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Primary Policy Area:

Innovations in Science and Technology

Mapping Open Source Software: A Bibliometric Approach to Attributing Credit and Measuring Impact

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Abstract Text:
Open source software (OSS) has become an essential in knowledge production and innovation in both academic and business sectors around the globe. OSS is developed by a variety of entities and is considered a "unique scholarly activity" due to the complexity of scientific computational tasks and the necessity of cooperation and transparency for research methodology. While the developers of OSS are thought to be very widespread, there remains many questions to be answered about who these contributors are, who are the largest contributors (countries, sectors, organizations), and how they influence each other.

Using data collected on Python and R packages from GitHub, we leverage fractional-counting methods to measure the exact contribution of each developer and use weighted counting based on the lines of code added by each developer to accurately sum the contribution of countries. We find that for both Python and R, developers from a small group of top countries account for a considerable share of code additions. Developers from the top 10 countries, which include the United States, Germany, United Kingdom, France, and China comprise of 76.1% of the total R repositories, and 66.6% of Python repositories.

Next, we use the dependency relationship between packages and study the pairwise connections between countries to measure their respective impact, finding that the packages attributed to United States are most frequently reused by packages from Germany, Spain, Italy, Australia, and United Kingdom based on the total dependency fractions. In parallel, United States mostly uses packages from Germany, France, and Denmark.

Influential contributors to OSS can contribute heavily to the priorities and practices of scientific research when their work is widely used or built upon by other researchers. In this context, studying the global distribution, collaboration, and impact of the contributors is important to understanding the landscape of innovation in scientific research.

Paper Title

Mapping Open Source Software: A Bibliometric Approach to Attributing Credit and Measuring Impact

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Submission Information

Optional: Select a Secondary Policy Area.
Methods and Tools of Analysis

If accepted, would you be willing to present this paper as a poster, instead of as part of a panel?
Yes

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I am not a student

Diversity

I am a foreign-born, and a woman.

Are you the recipient of an APPAM Equity and Inclusion Fellowship?
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Are you (the submitter) willing to act as a chair and/or discussant for a session in your area of expertise at the 2024 Fall Research Conference?
Yes, as a chair only

If you chose yes, what are your areas of expertise?
Innovations in Science and Technology, Methods and Tools of Analysis

Acknowledgements

Agree to Code of Conduct, Agree to discussion & media, Agree to participate

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