Fine-grained Exploration of the GitHub Workflow Ecosystem

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Abstract

The topic of this master's thesis takes place within the general context of distributed open source software development through the GitHub[1] platform. This platform provides a mechanism to automate the creation and configuration of development workflows through the use of GitHub Actions[2].

A study conducted by Golzadeh et al. [1] indicated that GitHub Actions has become one of the most popular tools to automate the continuous integration (CI) workflow. Therefore, it is useful to conduct a quantitative empirical study about GitHub Actions in order to have a better understanding of their use and evolution. This work presents such a study aiming to gain a deeper understanding of how the GitHub Actions ecosystem is structured and how it evolves over time. Historical data about GitHub Actions available on the GitHub Marketplace[3] has been collected and observed in order to make observations about their use and evolution.

First, an observation has been made about the growth of the GitHub Marketplace overtime, the evolution of Actions, and the proportion of Actions in 18 distinct categories. Using the content of YAML files in the *.github/workflows/* directory of selected GitHub repositories, the number of Actions that were the most used in workflows and the number of distinct Actions were used by these GitHub repositories was identified. Then, the most popular Actions were identified along with the proportion of open and closed issues for each observed Action repository. Furthermore, the GitHub Marketplace indicate if the owner of an Action is verified, and the proportion of Actions owned by verified users has been observed. Finally, since developers have the possibility to trigger Actions in different ways, an observation has been made to identify the most commonly used trigger.

Keywords: GitHub, GitHub Actions, Development Workflow, Continuous Integration, Software Repositories, Automation

References

[1] M. Golzadeh, A. Decan, T. Mens, On the rise and fall of ci services in github, 2022.

[1] `https://github.com/`
[2] `https://github.com/features/actions`
[3] `https://github.com/marketplace`

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