Response to Reviewers JCGS-23-428

A Tidy Framework and Infrastructure to Systematically Assemble Spatio-temporal Indexes from Multivariate Data

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We would like to thank the reviewers and editor for taking the time to review our paper and provide constructive comments. Below is a point-by-point explanation of how we have changed the paper. Reviewers' comments are in black and **our responses are in red**.

Editor and Associate Editor

Two referees, an Associate Editor (AE), and I have reviewed your paper. The two referees hold significantly different views on the paper. As you will see, the first referee's assessment is rather negative, whereas the second is more positive. As recommended by the AE, it is essential to incorporate or highlight your methodological contributions in the paper to address the concerns raised by the first referee. Therefore, I would like to extend an opportunity for revision. However, the decision for the revision will depend on whether you can adequately address the reviewers' concerns.

We have made changes to the introduction and to the conclusions being more specific about the methodological and computational contributions of this work.

Reviewer: 1

I commend the authors for their work in the tidy index library. Certainly, a user friendly and unified approach to indices is useful across many fields. My main concern about the paper is that it doesn't seem to fit within the aims and scope of JCGS. A perusal of recent JCGS papers shows that a novel statistical component is needed for publication in addition to the software. This paper, while certainly useful, doesn't necessarily propose new statistical methods but rather proposes a great tidy framework for handling index calculation. As such, for JCGS, I think the authors need to highlight the statistical contributions more than the

library. However, I don't think the authors statistical contributions (even if highlighted) are sufficiently novel to warrant publication in JCGS. As written, I think the paper is more suited for publication in, say, Journal of Statistical Software than JCGS.

It is a bit disappointed to see the following comment "A perusal of recent JCGS papers shows that a novel statistical component is needed for publication in addition to the software." We disagree with that statement based on the journal scope: "The Journal of Computational and Graphical Statistics (JCGS) presents the very latest techniques on improving and extending the use of computational and graphical methods in statistics and data analysis." The contributions that this paper makes are in computational statistics for an especially prevalent data analysis activity, that also provides potential for making better graphics in this area. We have added language to the introduction and to the conclusions that hopefully helps see these contributions.

Reviewer: 2

This paper proposes new pipeline work for index development, including index generation, validation, and sensitivity analysis. The authors develop a new R package, "tidyindex" including all functions in the pipeline to produce a new index. This package will be beneficial for developing new indices. The central part of this paper is the development of the R package and the explanation of its usage. However, this package needs to be fixed.

The authors explain their functions briefly in Chapter 5 and use examples with R code in Chapter 6. However, the code in Chapter 6 does not work. Also, the demo in the R package (CRAN version 0.1.0) did not work (see attached R-output.html). Please check the package, including demos and examples in this paper. It would be great if all R codes for the example in Chapter 6 were provided, including generating plots.

This issue is now fixed in the Demo folder (the vignette folder worked fine) and we have also re-organised the code for the paper as follows:

- **The main file tidyindex.R, can be used to reproduce the paper from saved data objects, available in the data folder.**
- **New scripts can be found in the 'scripts' folder, which generate each of the examples. The README.md file has been updated and it contains instructions on how to set up the R environment to reproduce all of the analyses in the paper.**
- **The GitHub repo is listed in the Acknowledgements section, and any further updates needed for future versions to run will be made there.**

minor comments

- In Table 1, it would be great if there were a line between items. Because the name of the module is in two lines, it is not easy to match the other information (input, operation, and output)

The table layout has been modified accordingly.

- On page 19, " The output contains the original data, index values (.index), parameters used (.scale, .method, and .dist), and all the intermediate variables (.pet, .agg, and .fitted)." However, the output has no .index, .pet, .agg, and .fitted. Please check.

The output is now written in a way that all variables are visible (availble from dplyr::glimpse()).

- Figure 7 shows the sequence of screenshots from the animation to explore the sensitivity of the GGGI. It would be helpful to understand "what Frame 12 is" if the authors should explain this between " Figure 7 illustrates doing sensitivity analysis for GGGI, for a subset of 16 countries" and "Frame 12 shows the dot plot of the original index values sorted from highest to lowest",

Frame 12 is now described in more detail, with additional explanations provided regarding the information conveyed by the figure.

- Figure 8 on page 27 also shows the relatively wide confidence interval around 2004. It would be great if the author mentioned it, too.

The following has been added in the text: This wider confidence interval is interesting and corresponds to the millennium drought in Australia.

- reference for "SPEI package" on page 4 should be (Beguería and Vicente-Serrano 2017), and reference for "the Standardized Precipitation-Evapotranspiration Index (SPEI)" on page 12 should be (Vicente-Serrano, Beguería, and López-Moreno 2010)

The reference has been fixed.