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Geek Talents: Who are the Top Experts on GitHub and Stack Overflow?

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Overview

- Motivation
- Platform Display
- Datasets
- Application Design
- Experiments
- Conclusion

Motivation

Who are the users of this application?

- People who want to keep track of trending tech-topics and get in touch with talents related to the trending tech-topics.

Who will benefit from this application?

- Recruiters.
- Start-up companies.
- Everyone who wants to find and contact talents in a specific tech-domain.

Why is this application important?

- It is a novel platform that automatically identifies geek talents in specific field from GitHub, Stack Overflow and across two platforms.
- It has a new method to deal with user extraction problem, containing SO-based approach, GH-based approach as well as the approach to join them with particular weighing factor.
- It is a complete system with a carefully designed User Interface that visualize the result, which makes the exploration of large, complex user dataset easier.

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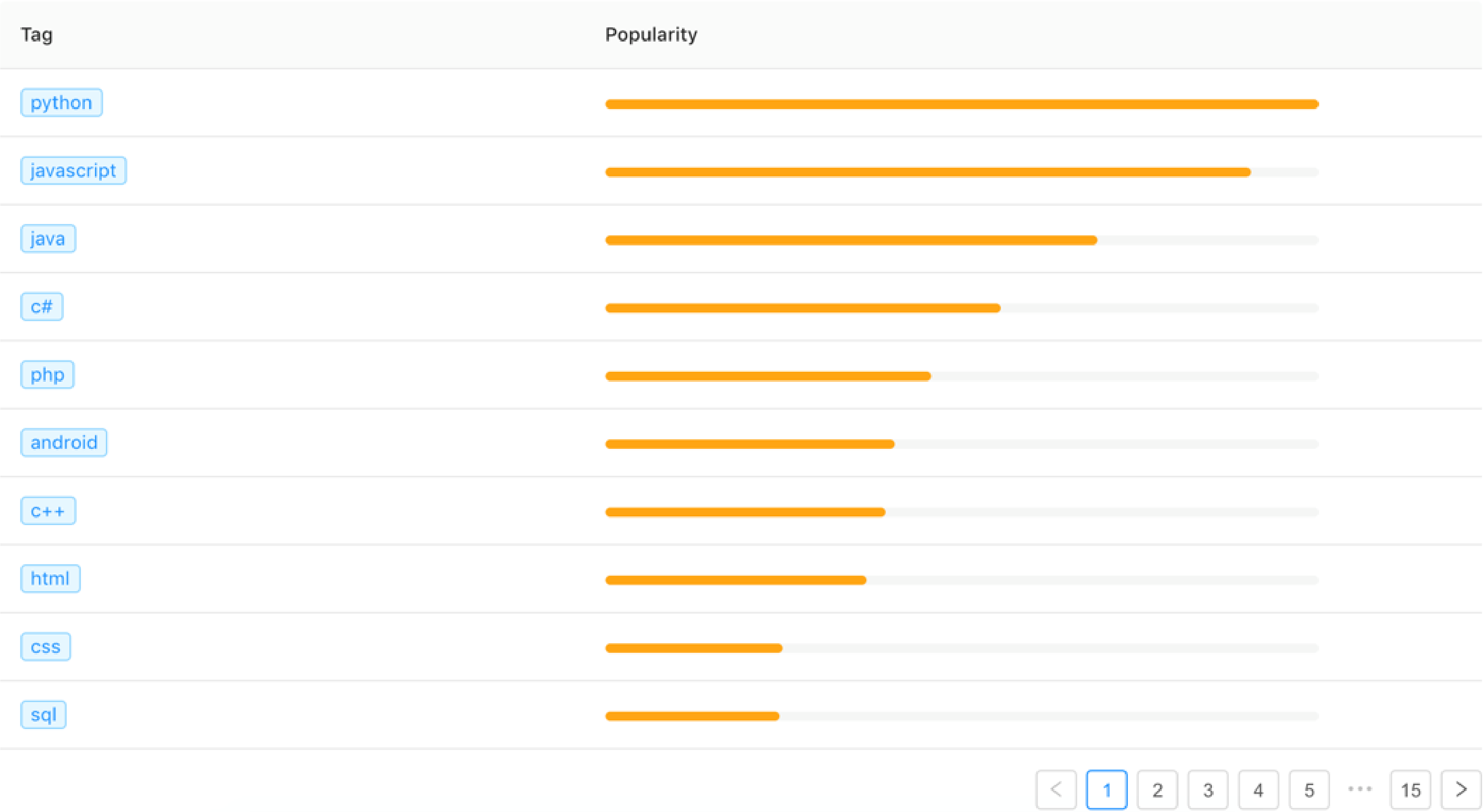
Platform Display



Tag	Popularity
python	
javascript	
java	
c#	
php	
android	
c++	
html	
css	
sql	

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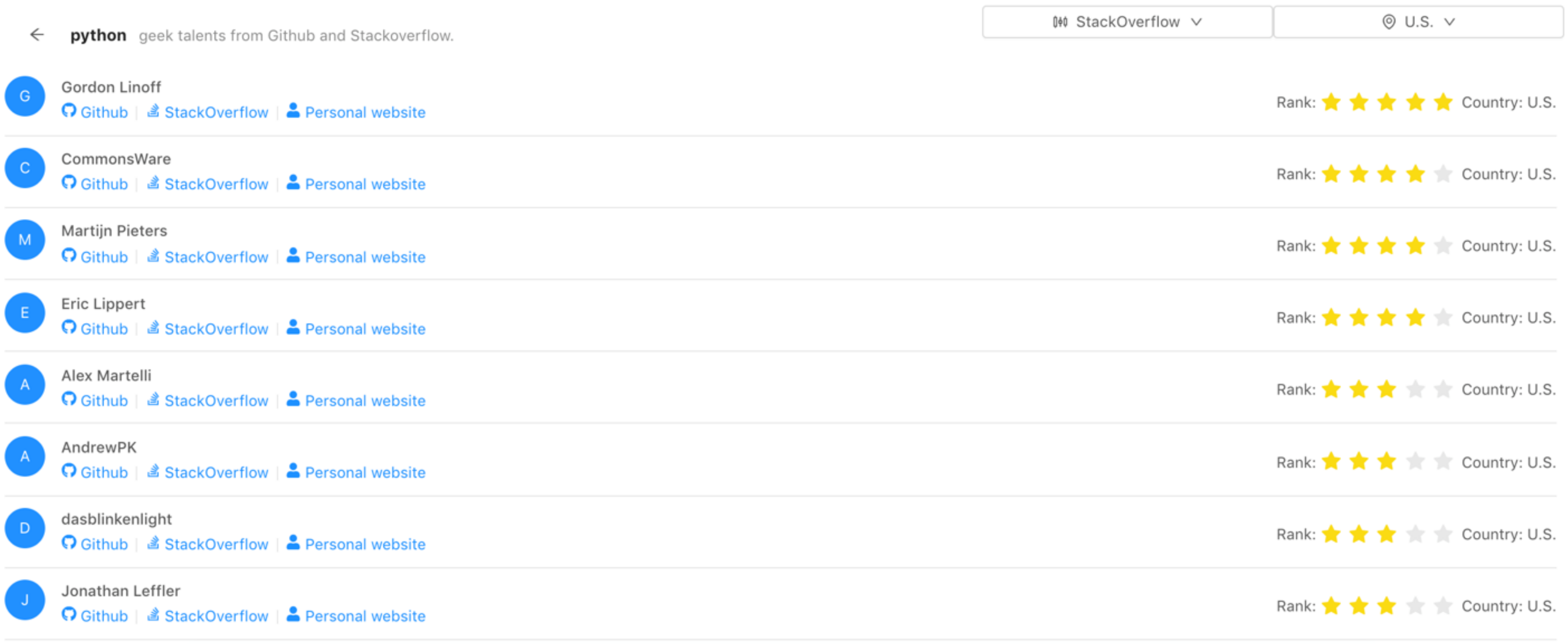
Platform Display



← **python** geek talents from Github and Stackoverflow.

StackOverflow ⌄ | U.S. ⌄

G	Gordon Linoff Github | StackOverflow | Personal website	Rank: ★★★★★	Country: U.S.
C	CommonsWare Github | StackOverflow | Personal website	Rank: ★★★★☆	Country: U.S.
M	Martijn Pieters Github | StackOverflow | Personal website	Rank: ★★★★☆	Country: U.S.
E	Eric Lippert Github | StackOverflow | Personal website	Rank: ★★★★☆	Country: U.S.
A	Alex Martelli Github | StackOverflow | Personal website	Rank: ★★★☆☆	Country: U.S.
A	AndrewPK Github | StackOverflow | Personal website	Rank: ★★★☆☆	Country: U.S.
D	dasblinkenlight Github | StackOverflow | Personal website	Rank: ★★★☆☆	Country: U.S.
J	Jonathan Leffler Github | StackOverflow | Personal website	Rank: ★★★☆☆	Country: U.S.

Datasets

- Stack Overflow Post data dump

  A post dataset containing questions and answers.

- Stack Overflow User data dump

  A user profile dataset containing user attributes.

- GitHub Search API

  Search for the specific projects we want to find under given tags.

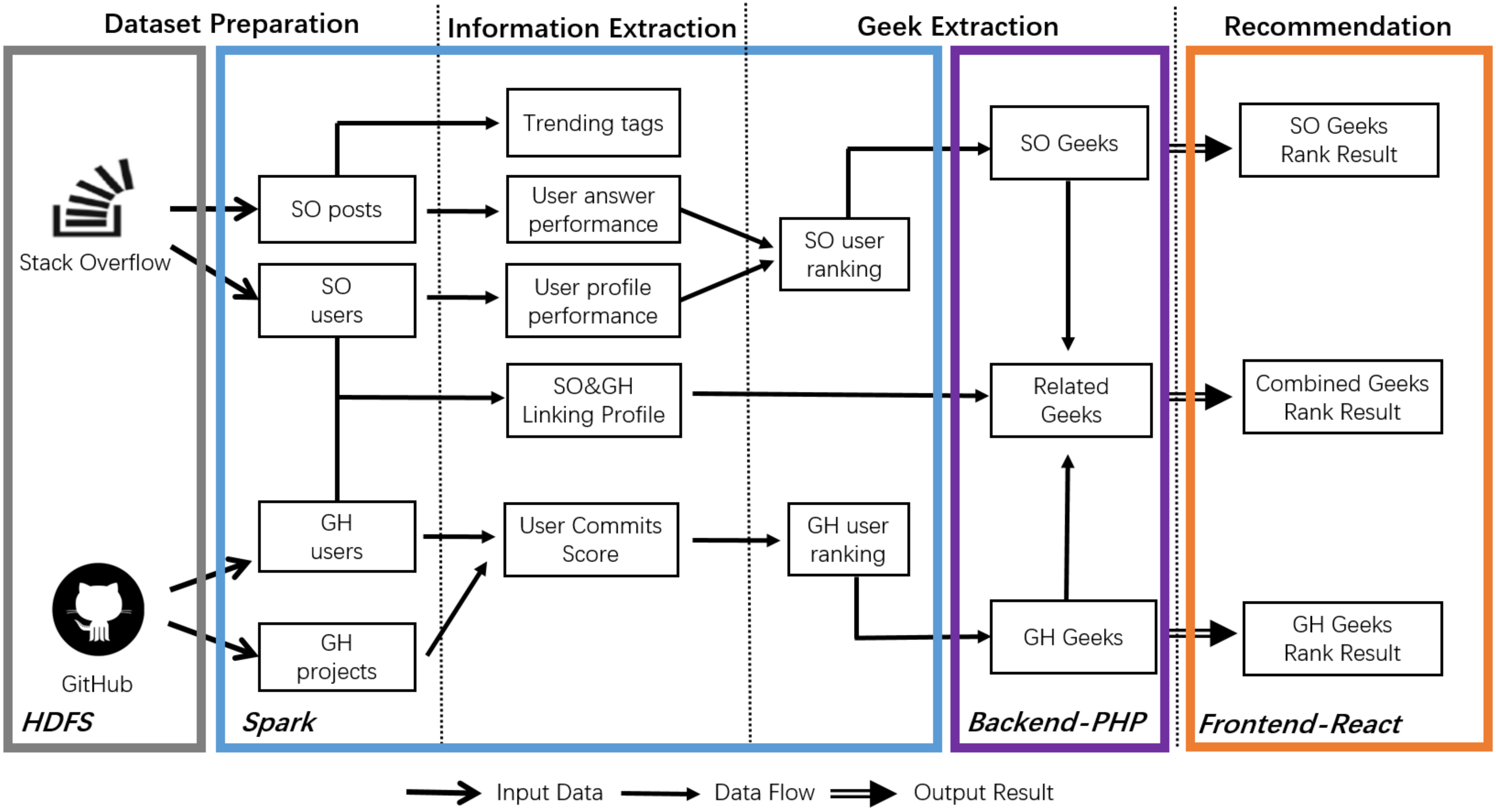
- GitHub Users API

  Get the information about currently authenticated user.

- GitHub Repository API

  Access to repositories a user owns, repositories they contribute to, and repositories that they can access through an organization membership.

Application Design



Application Design

Stack Overflow Tag Selection

$$viewCount_{tag} > 1000, \forall tag \in Set_{Tag} \qquad (1)$$

$$viewCount_{tag} = \sum_{i=1}^{postNum_{tag}} viewCount_{post_i} \qquad (2)$$

$viewCount_{tag}$: the popularity of a tag
$viewCount_{post}$: the times a post been viewed
$postNum_{tag}$: the number of post under this tag

Application Design

Stack Overflow Expert Recommendation

$$S_{userSO} = 0.6 \times S_{UAP} + 0.4 \times S_{UPP} \qquad (3)$$

$$S_{UAP} = 0.5 \times S_{ans} + 0.5 \times S_{question} \qquad (4)$$

$$\begin{aligned} S_{question} &= 0.3 \times avgViewCount \\ &+ 0.3 \times avgFavoriteCount \\ &+ 0.3 \times avgAnsCount \end{aligned} \qquad (5)$$

$$S_{UPP} = 0.7 \times reputation + 0.3 \times viewCount_{user} \qquad (6)$$

S_{userSO}: score of user in Stack Overflow
S_{UAP}: score of user answer performance
S_{UPP}: score of user profile performance
S_{ans}: score of answer
$S_{question}$: score of question

Application Design

GitHub Expert Recommendation

$$S_{userGH} = \sum_{repo=0}^{repoNum} S_{repo,user} \tag{7}$$

$$S_{repo,user} = commits_{repo,user} \times S_{repo,PC} \tag{8}$$

$$S_{repo,PC} = Weight_{tag} \times \frac{watchers_{repo}}{commits_{repo}} \tag{9}$$

$$Weight_{tag} = \frac{BOC_{tag}}{BOC_{total}} \tag{10}$$

S_{userGH}: score of user in GitHub $S_{repo,user}$: the contributing score of user to repo
$S_{repo,PC}$: score of per commit of repo BOC: byte of code

Experiments

User Extraction

We extracted 1,295,622 users from SO users dataset and 7,953,512 users from GH users.

User Linking

We linked 332,362 users for our combined expert recommendation, including 309,735 using the hashed email address method and 28,294 using the GH username method.

Tag Selection

we extracted the latest month post tags from SO post dataset and found 12,370 different tags. Selecting those with posts been viewed by more than 1,000 times.

Experiment

User under Tag

2,548,505 pairs of (user, tag) tuples have been generated in GitHub under language tag, compared to 56,889 pairs of (user, tag) tuples under topic tag.

Regional Selection

There are 106,263 different cities in SO set, 31,205,585 different cities in GH set and 18,858 same cities between SO and GH. Therefore, we use ISO-3166-Countries-with-Regional-Codes table to map the relationship between country code and city names.

Analysis

We manually checked the profiles of the top hundred talents under the top ten trending topics. It turned out that:

(1) Their profiles are highly related to the given topic.

(2) The accuracy of cross platform profiles linking is high

Conclusion

- We addressed the problem of user recommendation in GitHub, Stack Overflow, and across both platforms.
- We proposed a novel methodology to deal with the user extraction problem, which make full use of different user attributes and related platform specific information.
- We build a complete system with a carefully designed User Interface that visualize the result, which makes the exploration of large, complex user dataset easier.

Q & A

THANKS FOR LISTENING

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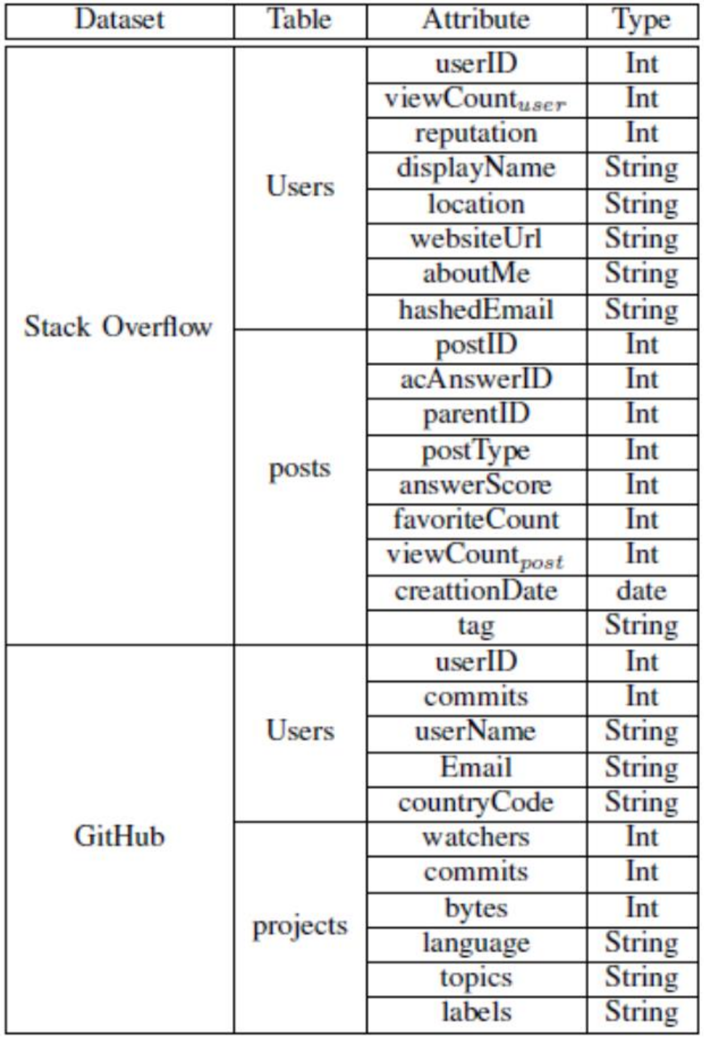
Appendix

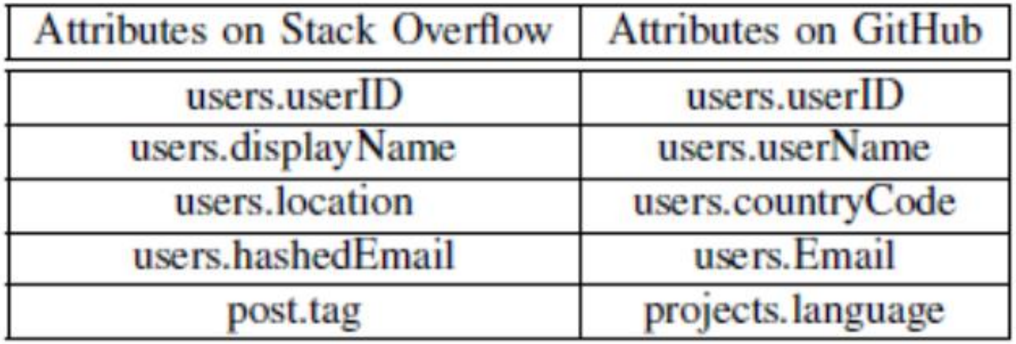
Table 1:selected attributes and content types for each dataset.



Dataset	Table	Attribute	Type
Stack Overflow	Users	userID	Int
		viewCount$_{user}$	Int
		reputation	Int
		displayName	String
		location	String
		websiteUrl	String
		aboutMe	String
		hashedEmail	String
	posts	postID	Int
		acAnswerID	Int
		parentID	Int
		postType	Int
		answerScore	Int
		favoriteCount	Int
		viewCount$_{post}$	Int
		creattionDate	date
		tag	String
GitHub	Users	userID	Int
		commits	Int
		userName	String
		Email	String
		countryCode	String
	projects	watchers	Int
		commits	Int
		bytes	Int
		language	String
		topics	String
		labels	String

Appendix

Table 2: Mapping between Stack Overflow and GitHub



Attributes on Stack Overflow	Attributes on GitHub
users.userID	users.userID
users.displayName	users.userName
users.location	users.countryCode
users.hashedEmail	users.Email
post.tag	projects.language