https://doi.org/10.1038/s43588-022-00388-w

Seamless sharing and peer review of code

Recent changes to our submission system, including a better integration with the Code Ocean platform, make the code peer review process more effortless for authors and referees.

It likely comes as no surprise to our readers that, at *Nature Computational Science*, we consider the code associated with a research study to be as important as the manuscript that describes and discusses that study. After all, without the code, hypotheses and conclusions put forth by the authors cannot be properly validated, and if a scientific tool is being proposed, the tool's usability and potential practical impact cannot be easily assessed.

For this reason, when we decide to send a manuscript out for peer review, we ask for authors to make their code immediately available to referees, and for referees to provide as much feedback about the code as is possible and feasible. Authors may share their code via public repositories, such as GitHub and Zenodo, but they may also choose to use Code Ocean[1], a cloud-based platform that provides researchers with an easier way to share executable code. With Code Ocean, authors can set up 'compute capsules' via a web interface with their data and code, and reviewers can check and run the code without having to install and configure software, which substantially eases the burden of code review. In addition, reviewers are provided with anonymous access to the capsules, which remain private during the peer review process: once the manuscript is published, so is the accompanying capsule with a persistent identifier to ensure the longevity of the code. Thanks to a partnership between Springer Nature and Code Ocean, this service — which includes support for building and running the capsules — is free for both authors and referees.

While we have been successfully performing code peer review at *Nature Computational Science* since our launch in January 2021 — and several other Nature Portfolio journals have been doing this since the early 2010s[2] — we recently recognized that our workflow in place at the time was not optimal, as the communication between editors, authors and referees was manual and ad hoc, mostly via e-mail. More specifically, our workflow was not integrated within our submission system, thus offering a subpar experience to authors and referees and making the sharing and peer review of code an involved task to track. There was no standardized way for referees to report on their assessment of the code either.

Despite these hurdles, it was clear that our authors and referees were generally very satisfied with our open science policies, including code peer review, which stimulated us to provide them with a better experience. Ultimately, if we want code to achieve first-class status when it comes to the peer review and publication processes, it is of utmost importance to have appropriate capabilities implemented in the systems that support these processes in order to help authors and referees to comply with our policies.

We are happy to announce that such a desideratum is now being addressed. Alongside *Nature Machine Intelligence*, *Nature Computational Science* has implemented a more streamlined process for authors and reviewers to easily share and review code, integrated within our submission system. But what has changed?

For authors, code deposition has been made easier. At the time of submission, authors will be asked whether or not they would like to use Code Ocean to share their code. If they opt out, they can provide, directly via the submission platform, the details on how to access their code (for instance, a GitHub link). If they opt in for Code Ocean and their manuscript is selected for peer review by the editorial team, the authors will automatically receive a link for setting up their compute capsule, which will be linked to their manuscript: once the capsule is submitted by the authors and verified by the Code Ocean team, the editors will have access, via the submission system, to all of the relevant information and metadata about the capsule.

For reviewers, there is no longer convoluted communication about the code peer review process. They will be able to immediately see all of the code availability information (including the public repository link and the Code Ocean anonymous link, if available) via the submission system, without having to dig into their inboxes to find this information within an editor's e-mail: code details will be listed together with all of the manuscript files, since the code is as important as the report of the research. In addition, reviewers now have a specific section in the review report that they can use to provide comments on code assessment, boosting the importance of these comments in the peer review process.

Overall, this integration also offers an opportunity to gather more detailed data on the use of our open science services, such as the Code Ocean support, and on the benefits that arise from them. We are looking to report on this in due course.

At *Nature Computational Science* we are devoted to providing continuous support to our authors and referees in the peer review process. These new changes are just one example of our commitment to advance reproducibility and open research practices, and they complement other efforts being implemented by our sister journals, such as the integration with Figshare to facilitate data sharing. As we develop more efficient workflows, we hope that the sharing of code and data becomes more seamless for authors and that the code peer review process becomes a less arduous and more satisfying task for reviewers. And as always, we are looking forward to receiving feedback from our research community!

Published online: 12 December 2022

References

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2. *Nature* **555**, 142 (2018).