Special Issue on
"Reproducibility in Evolutionary Computation"
Evolutionary Computation Journal, MIT Press
https://direct.mit.edu/evco/pages/submission-guidelines

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Description:

Experimental research is crucial in Evolutionary Computation. The scientific method requires that empirical results are reproducible by the authors themselves and replicable by others. Computer Science in general, and Evolutionary Computation in particular, show signs of a reproducibility crisis despite their digital underpinnings. Interest in improving reproducibility in Computer Science and other empirical sciences has grown in recent years and there is a growing number of works analysing current and best practices, obstacles and guidelines, effectiveness of journal policies, etc. Reproducibility issues in the context of Evolutionary Computation have been a topic of discussion for a long time in the context of best practices for empirical research, but there are few studies analysing reproducibility in EC research and reproducibility studies themselves are extremely rare. There is room for improvement to attain the minimum standards for reproducibility encouraged in other scientific fields. Challenges for reproducibility in EC research arise from the stochastic nature of the algorithms and, sometimes, the problems, which requires multiple runs to analyse expected behavior and variance; sensitivity of the results to the computational environment, parameter settings or implementation details; and the generalizability of conclusions to different instances of the same or related problems.

The aim of this special issue is to encourage research that analyses the topic of reproducibility in EC and showcase excellent examples of both reproducible research and reproducibility studies. Within the context of EC, we include non-evolutionary metaheuristics, swarm intelligence methods, stochastic local search, and hybrids with exact methods, i.e., matheuristics. We welcome papers that deal with the topic of reproducibility with a specific focus on the EC context, either by analysing the current state of the field or providing evidence that supports best practices for authors, journals or funding bodies. Furthermore, we also welcome papers that, in addition to an original research contribution to the field of EC, go well above the current standards of reproducibility. Finally, we also welcome high-quality reproducibility studies that attempt to reproduce (by using the materials provided by the original authors) and/or replicate (by reimplementing the materials from scratch) previously published results of interest.

Submission Guidelines

We will accept four different types of contributions:

1. Original and significant empirical research submissions following the usual requirements and scientific quality of works published by ECJ with the added contribution of raising the bar in terms of reproducibility of the results by, satisfying or going beyond the reproducibility requirements discussed below.

2. Reproducibility studies that confirm, contradict (fail to reproduce) or widen the scope of (generalize) previously published experimental results. The paper that is chosen to be reproduced must present results that are of particular interest to the EC community (for example indicated by citations, studies use of common benchmarks, use of well-known algorithms) and must have been previously published in a reputable venue. Acceptable confirmation studies must extend the previous analysis in a significant manner. Studies that contradict previous results must make a serious attempt at analysing the reasons for the different results and provide convincing enough evidence that the new results are correct. In all cases, submissions must follow the minimum reproducibility requirements discussed below. If you intend to submit a paper in this category, please contact the Guest Editors before you embark on the study who can advise if the study is appropriate.

3. Empirical research on the topic of reproducibility in the context of EC, including but not limited to the empirical analysis of:
   a. reproducibility aspects in EC in contrast to other fields;
   b. cultural and technical challenges for reproducibility in EC and how to overcome them; and
   c. the effectiveness of journal and funding bodies policies.

4. Methodological contributions on the topic of reproducibility in the context of EC, including but not limited to improving reproducibility, reducing reproducibility effort, and the design and evaluation of reproducibility studies. We would accept two types of contributions:

   a. Submissions that describe software aimed at improving reproducibility in EC in original ways. These submission must follow the guidelines for Software Articles (https://direct.mit.edu/evco/pages/submission-guidelines#software).

   b. Position papers that do not provide empirical results but make original methodological contributions. Submissions must go beyond what has been already proposed in the literature.

Reproducibility Guidelines

In addition to the usual requirements for submissions to *Evolutionary Computation* Journal (https://direct.mit.edu/evco/pages/submission-guidelines#full), all submissions containing empirical research must adhere to the following minimum requirements to be considered for this special issue:

1. A hyperlink to a permanent repository containing the "artifacts" required to reproduce the experiments in the paper. Zenodo, Figshare, OSF and institutional repositories with a declared plan for permanent accessibility of a precise version of the artifacts are acceptable. Dropbox, Google Drive, personal and institutional webpages without a declared plan for permanent accessibility are not appropriate. We will use OPENDOAR (https://v2.sherpa.ac.uk/opendoar/) to evaluate the accessibility of data repositories.

2. Artifacts must contain:
   a. Pre-processing code, e.g. code that generates instance data and scripts that set up the experimental conditions.
   b. Algorithm code, the implementation of the algorithm(s) to be tested.
   c. Analysis code, scripts that post-process the data produced by the algorithm and perform statistical analysis.
   d. Presentation code, e.g. scripts that generate tables and figures reported in the article.

A README.txt file should be included that explains how to reproduce every result reported in the article. Experimental conditions should be provided with as much detail as possible. The process used for configuring algorithmic parameters should also be reproducible. For randomized algorithms, random seeds should also be provided for allowing the exact repetition of an experiment. Should exact repetition not be possible due to the complexity of the code, it should be explained in the README.txt to what extent and why this is not possible.

Submission:

Authors should submit their manuscripts to the Evolutionary Computation Editorial Manager (https://www.editorialmanager.com/ecj/default.aspx). Authors must select "Special Issue: Reproducibility" as the article type when submitting.

When submitting a paper, please send also an email to Manuel López-Ibáñez (manuel.lopez-ibanez@uma.es) mentioning the special issue, the paper id, title, and author list to inform us about the submission.