• Theoretical results given in Appendix A are naive. For instance, to prove that the confidence interval for the parameter μ of a normal distribution is asymptotically exact. It is a well-known result in Mathematical Statistics that

$t_n \rightarrow N(0,1),\ n \rightarrow \infty$

In fact, the concept they use of **"asymptotically exact"** sounds strange to me. Asymptotic results are always approximations, therefore they cannot be "exact".

The optimality property of confidence intervals based on MLE they refer must be "they are, asymptotically, the shortest in a certain class of intervals" (Wilks (1938), see Casella & Berger p.498).

- We use the notion of "asymptotically equivalent Wald-type interval" instead of the notion "asymptotically exact".

We also computed all Ripley intervals in the new paper.

Rejection from Technometrics (17-09-11)

September 17, 2011

Mr. Tyralis
Greece

Re: MS11-150, "An algorithm to construct Monte Carlo confidence intervals for an arbitrary function of probability distribution parameters"
Received by Editor: 2011-09-10

Dear Mr. Tyralis,

Thank you for submitting the above manuscript "An algorithm to construct Monte Carlo confidence intervals for an arbitrary function of probability distribution parameters" for possible publication in Technometrics.

I have now read the manuscript. Though I enjoyed reading it, I feel it is not necessarily a good fit for Technometrics, and lacks the level of novelty and comprehensive treatment required of a Technometrics paper given competition for limited space. I have thus decided to quickly reject your paper so that you are not delayed in submitting it to a more appropriate journal.

My primary concern is that the paper is not directly related to the central mission of the journal, as indicated in our statement of purpose:

"The purpose of Technometrics is to contribute to the development and use of statistical methods in physical, chemical, and engineering sciences as well as information sciences and technology."

While confidence intervals are ubiquitous in Statistics, the article does not seem directly related to the application areas mentioned above. Moreover, our editorial policy places emphasis on the demonstration of statistical methodology via substantive applications from the physical, chemical and engineering sciences. The simulations in your article don't really fit in this mold.

Some additional concerns I have are i) that the accuracy of the asymptotically exact intervals are not studied in any theoretical framework, ii) the algorithms seems to depend on the choice of a "small" increment delta, iii) the accuracy of the approximation would seem to depend on the choice of parameterization (i.e., parameter transformations might improve or worsen the approximation), and iv) Bayesian methods seem comparable in your examples, but might generalize better to high-dimensional regions or problems with nuisance parameters.

Thank you for giving us the opportunity to review your work. I wish you the best in finding it a proper publication venue.

Sincerely,

Hugh Chipman
Editor
Technometrics

Authors' note on Technometrics editors' comments, which was submitted to CSDA: Comments (ii) and (iii) have been addressed in the current paper (***version sent to CSDA***). Specifically these paragraphs have been added:

Page 11: *We also test the sensitivity of the algorithm on the choice of the increments $\delta\mu$ and $\delta\sigma$ in the case of the location parameter and the percentile of the normal distribution.*

Page 21-22: The chapter *Sensitivity of the algorithm on the choice of the small increment* has been added.

Page 23-24: *Further research is needed to evaluate the influence of the choice of the increments $\delta\boldsymbol{\theta}_i$ to the results of the algorithm. An additional drawback of the method is that the result depends on the choice of the point estimators. In the normal distribution case the choice of the unbiased estimators gave results nearest to the exact confidence intervals compared to the results of the maximum likelihood estimator. In any case, the confidence intervals obtained by the algorithm are approximate and the algorithm was not developed with the intention to substitute the exact confidence intervals.*

Note for comment (i): We have not met any theoretical framework that examines the accuracy of the asymptotically exact confidence intervals. We believe that there is nothing wrong with it in this paper.

Note for comment (iv): The algorithm works on one-dimensional regions. We cannot test it in high dimensional regions. Bayesian methods don't have a standard method to simulate from the posterior distribution of the parameter. In our algorithm there is a standard procedure. On the other hand Bayesian methods are always exact. Problems with nuisance parameters could be examined in another paper and are outside the scope of our paper, which is to introduce the particular method proposed.