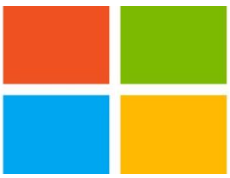

A reviewer tool for DevOps

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Introduction

This is a tool mainly focus on helping people free from selecting reviewers for their Pull Requests. The works flow may show as that: Once a dev created a commit and click the pull request button, the most related reviewers will been added to the DevOps reviewer list just in few more seconds.

This tool has three parts of items need to be done. First, we should find a way to select the most related reviewers that just hit the mission. Second, an End2End solution is needed for adding reviewers to DevOps. Last thing is about the users' notification and other sort of things.

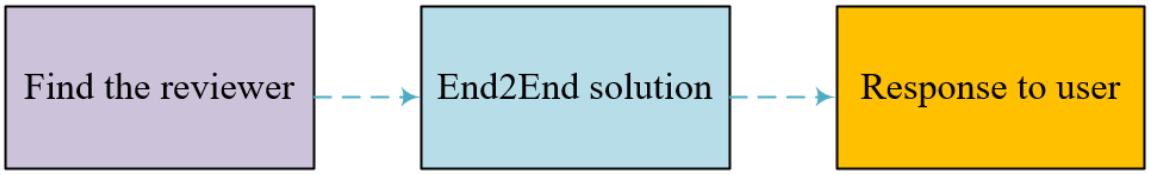

Fig.1 The main work flow of the system.

Find the reviewer

Finding the related reviewers is always can't get the performance state-of-art.

In this part, we should find a solution with high recall rate and precision, which means

- The author list should be smaller (Considering adding all of authors in all PRs, the reviewer list we want must be a part of whole author list, but the precision is really low).
- We also need to add more right people (Considering adding the Project owner, we can always hit the mission and get 100% precision, but lower recall rate).

Several papers are studied. In "Reducing Human Effort and Improving Quality in Peer Code Reviews using Automatic Static Analysis and Reviewer Recommendation", ICSE 2013, IEEE, a file changed history based method is proposed, the researchers beats the benchmark by 40%.

REVIEWER RECOMMENDATION ACCURACY

Dataset	Algorithm	Accuracy (%)				
		$k=1$	$k=2$	$k=3$	$k=4$	$k=5$
$Proj_1$	Review Bot	61.17	72.87	77.13	79.26	80.85
	RevHistRECO	34.15	41.46	43.90	45.12	46.34
$Proj_2$	Review Bot	59.92	79.35	86.23	91.50	92.31
	RevHistRECO	47.83	58.70	59.42	60.14	60.39

In "Who Should Review My Code?", SANER 2015, IEEE, a file path similarity-based method is proposed.

System	RevFinder				ReviewBot			
	Top-1	Top-3	Top-5	Top-10	Top-1	Top-3	Top-5	Top-10
Android	46 %	71 %	79 %	**86** %	21 %	29 %	29 %	29 %
OpenStack	38 %	66 %	77 %	**87** %	23 %	35 %	39 %	41 %
Qt	20 %	34 %	41 %	**69** %	19 %	26 %	27 %	28 %
LibreOfiice	24 %	47 %	59 %	**74** %	6 %	9 %	9%	10 %

Although the algorithms have strong performances, we temporarily choose a simple way due to limited time. First, we find the changed files that modified by the user. Then we select the similarity author who changed the same files. An author will earn a high score once he had changed the file in recent days. We can modify this algorithm anytime. The operations are all based on the Git.

End2End Solution

In this part, we focus on the system structure.

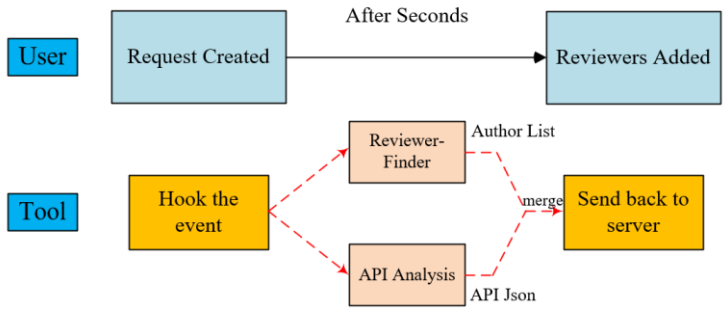

Fig.2 End2End Structure

1. Hook the event

When the user created a Pull Request, we need to know that. We need to listen the event. DevOps has the settings for service hook. Once we have all confirmation done, the DevOps will send a Json to our Url each time a PR in our repo created.

In our localhost, our system will listen the port 80. Each time a Post received, the system comes to next stage.

2. API Analysis

By the post information, the system know the RepoID, ProjectID, the author and the state of the PR.

The unique ID and descriptor for ADD which we can acquire from nowhere but Azure itself. In case of that, we have a prior hypothesis: The reviewers we find must can be found in other pull requests no matter the roles they play. We first call the function getPullRequestsByProject in azure-devops-node-api. We can find the details of all authors who created a PR or review a PR. The details in Json format is as below,

By that, we call the function createPullRequestReviewers , in which the reviewer list is a json file stored the author list we have find in part “Find the reviewers” with their uniqueName and id.

Response to user

Due to this server is running in the LocalHost, the PR creator need a feedback. The mail notification and reasons analysis are proposed.

Nodemail module is used for this. We also deployed the tool in Azure for a stable long-term work.

The Github-link: https://github.com/SeanWeiSean/AutoReviewer