Web Information Systems

Delft University of Technology

Accelerating Knowledge Creation in Collaborative Q&A Systems

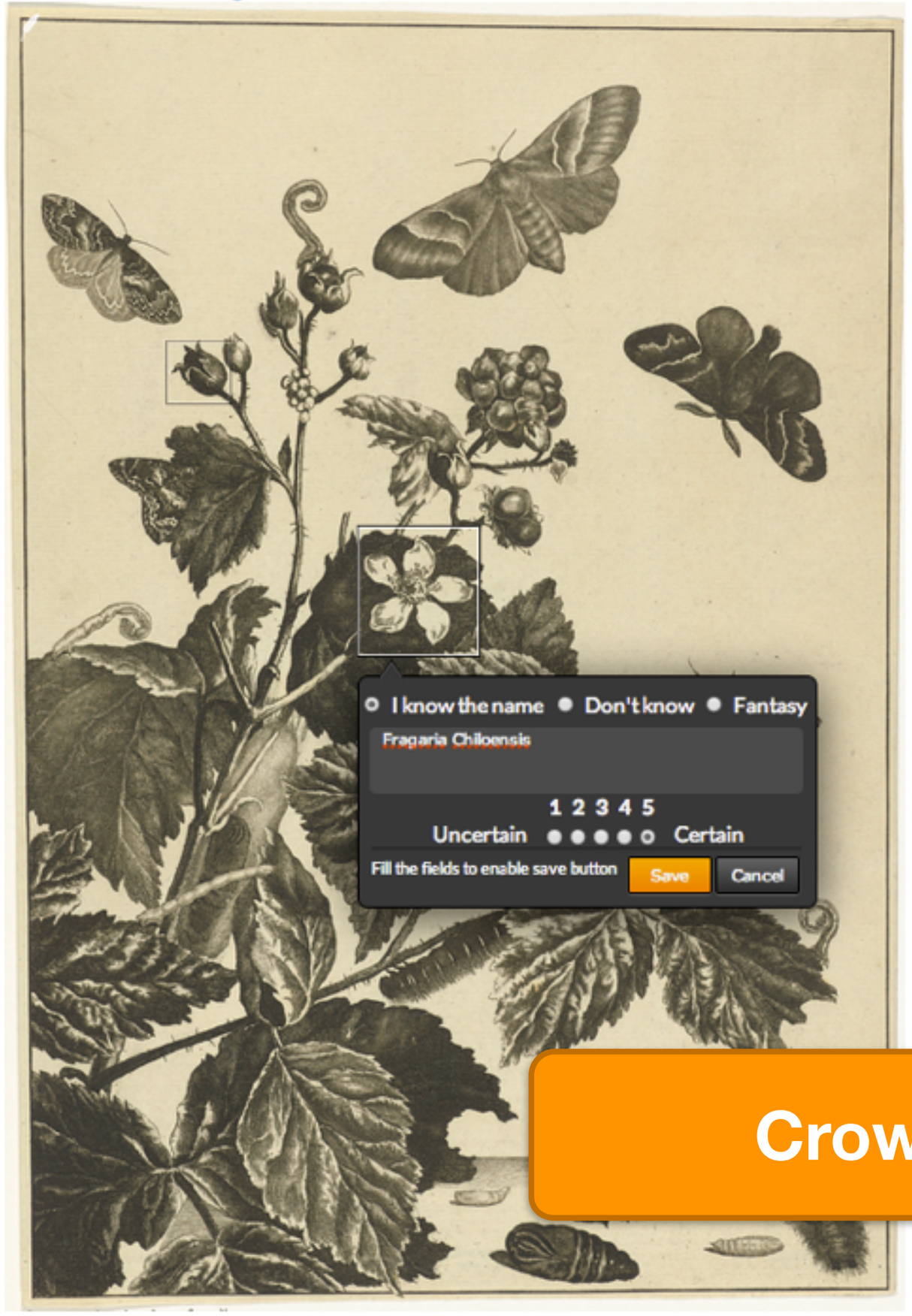
A case study of Stack Overflow: a crowd-generated knowledge repository for software engineering

Jie Yang, Alessandro Bozzon, Geert-Jan Houben
j.yang-3@tudelft.nl

Self-introduction

- PhD researcher at Web Information Systems group
- Working on social media → user modelling → knowledge crowdsourcing
  - **crowdsourcing**: the process of sourcing tasks to large online crowds, soliciting human contributions to obtain results

Click for the full-size image



How many FLOWERS are in this image?*

10

Count every flower and flower bud you see on the image. Click for the full-size image if needed.

Tag each individual FLOWER by drawing a bounding box around it.

For each box fill in the fields of the popup.

Number of bounding boxes: 2

For how many of the FLOWERS you identified on this image did you provide a FLOWER NAME?*

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- More

Please provide a reference on how you got the answer to these questions*

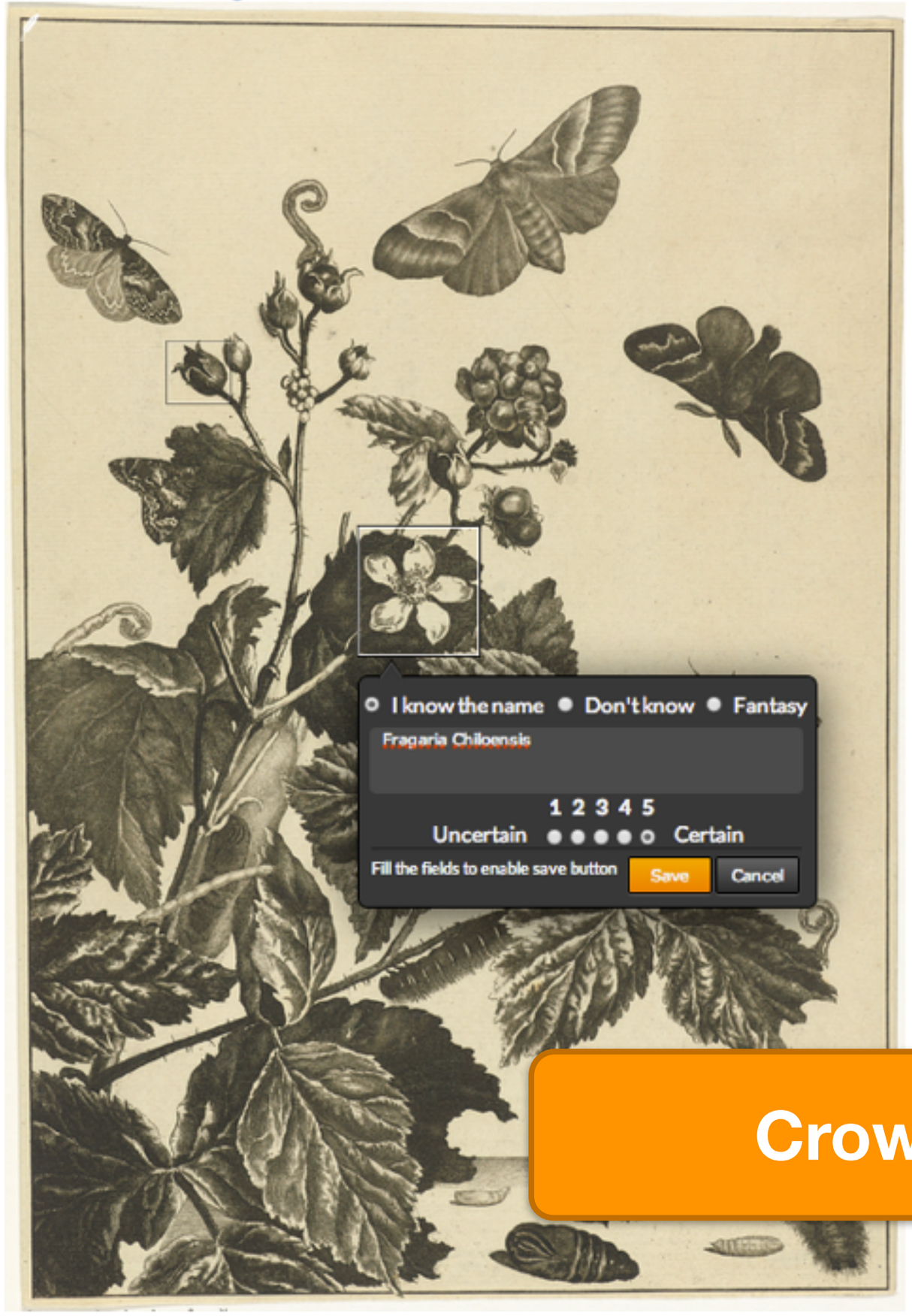
Describe the search strategy you used, or the website you used to find the flower name, or the reason you already knew the names of the flowers.

Crowdsourcing

Self-introduction

- PhD researcher at Web Information Systems group
- Working on social media ➡ user modelling ➡ knowledge crowdsourcing
  - **crowdsourcing**: the process of sourcing tasks to large online crowds, soliciting human contributions to obtain results
  - **knowledge crowdsourcing**: the process of designing, executing and coordinating crowdsourcing tasks that are knowledge intensive.

Click for the full-size image



How many FLOWERS are in this image?*

10

Count every flower and flower bud you see on the image. Click for the full-size image if needed.

Tag each individual FLOWER by drawing a bounding box around it.

For each box fill in the fields of the popup.

Number of bounding boxes: 2

For how many of the FLOWERS you identified on this image did you provide a FLOWER NAME?*

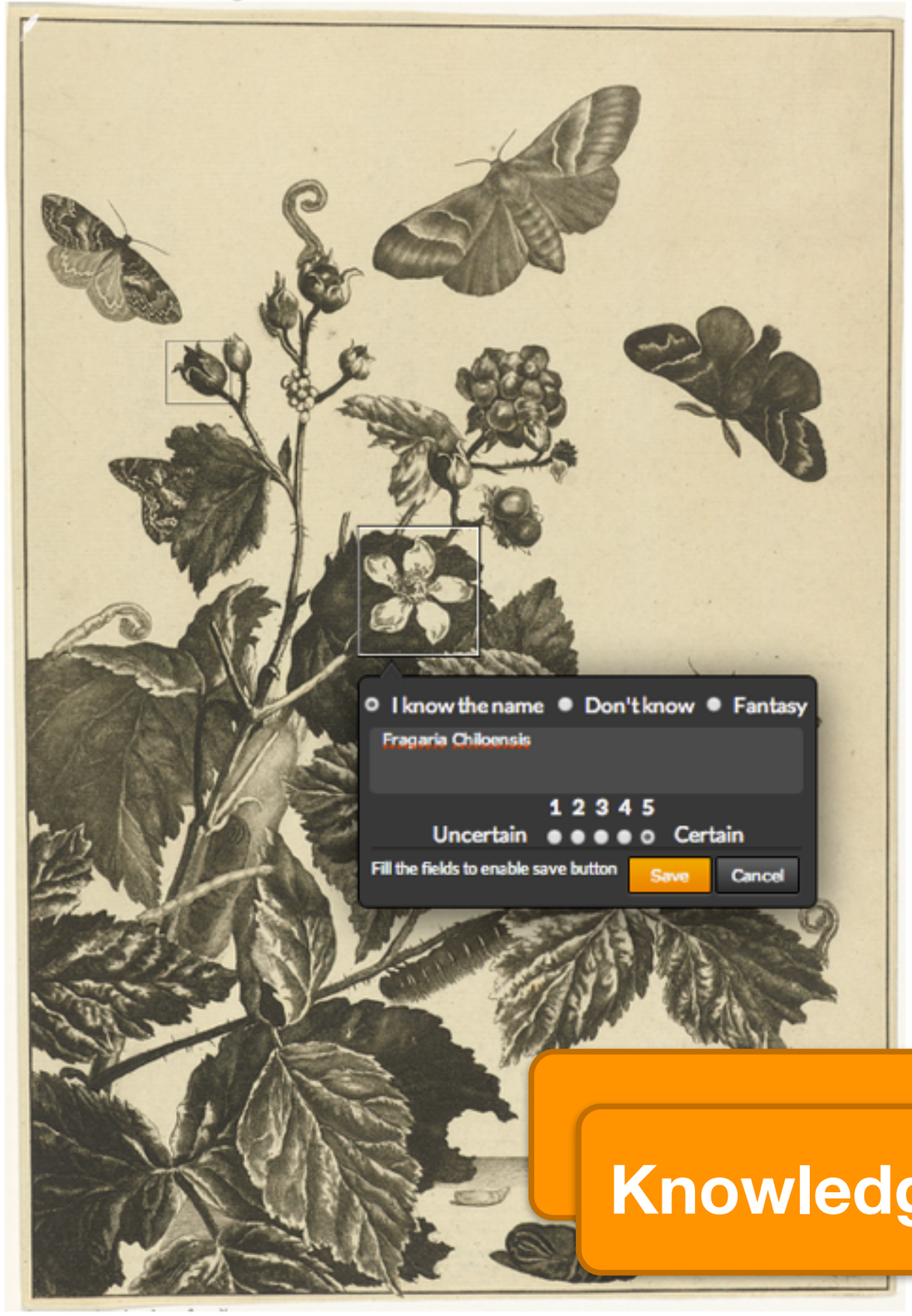
- 0
- 1
- 2
- 3
- 4
- 5
- 6
- More

Please provide a reference on how you got the answer to these questions*

Describe the search strategy you used, or the website you used to find the flower name, or the reason you already knew the names of the flowers.

Crowdsourcing

Click for the full-size image



How many FLOWERS are in this image?*

10

Count every flower and flower bud you see on the image. Click for the full-size image if needed.

Tag each individual FLOWER by drawing a bounding box around it.

For each box fill in the fields of the popup.

Number of bounding boxes: 2

For how many of the FLOWERS you identified on this image did you provide a FLOWER NAME?*

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- More

Please provide a reference on how you got the answer to these questions*

Describe the search strategy you used, or the website you used to find the flower name, or the reason you already knew the names of the flowers.

Knowledge Crowdsourcing

Self-introduction

- PhD researcher at Web Information Systems group
- Working on social media → user modelling → knowledge crowdsourcing
  - **crowdsourcing**: the process of sourcing tasks to large online crowds, soliciting human contributions to obtain results
  - **knowledge crowdsourcing**: the process of designing, executing and coordinating crowdsourcing tasks that are knowledge intensive.

More about crowdsourcing:

IN4325 Information Retrieval

Self-introduction

- PhD researcher at Web Information Systems group
- Working on social media → user modelling → knowledge crowdsourcing
  - **crowdsourcing**: the process of sourcing tasks to large online crowds, soliciting human contributions to obtain results
  - **knowledge crowdsourcing**: the process of designing, executing and coordinating crowdsourcing tasks that are knowledge intensive
  - **user modelling** as a integral part of knowledge crowdsourcing to profile crowd's knowledge-related properties
  - **social media** (e.g. social Q&A system like Stack Overflow) as a source of large-scale crowd
- PhD topic: *knowledge crowdsourcing acceleration*.

Accelerating Knowledge Creation in Collaborative Q&A Systems

Accelerating Knowledge Creation in Collaborative Q&A Systems

- **Collaborative QA (CQA)**
- **Expertise Recognition**
- **Question Routing**
- **Question Editing**

Outline

- **Collaborative QA (CQA)**
- Expertise Recognition
- Question Routing
- Question Editing

CQA systems are everywhere

Quora

reddit

stackoverflow

ANSWERS

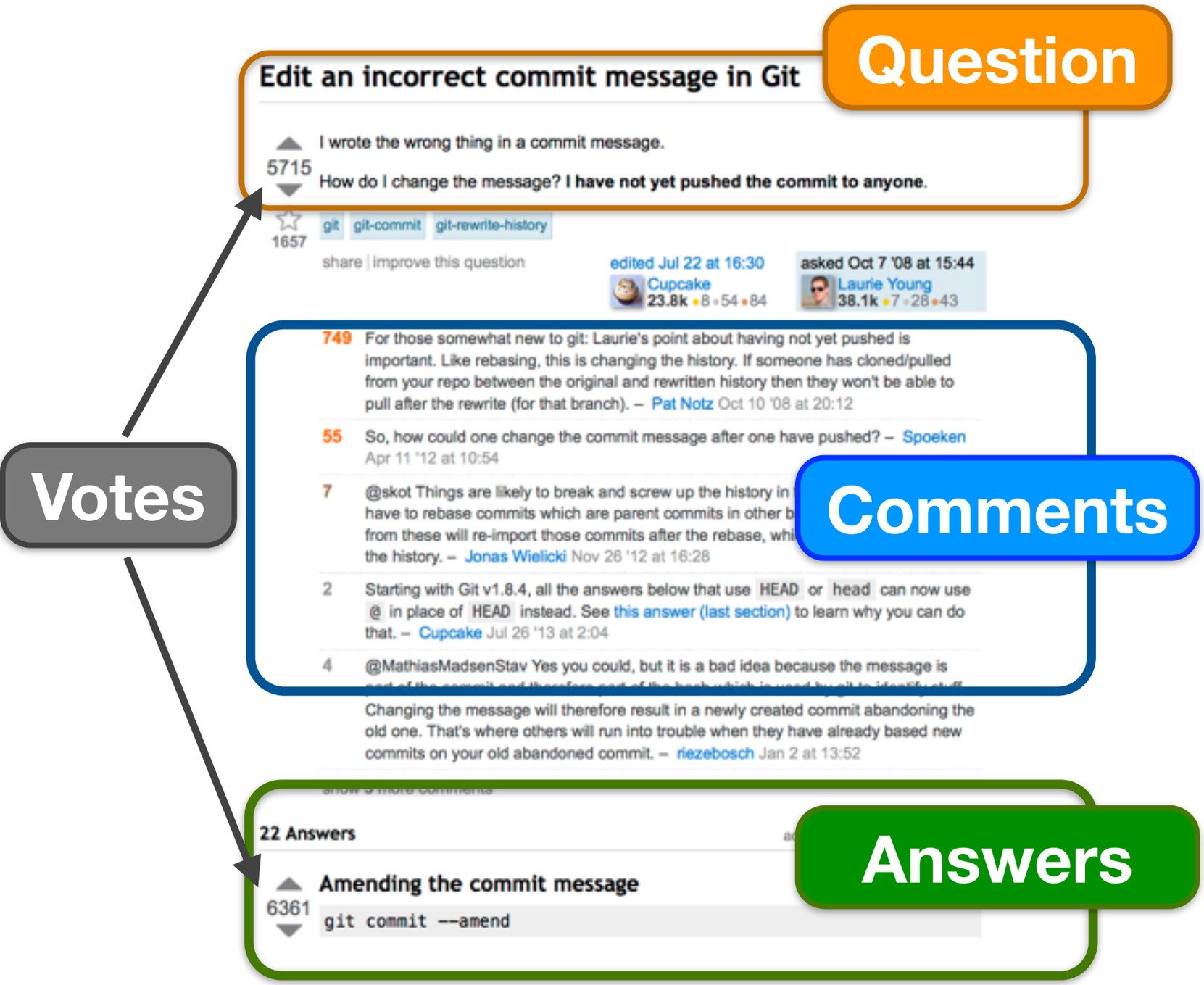
Mailing List

Rich user interfaces

Effective incentives

Fast knowledge generation & exchange

Stack Overflow: a CQA system for programmers



Highly active (Sept. 2013):

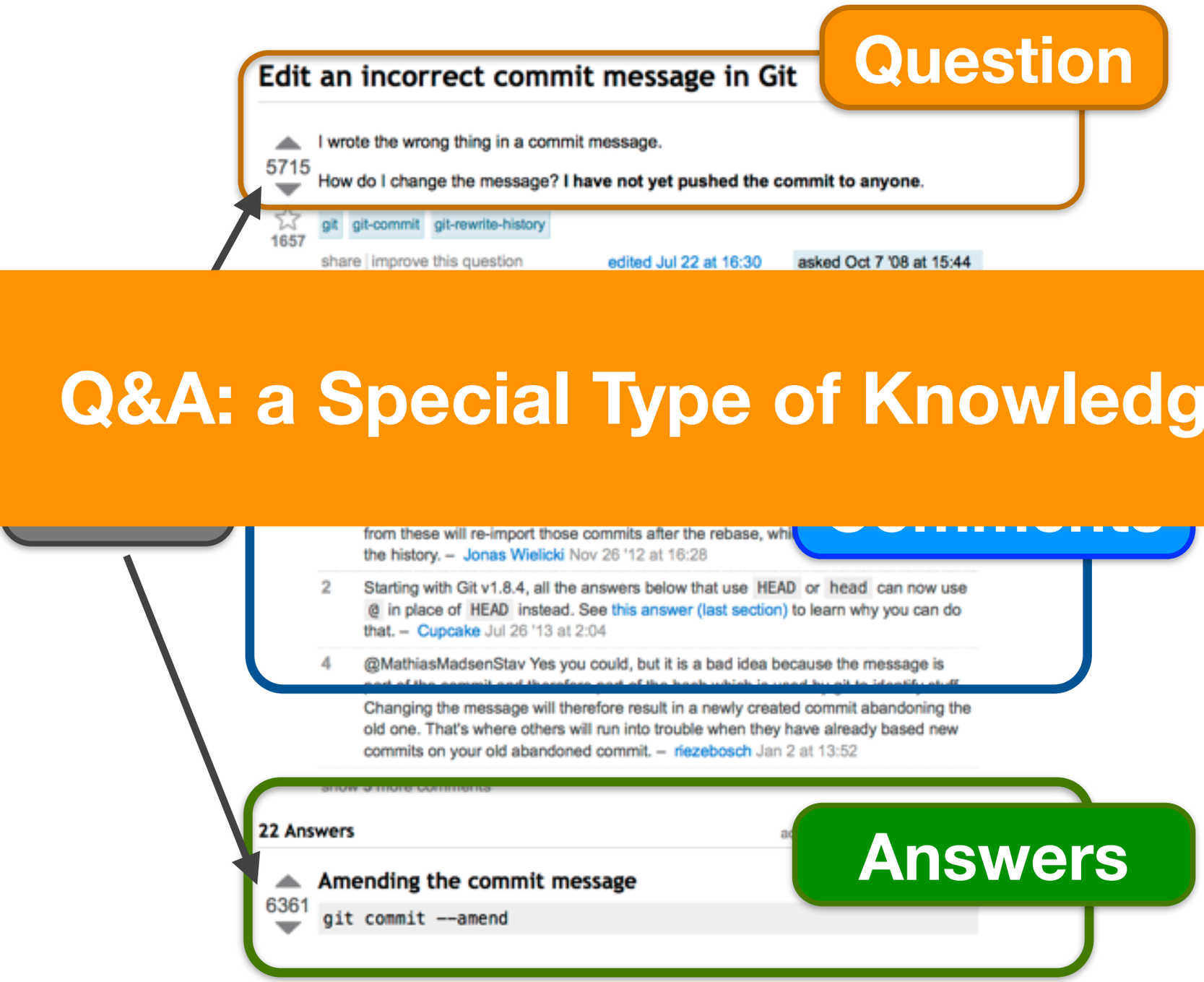
5.6M questions

10.3M answers

22.0M comments

Effective **gamification**: users earn reputation points if their posts are up-voted

Stack Overflow: a CQA system for programmers



Highly active (Sept. 2013):
5.6M questions

Q&A: a Special Type of Knowledge Crowdsourcing

Effective **gamification**:
users earn reputation points
if their posts are up-voted

Stack Overflow as a knowledge repository

From the perspective of **A. Web Information System, B. Software Engineering**

A. Crowd-generated	Knowledge Repository	B. in Software Engineering

Main research topics:

- accelerating the process of knowledge creation

- mining knowledge repository

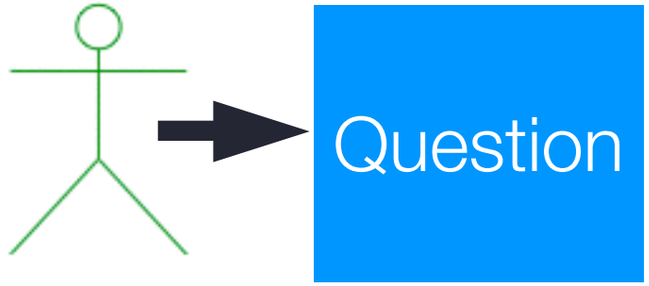
Stack Overflow challenges & solutions

- 2M questions (36%) do **not** have any up-voted answer

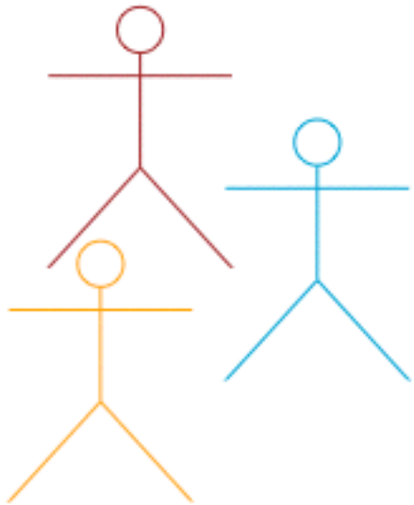
- **Median** time until an accepted answer is posted: ~30 minutes, **average** time: ~3 days (i.e. some questions require a long waiting time)

- Remedies to decrease the time to an answer:
  - Route questions to the “right” user
  - Improve the question itself

Topics to be discussed

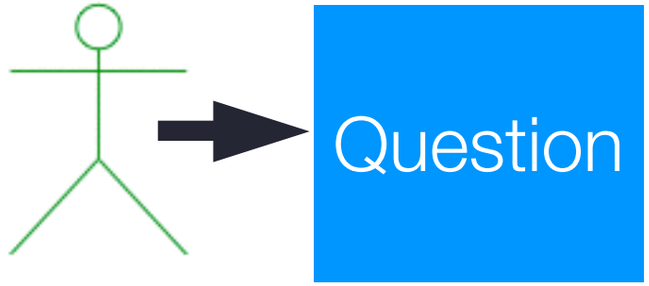


Asker

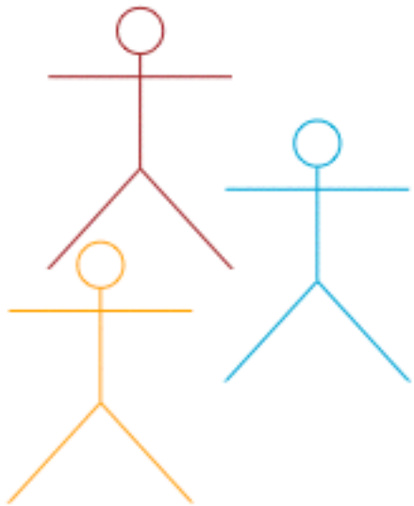


Stack Overflow Users

Topics to be discussed



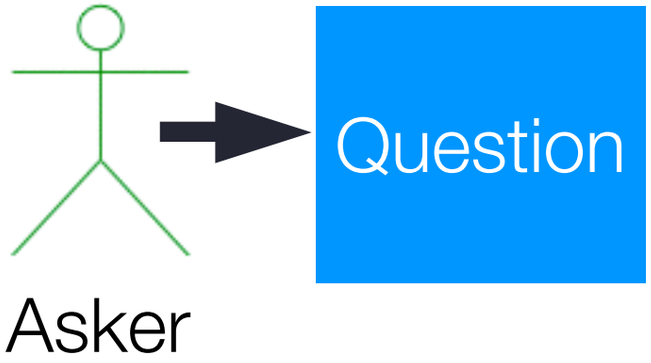
Asker

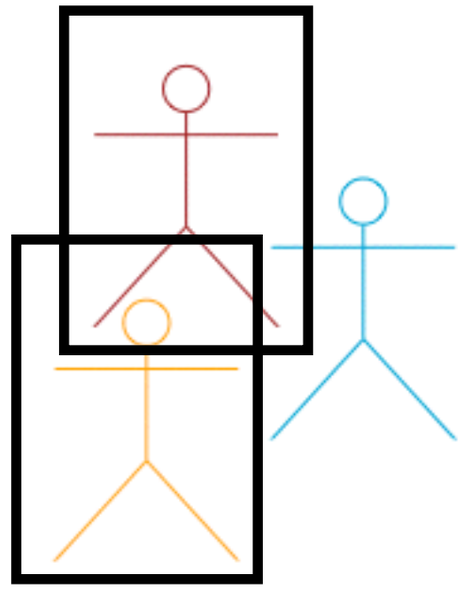


Stack Overflow Users

Edit Suggestion

Topics to be discussed

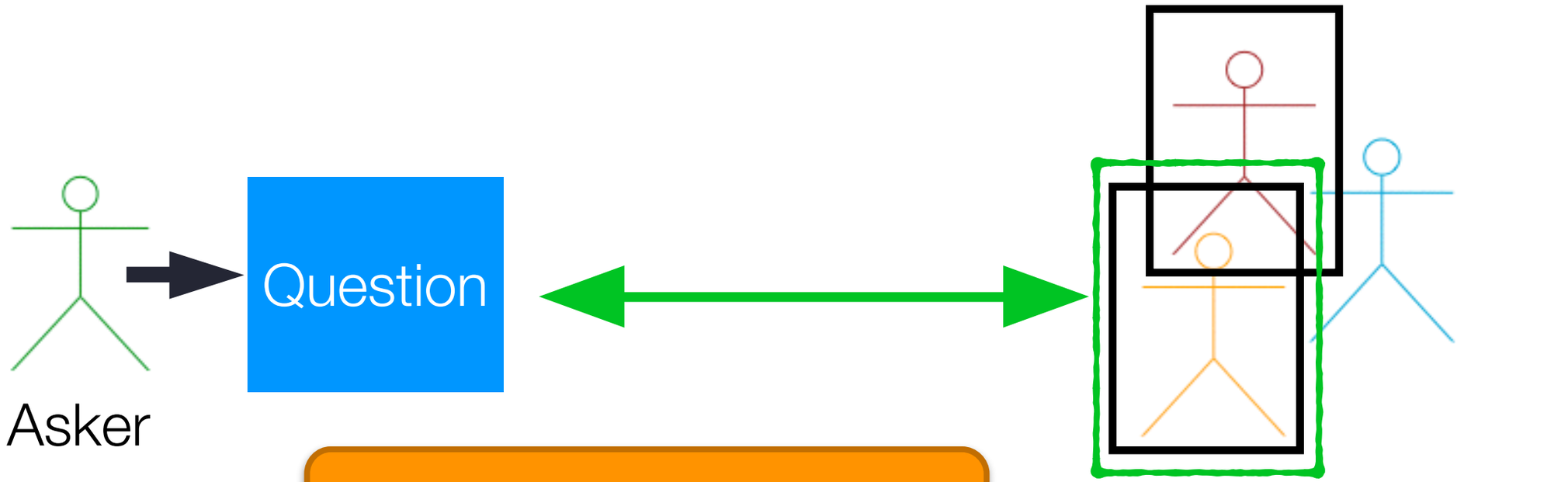




Edit Suggestion

Expertise recognition

Topics to be discussed



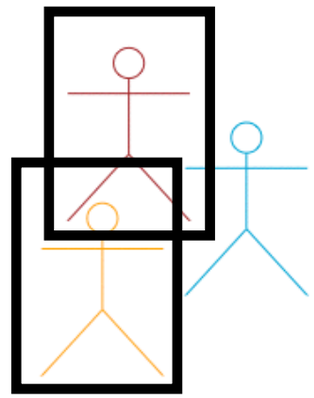
Question Routing

Edit Suggestion

Expertise recognition

Outline

- Collaborative QA (CQA)
- **Expertise Recognition**
- Question Routing
- Question Editing



Expertise recognition

Activeness = Expertise?

- Existing Metrics
  - #answers
  - reputation (mostly got from voting's for answers)
  - Zscore (#answers-#questions)

Activeness = Expertise?

- Existing Metrics
  - #answers
  - reputation (mostly got from voting's for answers)
  - Zscore (#answers-#questions)

All biased to user activeness

Activeness = Expertise?

- Existing Metrics
  - #answers
  - reputation (mostly got from voting's for answers)
  - Zscore (#answers-#questions)

All biased to user activeness

According to #votes

Activeness of an answerer

	Question: C# to C++ 'Gotchas'	
Rank 1	C++ has so many gotchas…	2 answers
Rank 2	Garbage Collections!	26 answers
Rank 3	There are a lot of differences	175 answers
…	…	
Rank 14	The following isn't meant…	24 answers

Activeness = Expertise?

- Existing Metrics
  - #answers
  - reputation (mostly got from voting's for answers)
  - Zscore (#answers-#questions)

All biased to user activeness

According to #votes

Activeness of an answerer

	Question: C# to C++ 'Gotchas'	
Rank 1	C++ has so many gotchas…	2 answers
Rank 2	Garbage Collections!	26 answers
Rank 3	There are a lot of differences	175 answers
…	…	
Rank 14	The following isn't meant…	24 answers

Best answer is provided by an inactive user

Dataset and data visualisation

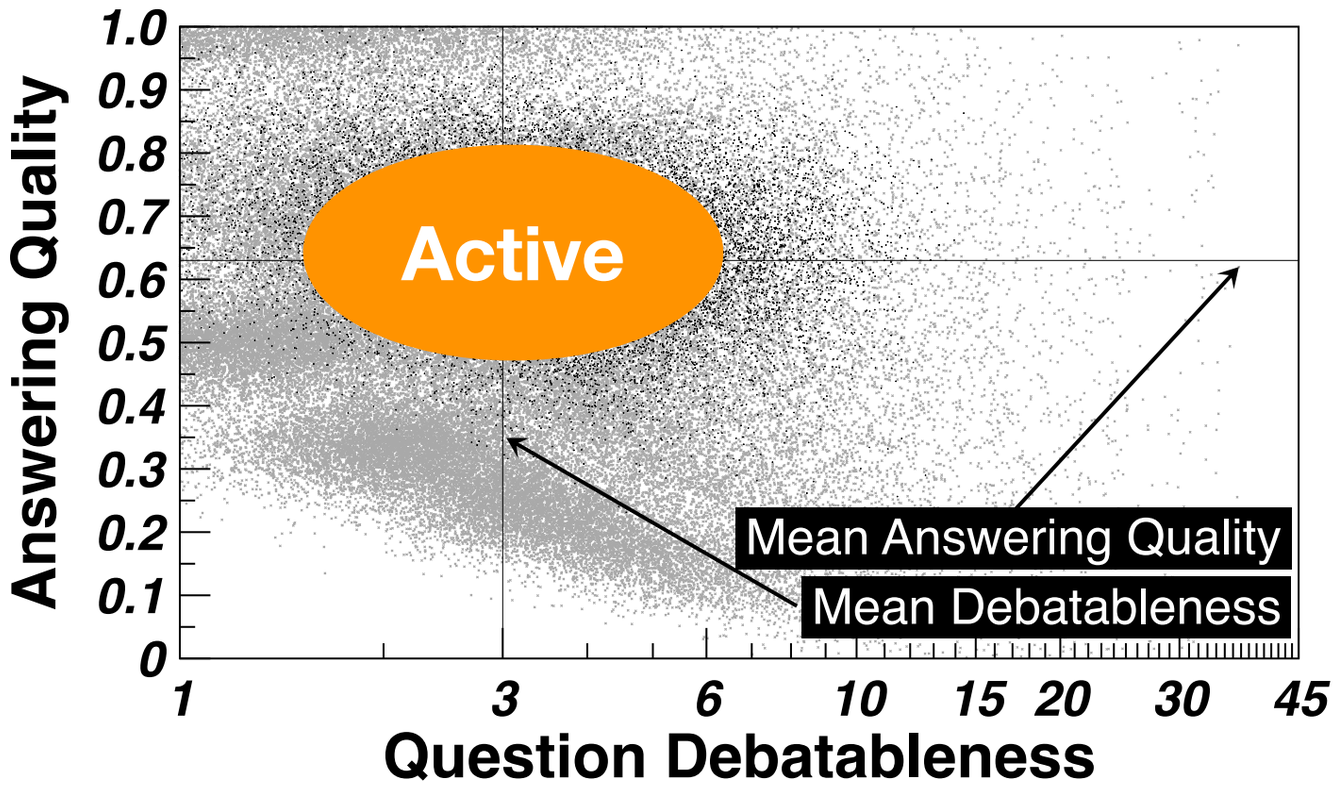
- Global: 5.6M questions, 10.3M answers, 2.3M users
- Topic C# related
  - 472K questions, 1M answers, 117K answerers
  - #answers per question： 2.27±1.74
  - #answers per user: **9.15±76.66**. (Power Law)

Expertise metric:
mean expertise contribution (MEC)

- Answer Utility
  - 1/(rank position) of an answer
  - measure the usefulness of answer to a question
- Question Debatableness
  - #answers to a question
  - consider “difficulty” of the question

Expertise metric:
mean expertise contribution (MEC)

- Answer Utility
  - 1/(rank position) of an answer
  - measure the usefulness of answer to a question
- Question Debatableness
  - #answers to a question
  - consider “difficulty” of the question



Mean expertise contribution

$$\mathtt{MEC}_{u,t} = \frac{1}{|Q_t^u|} \sum_{\forall q_i \in Q_{u,t}} \mathcal{AU}(u, q_i) * \frac{\mathcal{D}(q_i)}{\mathcal{D}_t^{avg}}$$

Question: C# to C++ ‘Gotchas’		
Rank 1	C++ has so many gotchas…	2 answers
Rank 2	Garbage Collections!	26 answers
Rank 3	There are a lot of differences	175 answers
…	…	
Rank 14	The following isn’t meant…	24 answers

Mean expertise contribution

$$\mathtt{MEC}_{u,t} = \frac{1}{|Q_t^u|} \sum_{\forall q_i \in Q_{u,t}} \mathcal{AU}(u, q_i) * \frac{\mathcal{D}(q_i)}{\mathcal{D}_t^{avg}}$$

Answer Utility = 1/2

Question: C# to C++ ‘Gotchas’		
Rank 1	C++ has so many gotchas…	2 answers
Rank 2	Garbage Collections!	26 answers
Rank 3	There are a lot of differences	175 answers
…	…	
Rank 14	The following isn’t meant…	24 answers

Mean expertise contribution

$$\texttt{MEC}_{u,t} = \frac{1}{|Q_t^u|} \sum_{\forall q_i \in Q_{u,t}} \mathcal{AU}(u, q_i) * \frac{\mathcal{D}(q_i)}{\mathcal{D}_t^{avg}}$$

Question: C# to C++ ‘Gotchas’		
Rank 1	C++ has so many gotchas…	2 answers
Rank 2	Garbage Collections!	26 answers
Rank 3	There are a lot of differences	175 answers
…	…	
Rank 14	The following isn’t meant…	24 answers

Mean expertise contribution

$$\mathtt{MEC}_{u,t} = \frac{1}{|Q_t^u|} \sum_{\forall q_i \in Q_{u,t}} \mathcal{AU}(u, q_i) * \frac{\mathcal{D}(q_i)}{\mathcal{D}_t^{avg}}$$

Debatableness = 14

Question: C# to C++ ‘Gotchas’		
Rank 1	C++ has so many gotchas…	2 answers
Rank 2	Garbage Collections!	26 answers
Rank 3	There are a lot of differences	175 answers
…	…	
Rank 14	The following isn’t meant…	24 answers

Mean expertise contribution

$$\mathtt{MEC}_{u,t} = \frac{1}{|Q_t^u|} \sum_{\forall q_i \in Q_{u,t}} \mathcal{AU}(u, q_i) * \frac{\mathcal{D}(q_i)}{\mathcal{D}_t^{avg}}$$

Answer Utility * Debatableness = 7

Question: C# to C++ ‘Gotchas’		
Rank 1	C++ has so many gotchas…	2 answers
Rank 2	Garbage Collections!	26 answers
Rank 3	There are a lot of differences	175 answers
…	…	
Rank 14	The following isn’t meant…	24 answers

Demo

- Implementation in http://data.stackexchange.com
- Link: http://data.stackexchange.com/stackoverflow/query/219875/mec-revised?tag=c%23

Demo

58.9 ms
68.5 ms
4.4 ms
2.0 ms
2.3 ms
2.1 ms
3.2 ms
2.5 ms
2.2 ms
2.0 ms
2.2 ms
2.4 ms
2.4 ms
309.7 ms

Enter Parameters

tag c#

Run Query | Cancel | Options: Text-only results | Include execution plan

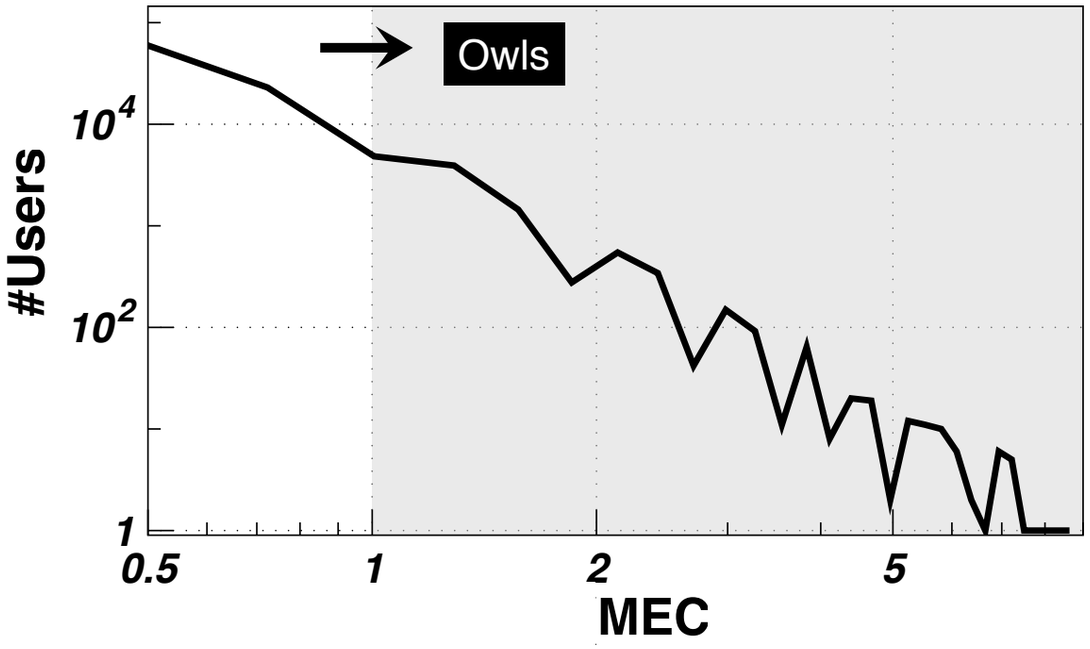
Switch sites: search by name or url

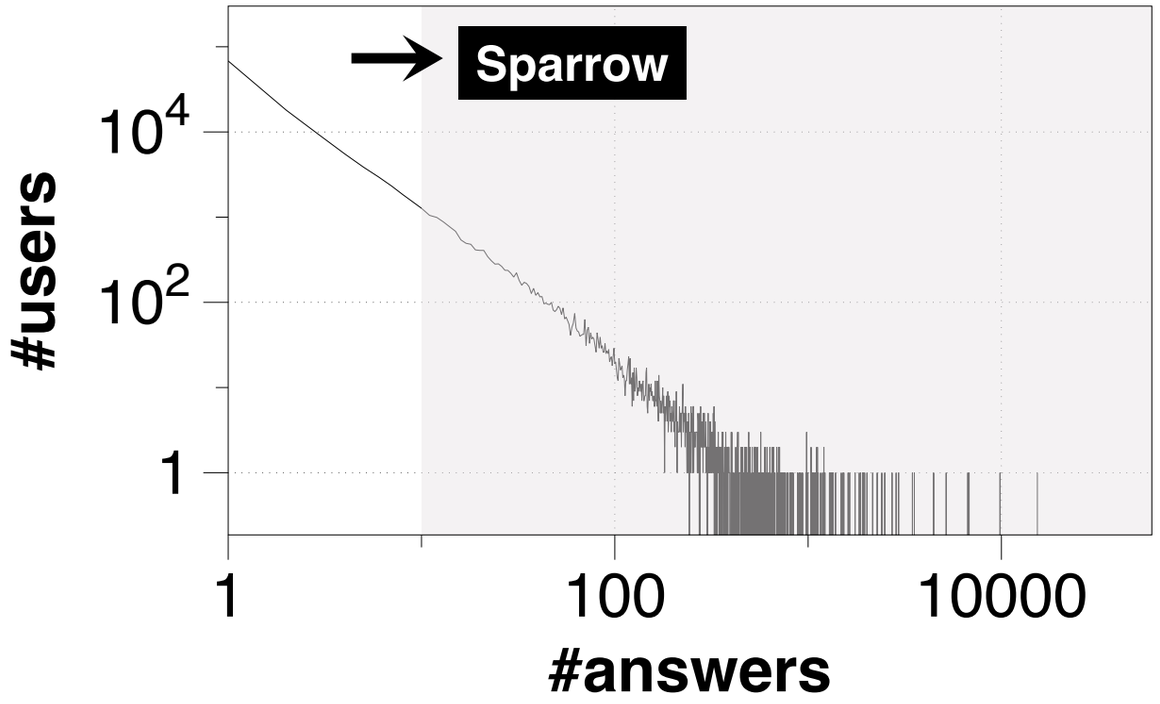
Results | Messages | Graph

Download CSV

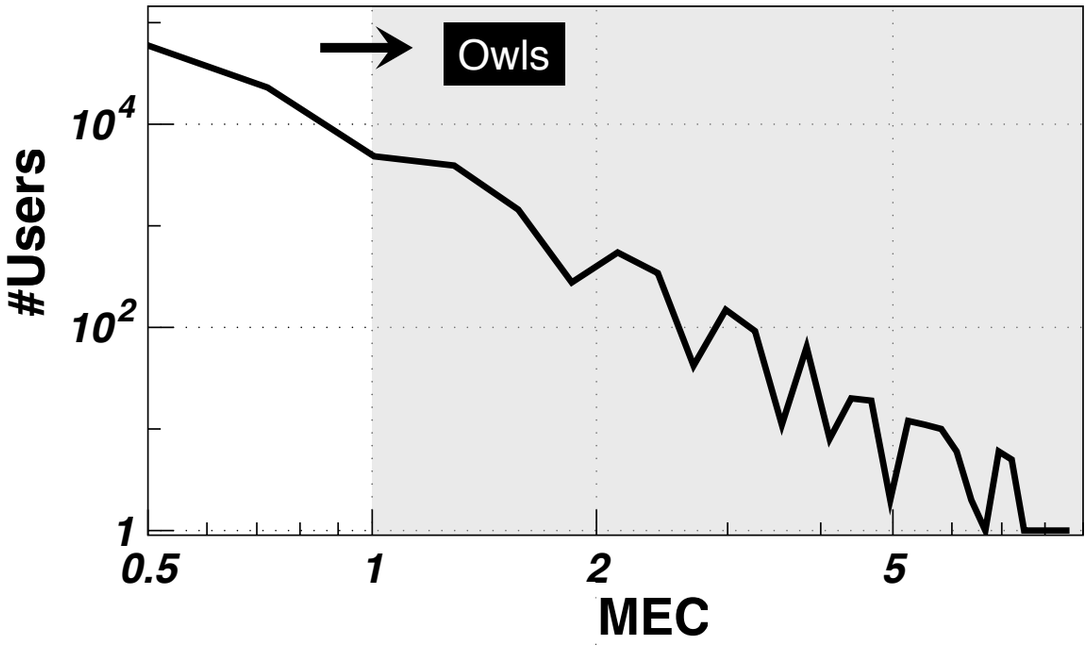
UserId	MEC	AU	D	D_avg_t	Q_u_t
332176	19.259821569496953	1	41	2.128784	1
6779	16.44131109591203	1	35	2.128784	1
4917	15.971559350314546	1	34	2.128784	1
74660	14.562304113522087	1	31	2.128784	1
154001	10.804290148742194	1	23	2.128784	1
20	10.334538403144705	1	22	2.128784	1
52028	9.864786657547217	1	21	2.128784	1
25375	9.864786657547217	1	21	2.128784	1
2537527	9.864786657547217	1	21	2.128784	1
7425	8.925283166352248	1	19	2.128784	1
350309	8.925283166352248	1	19	2.128784	1
384020	8.925283166352248	1	19	2.128784	1
611904	8.925283166352248	1	19	2.128784	1
1031134	8.925283166352248	1	19	2.128784	1
5390	8.45553142075476	1	18	2.128784	1
5823	8.45553142075476	1	18	2.128784	1
4276	8.220655547956015	0.5	35	2.128784	1
1488189	7.516027929559787	1	16	2.128784	2
2674	7.516027929559786	1	16	2.128784	1

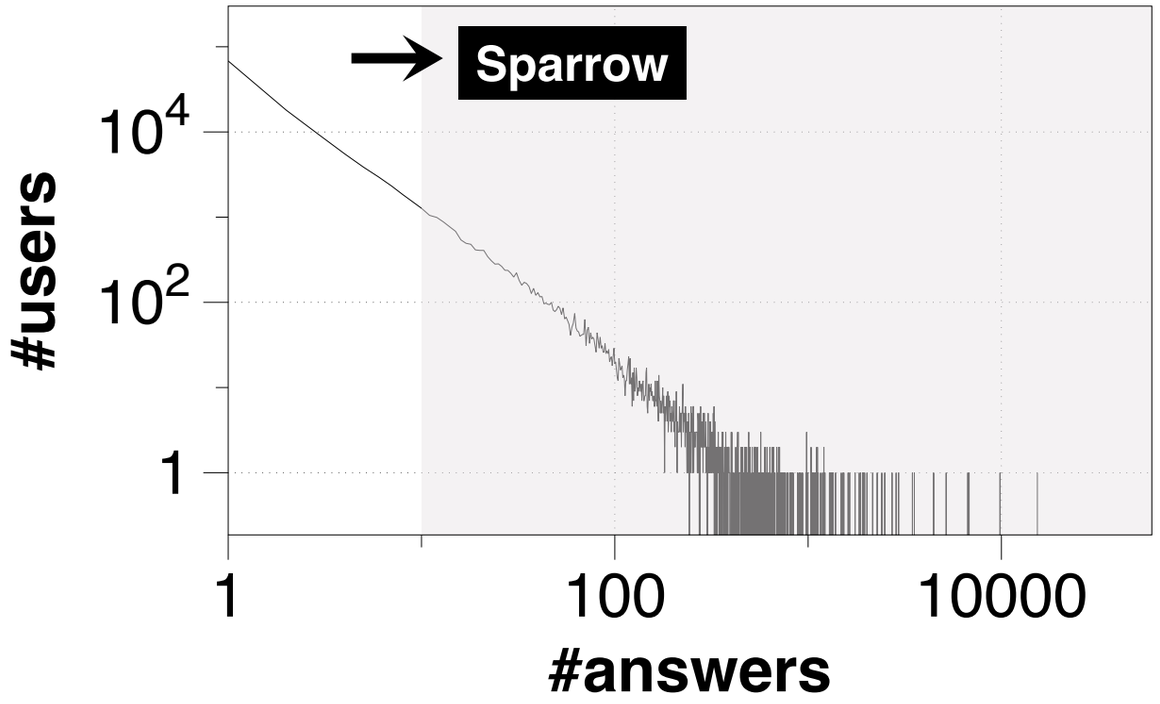
Distribution of Expertise (MEC) and Activeness (#answers)





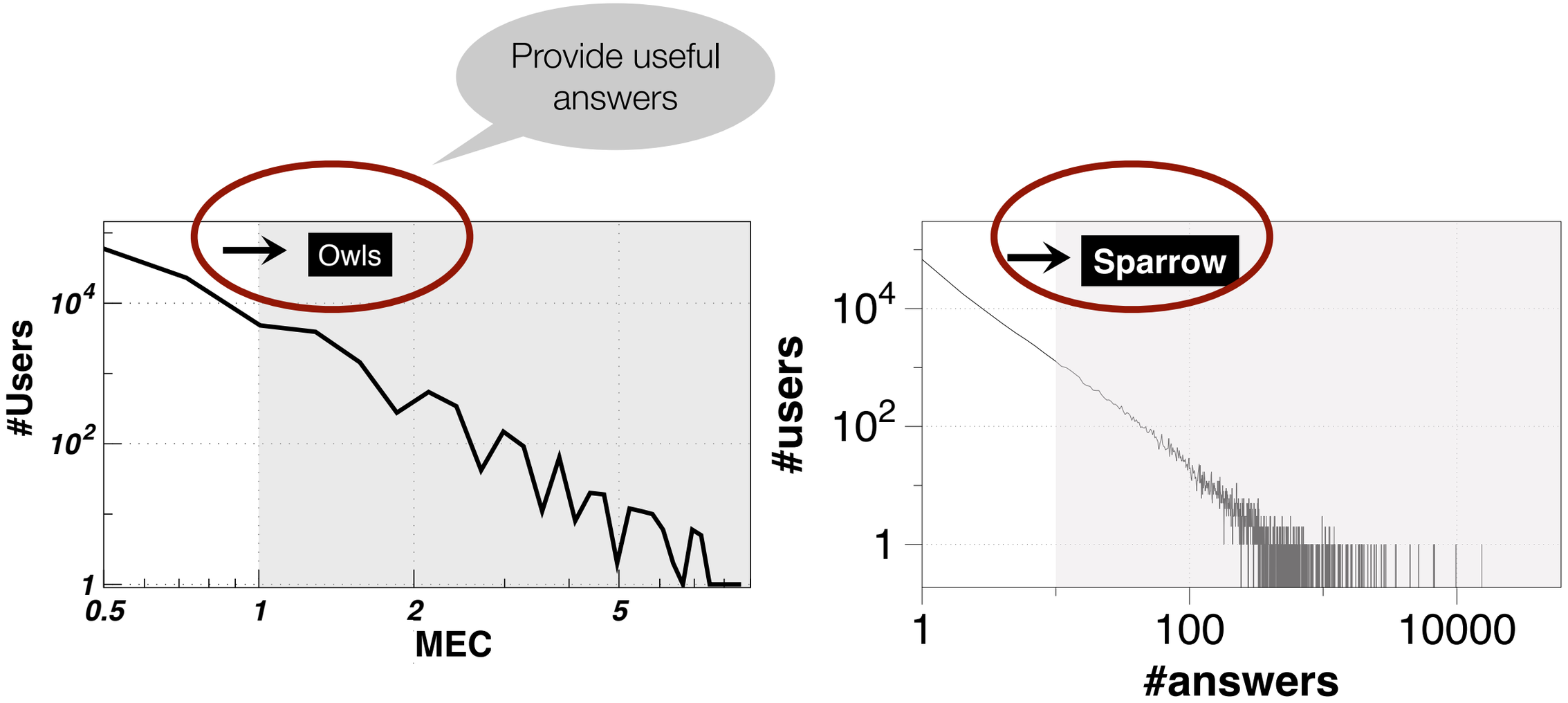
Distribution of Expertise (MEC) and Activeness (#answers)





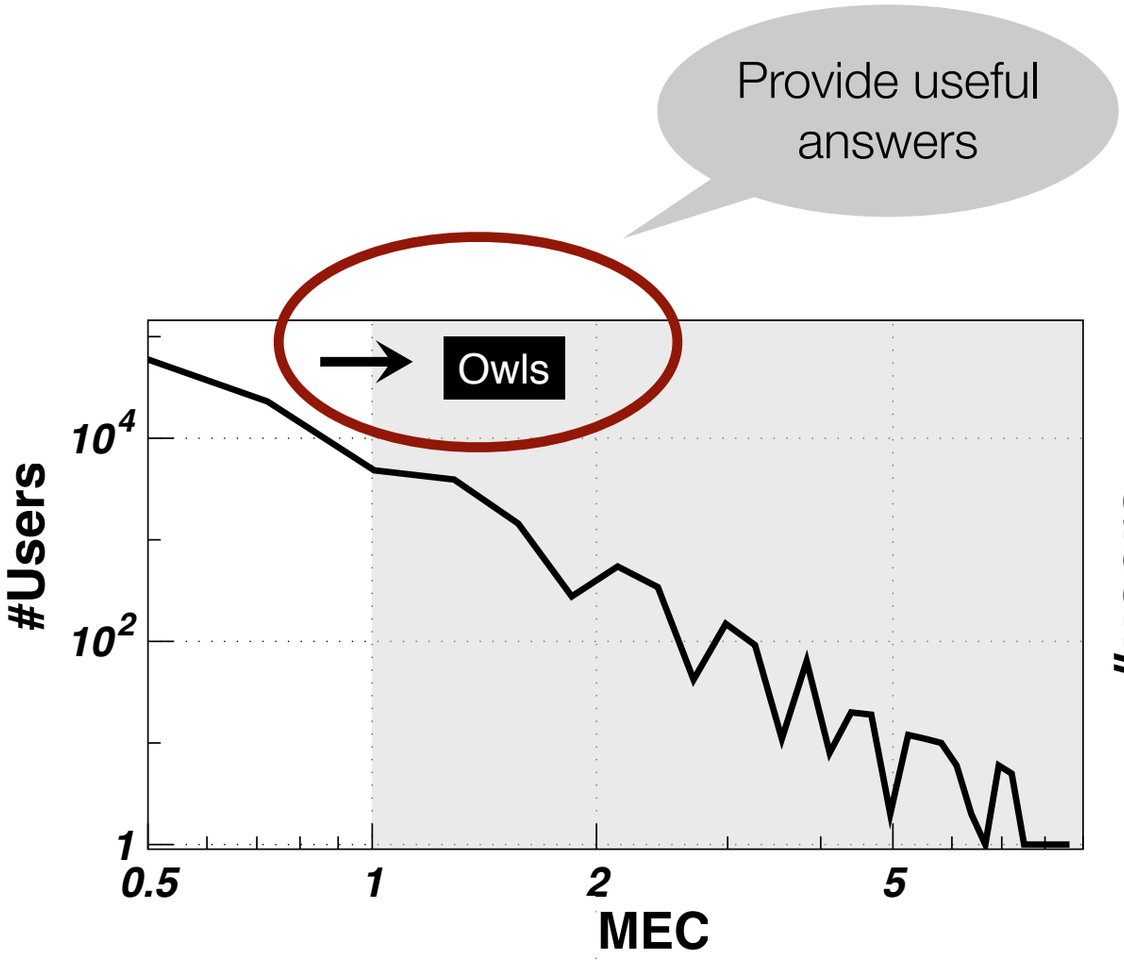
A small number of users have high MEC (provide useful answers), while others do not; MEC has a similar distribution with #answers.

Distribution of Expertise (MEC) and Activeness (#answers)

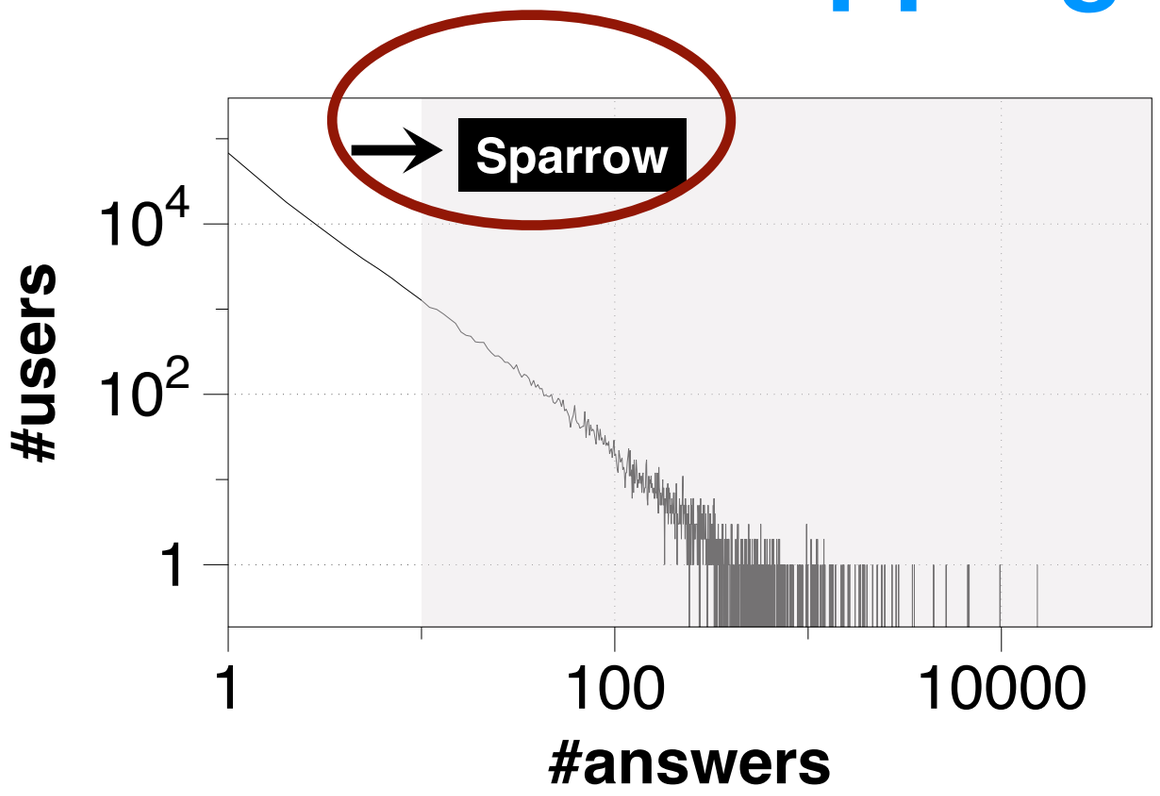


A small number of users have high MEC (provide useful answers), while others do not; MEC has a similar distribution with #answers.

Distribution of Expertise (MEC) and Activeness (#answers)



Sparrows and Owls 9.9% Overlapping



A small number of users have high MEC (provide useful answers), while others do not; MEC has a similar distribution with #answers.

How do owls and sparrows behave (differently)?

RQ1. How do CONTRIBUTIONS from Sparrows and Owls differ?

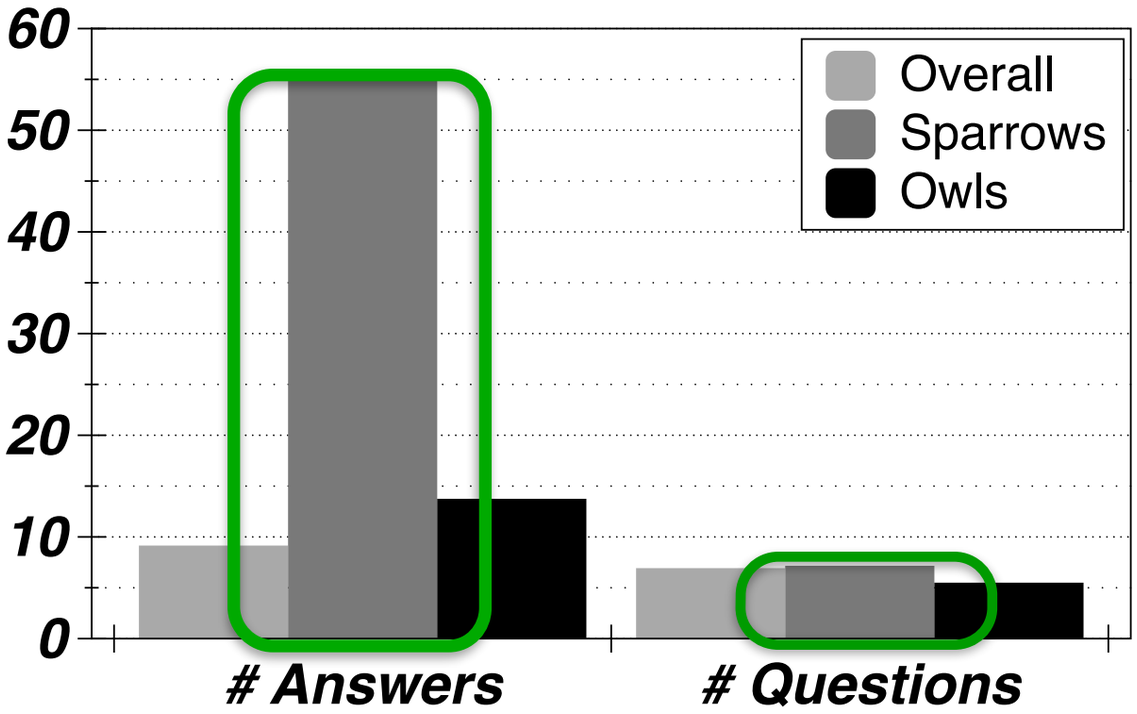
RQ2. Do Sparrows and Owls show different PREFERENCES in knowledge creation?

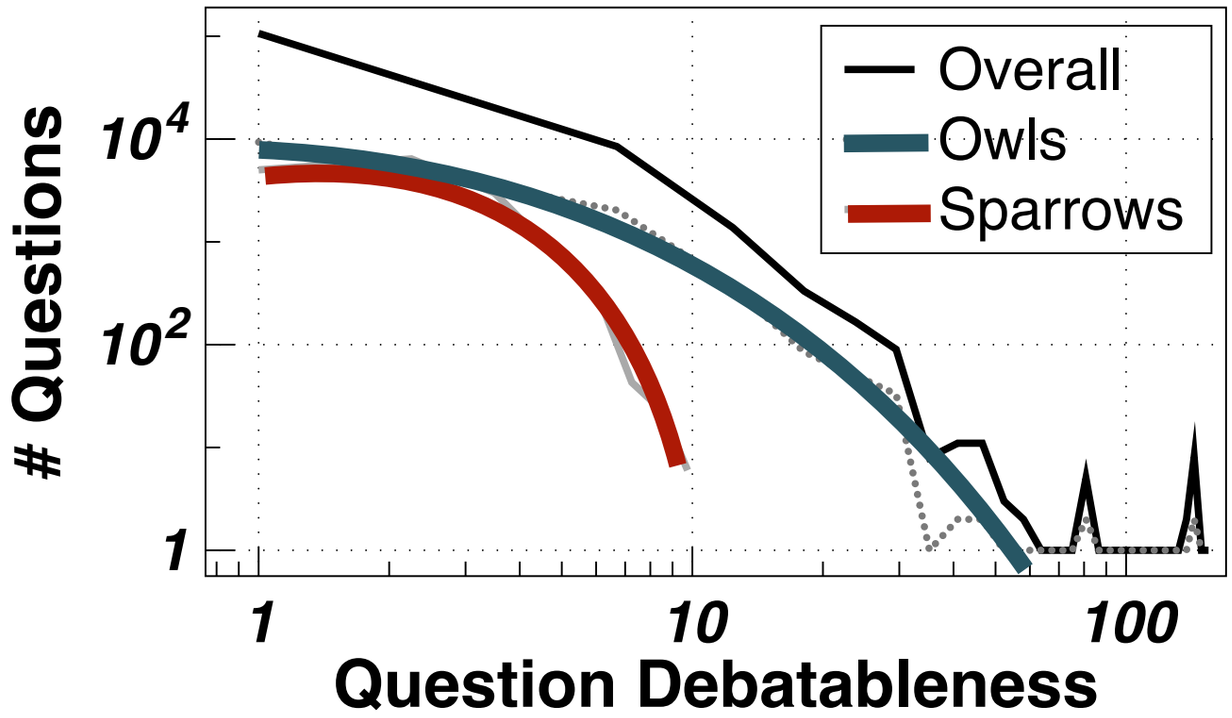
RQ3. Are INCENTIVISING mechanism equally effective on sparrows and owls?

RQ1. How do CONTRIBUTIONS from Sparrows and Owls differ?

Participation Activeness

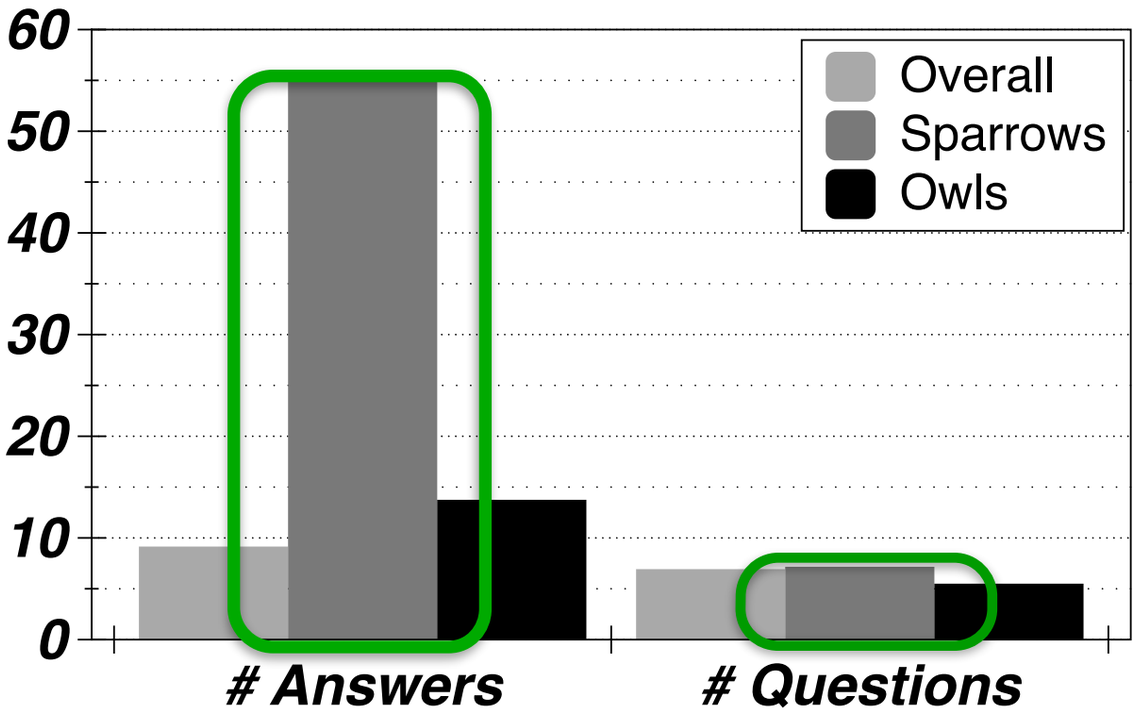
#question,answers, distribution of debatableness of the questions they answer to

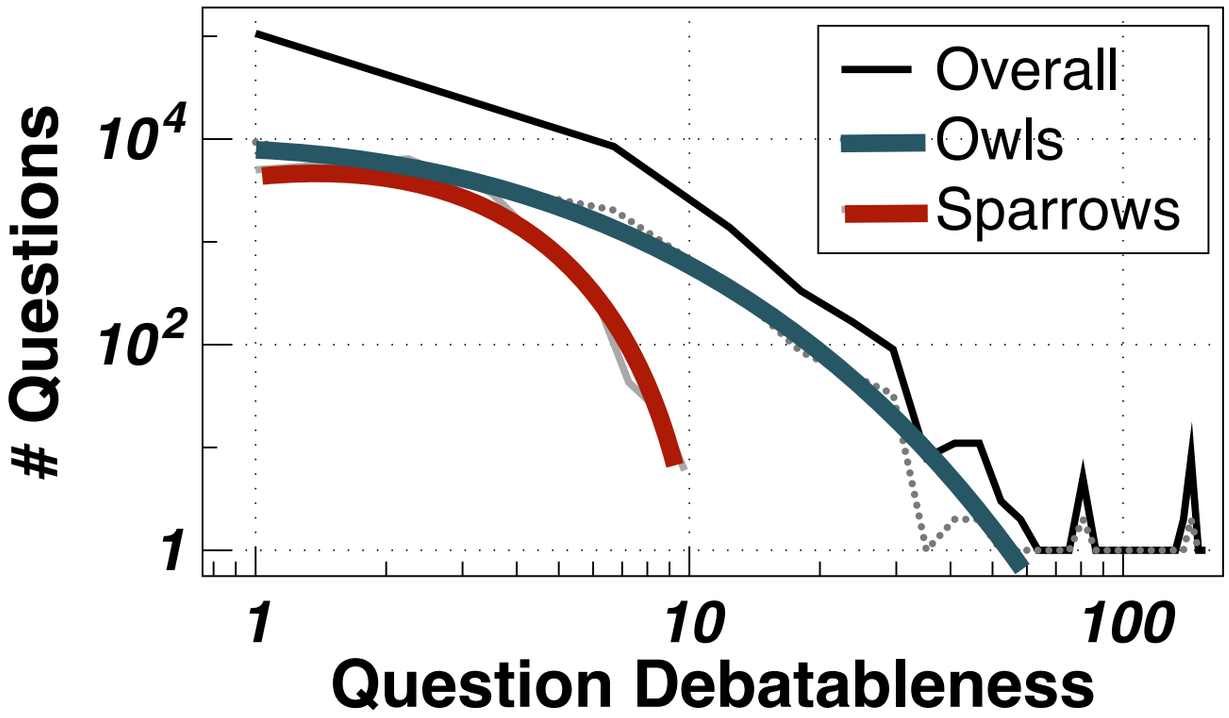




Participation Activeness

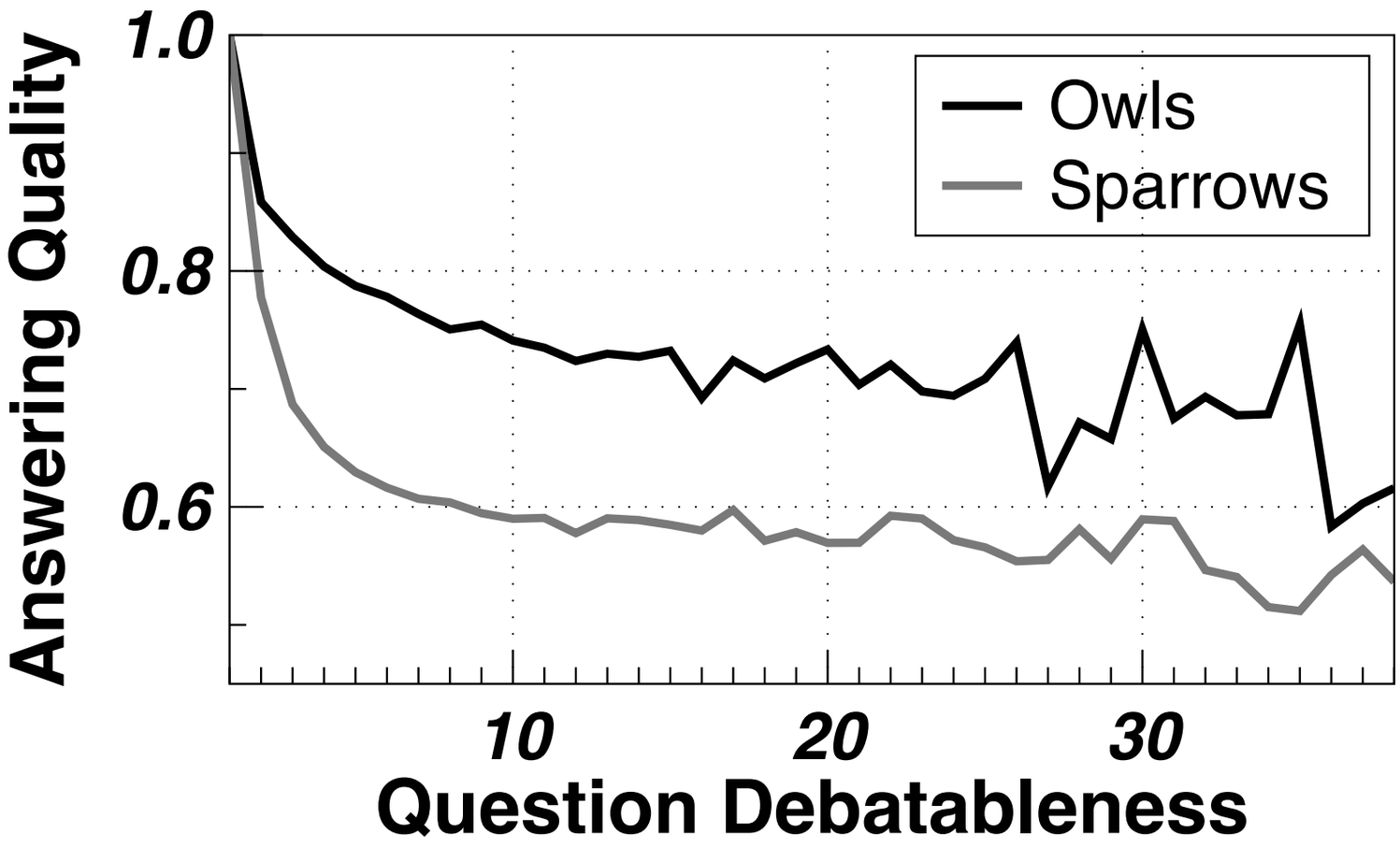
#question,answers, distribution of debatableness of the questions they answer to



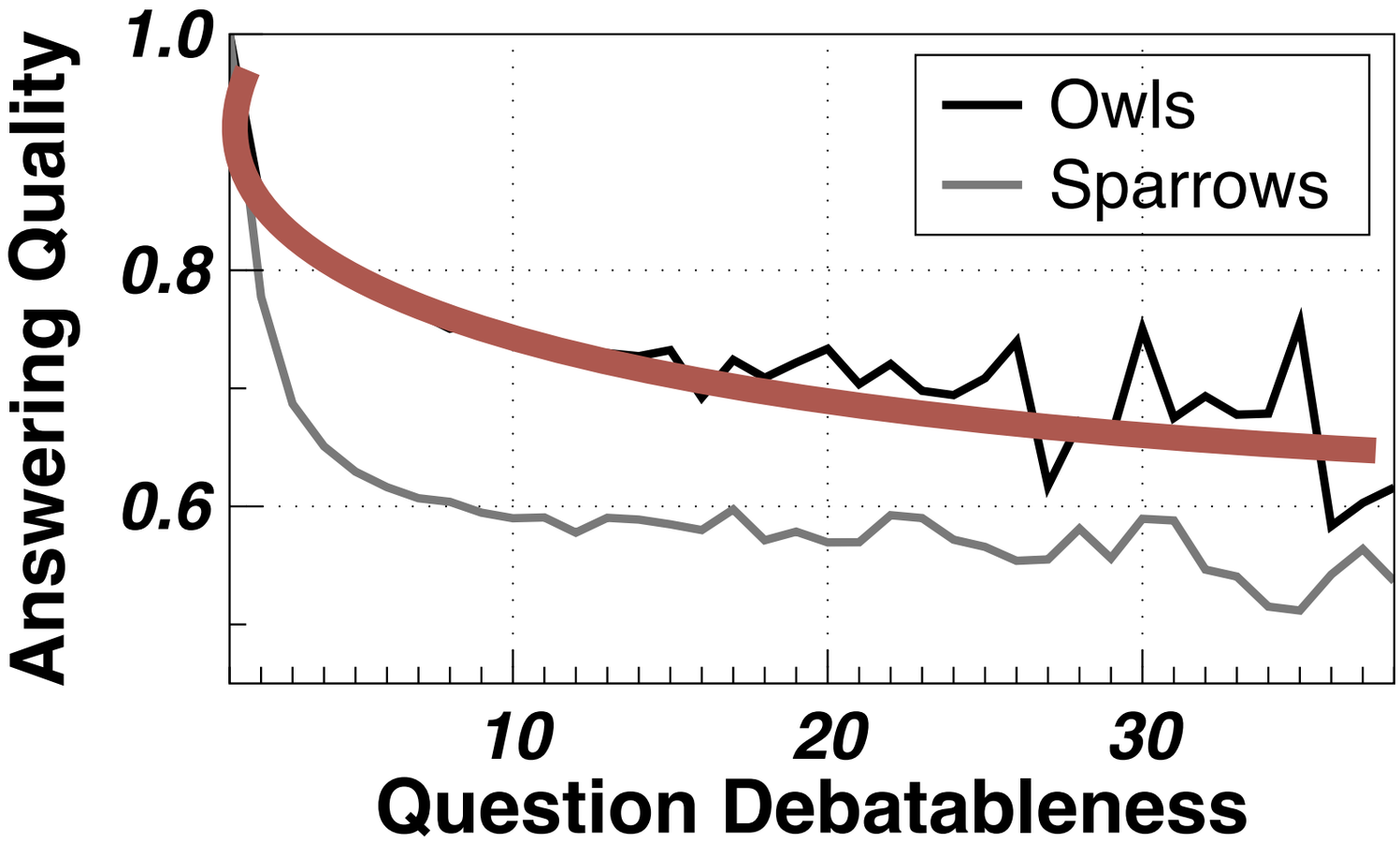


Sparrows answer much more, and more selective in answering less debatable questions.

Answering quality



Answering quality

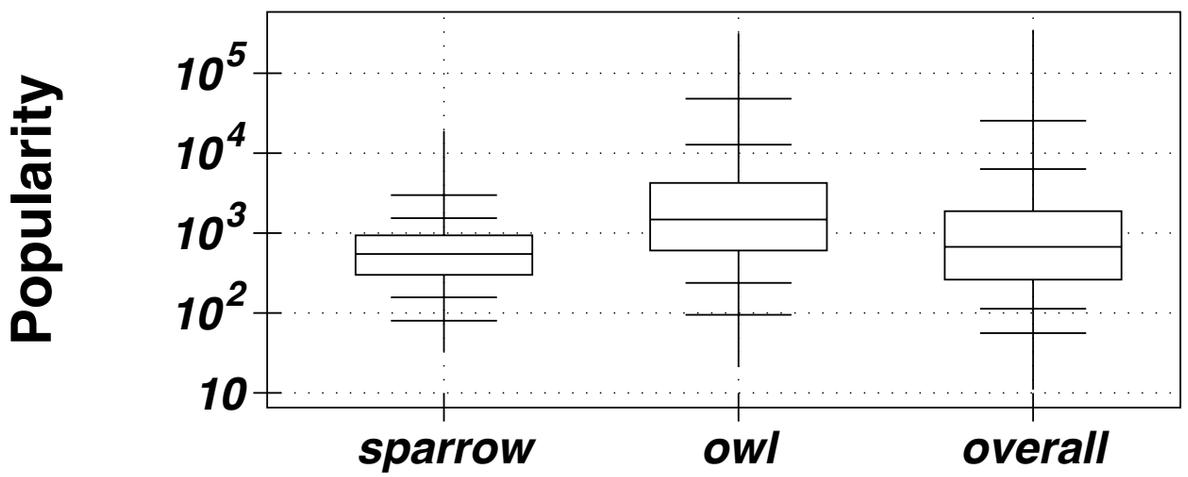


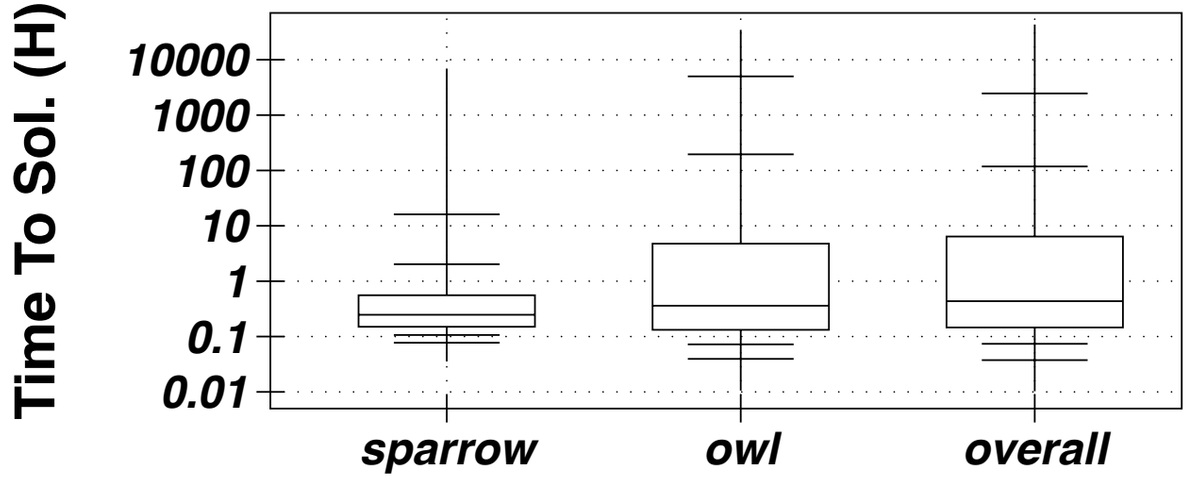
Owls give better answers than Sparrows for questions of all different debatableness.

RQ2. Do Sparrows and Owls show different PREFERENCES in knowledge creation?

Questions they answer to

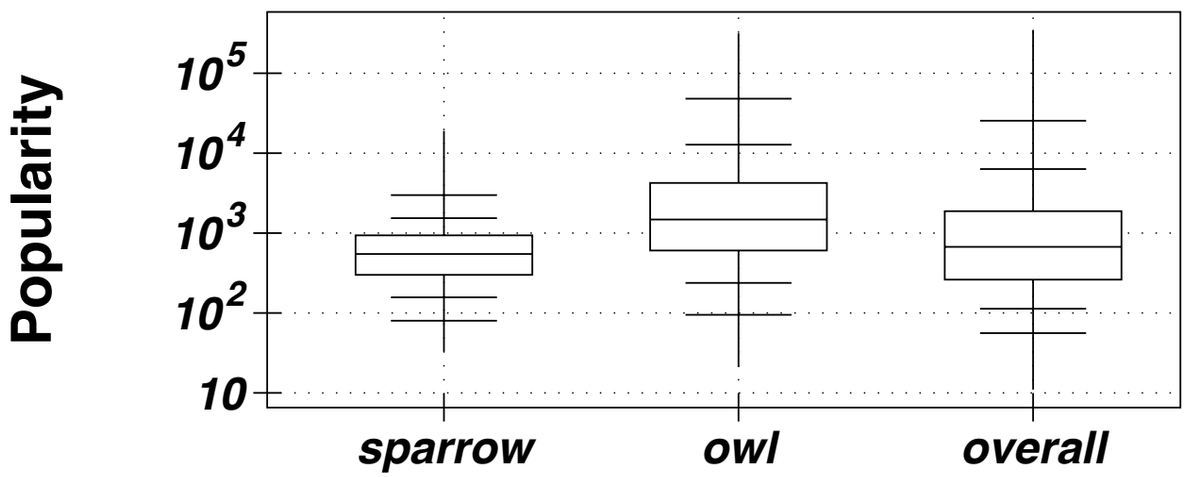
Popularity = #views
Difficulty = Time to Solution = Taccept - Tpost

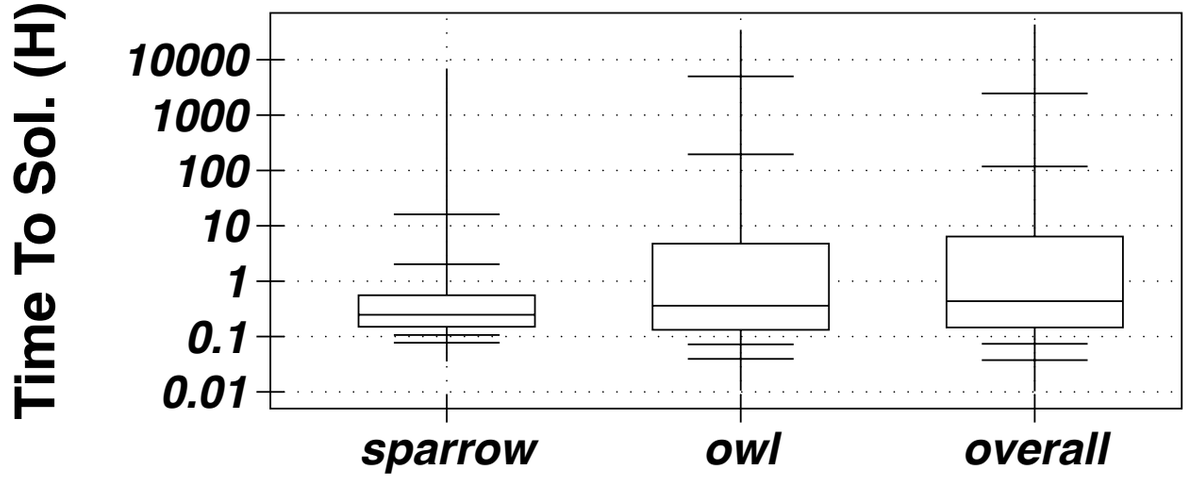




Questions they answer to

Popularity = #views
Difficulty = Time to Solution = Taccept - Tpost

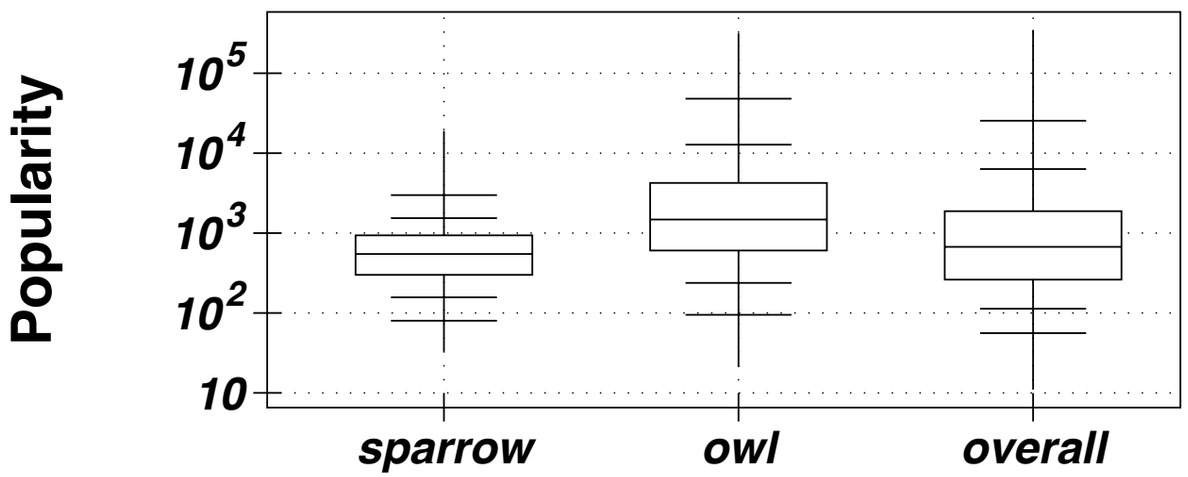


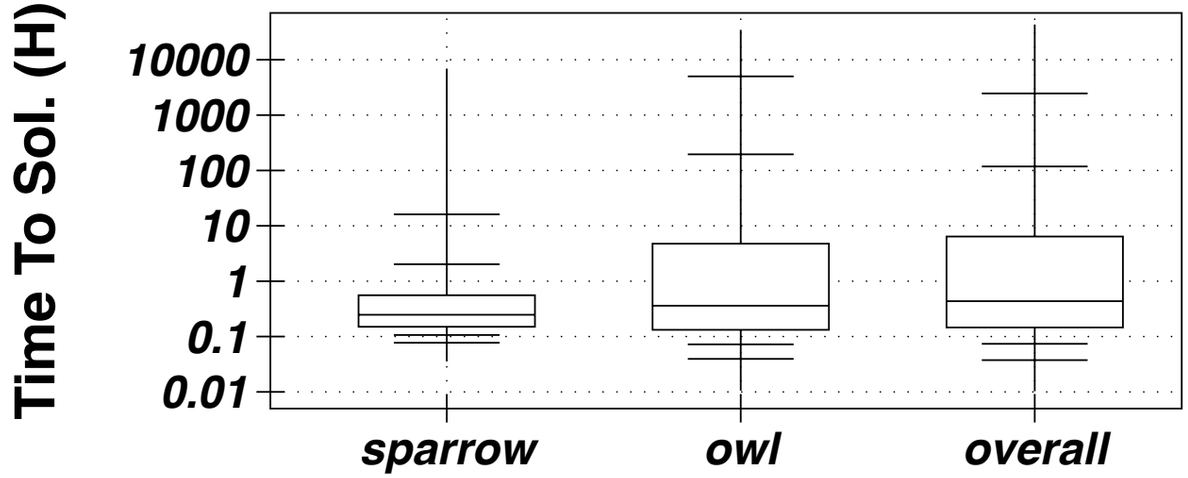


Owls ANSWER to questions that are more popular, and more difficult.

Questions they answer to

Popularity = #views
Difficulty = Time to Solution = Taccept - Tpost





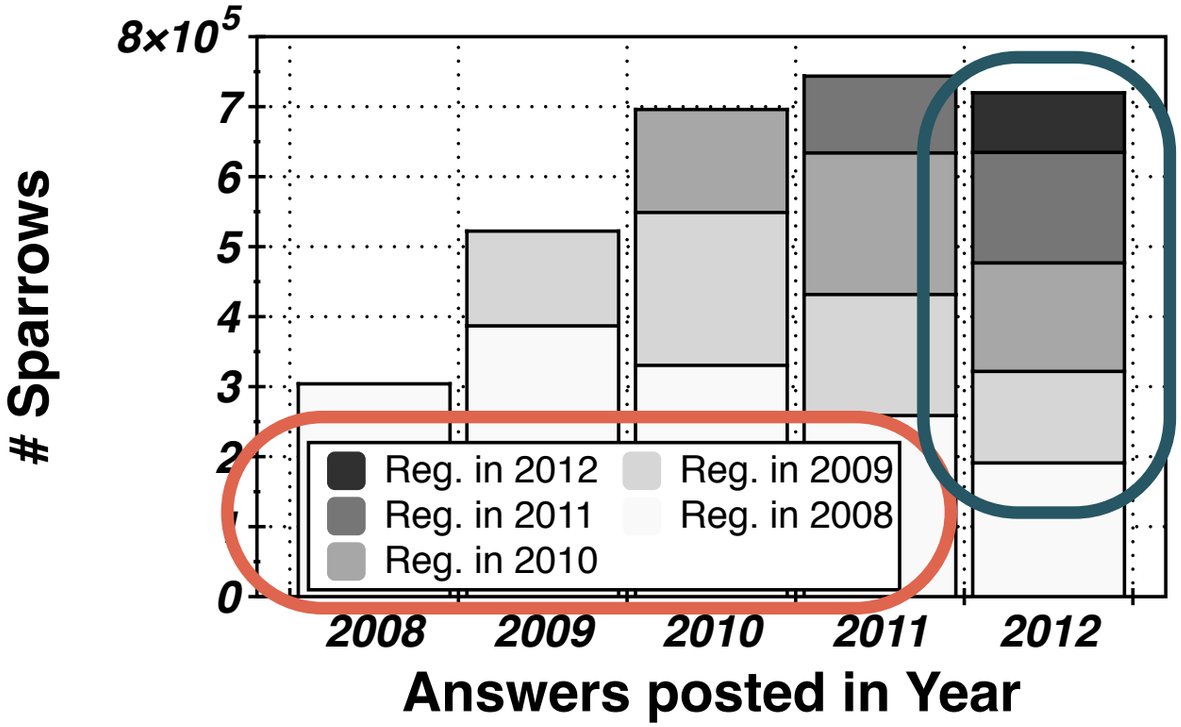
Owls ANSWER to questions that are more popular, and more difficult.

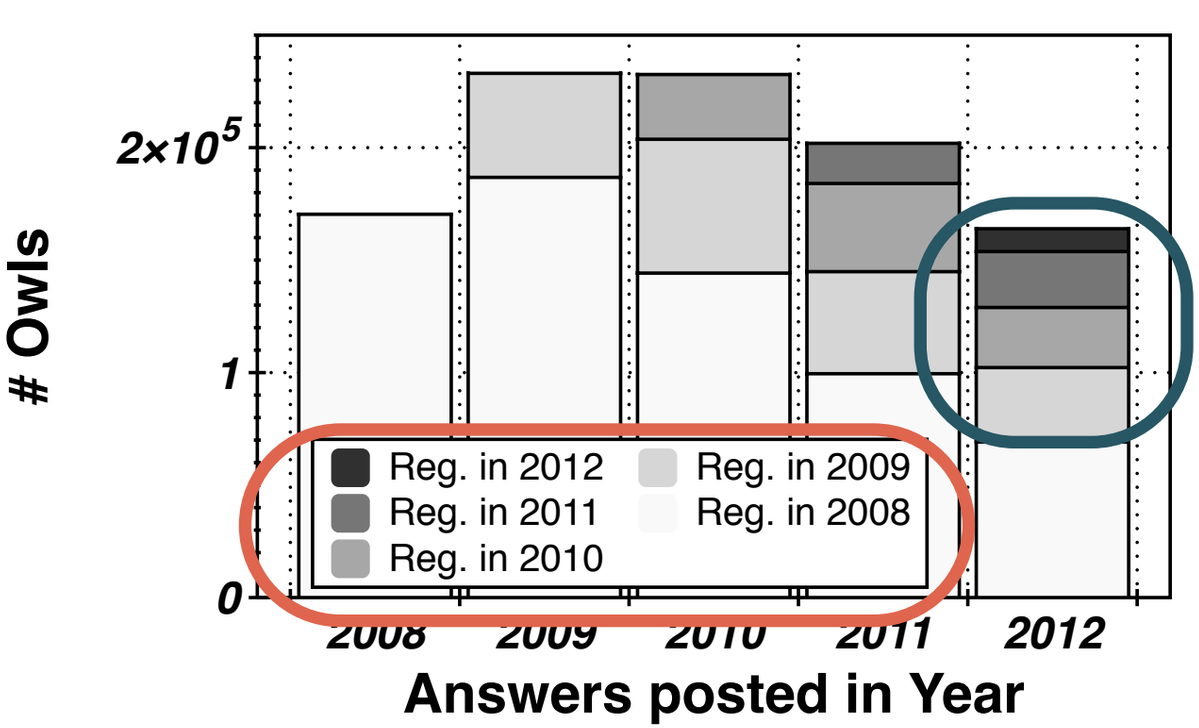
Similarly: Owls POST questions that are more popular, and more difficult.

RQ3. Are incentivising mechanisms equally effective on sparrows and owls?

Answers post by each group

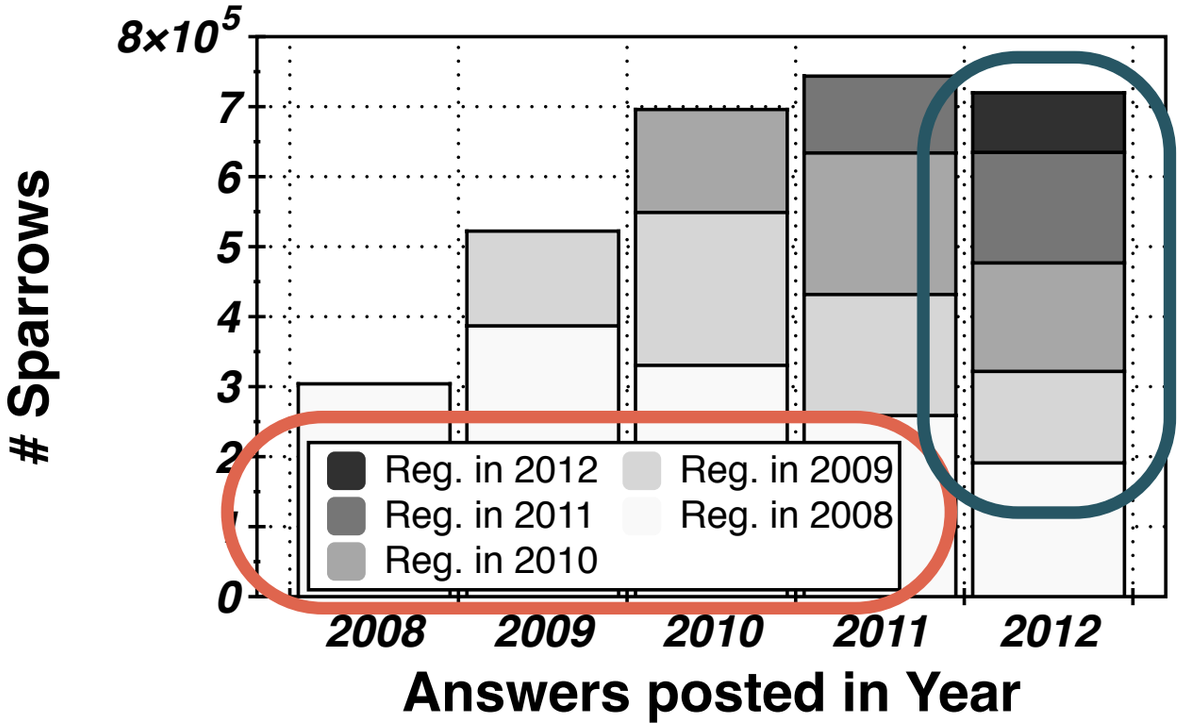
NOTE: Comparable #registrations

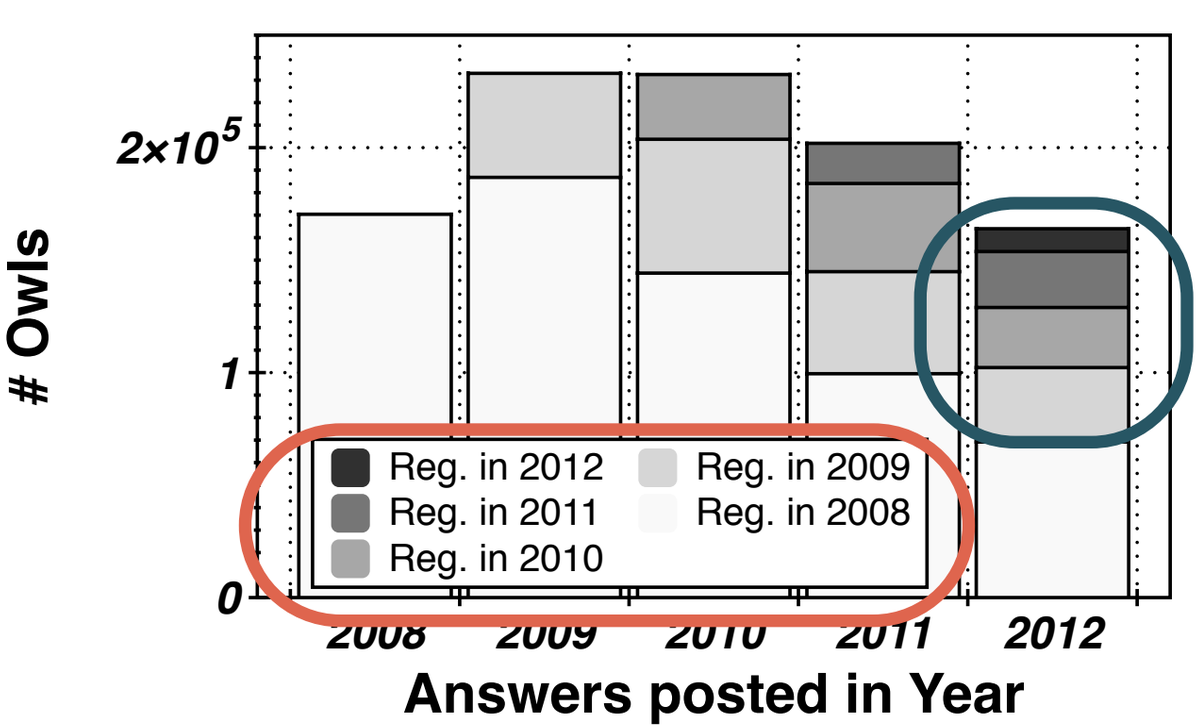




Answers post by each group

NOTE: Comparable #registrations

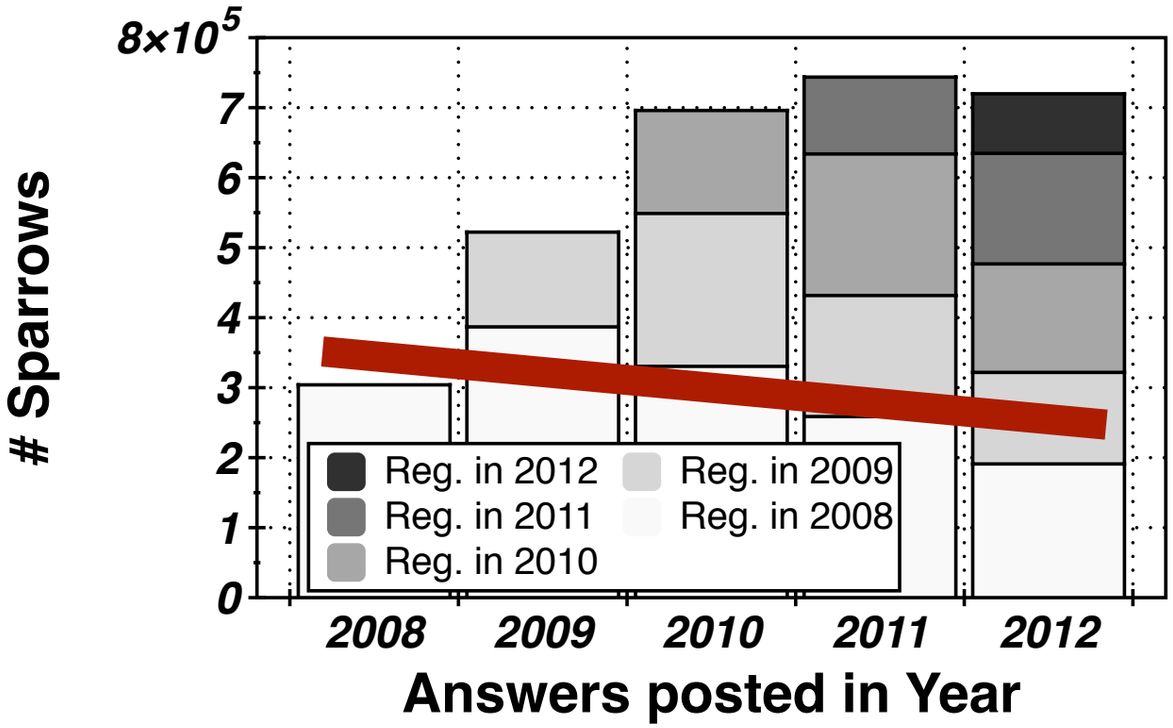


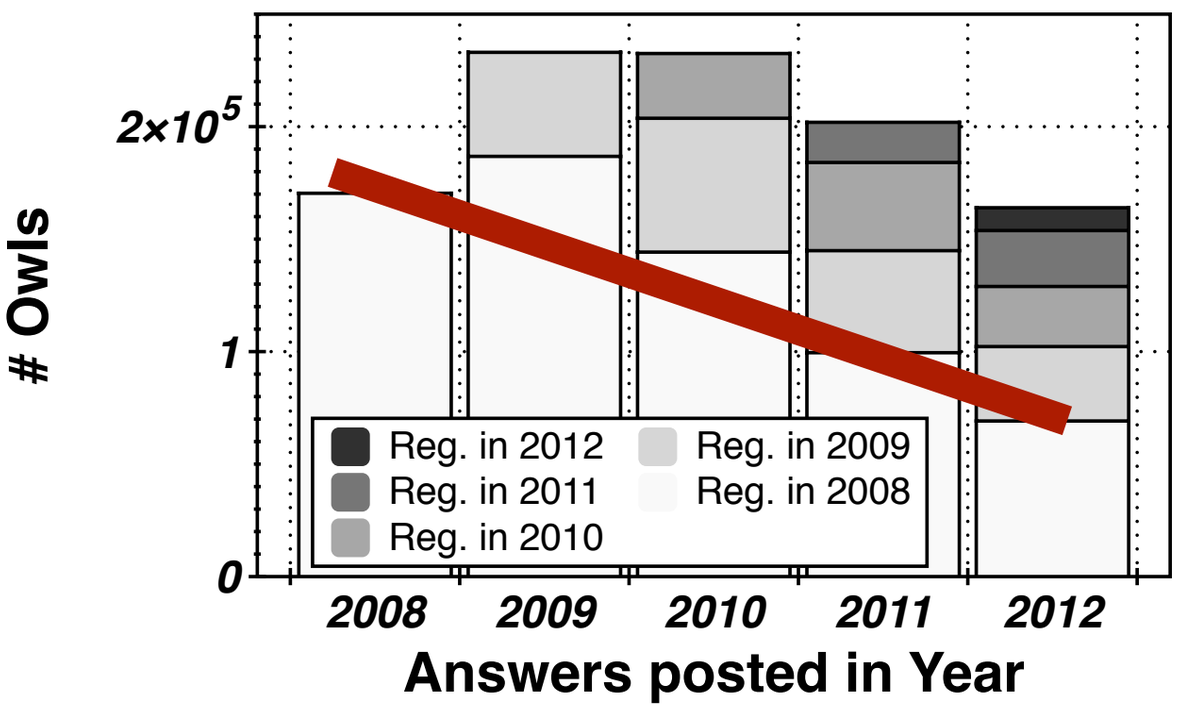


Newly registered sparrows contribute much more than newly registered owls

Answers post by each group

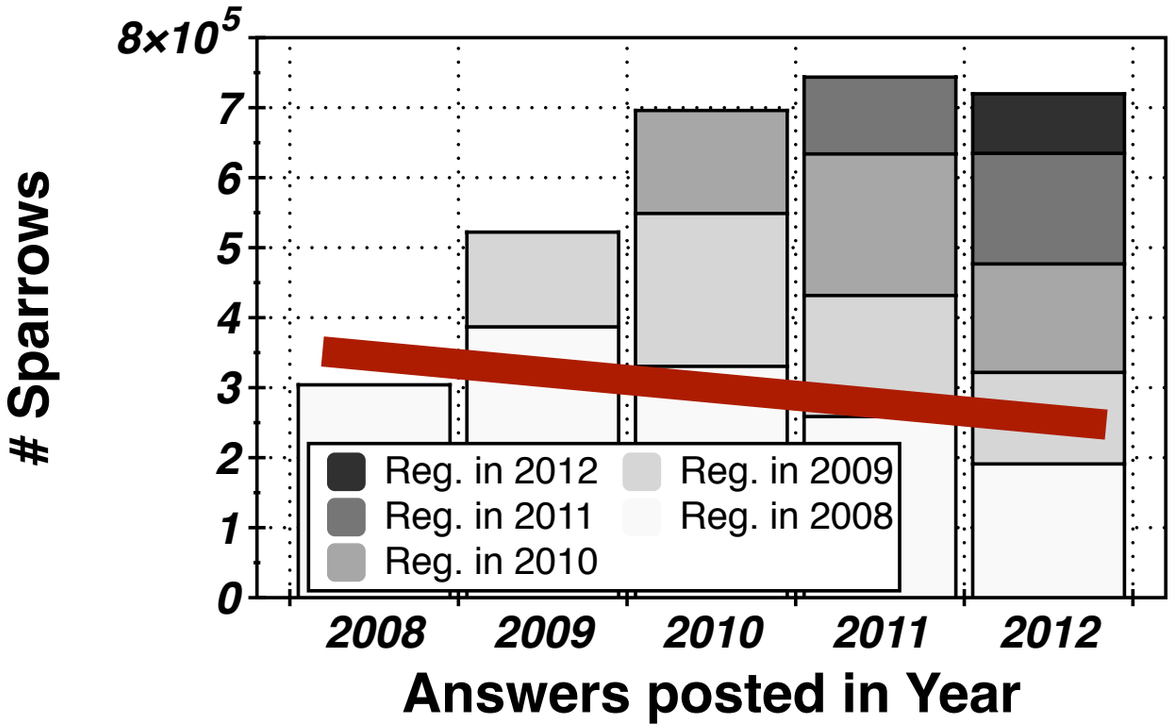
NOTE: Comparable #registrations

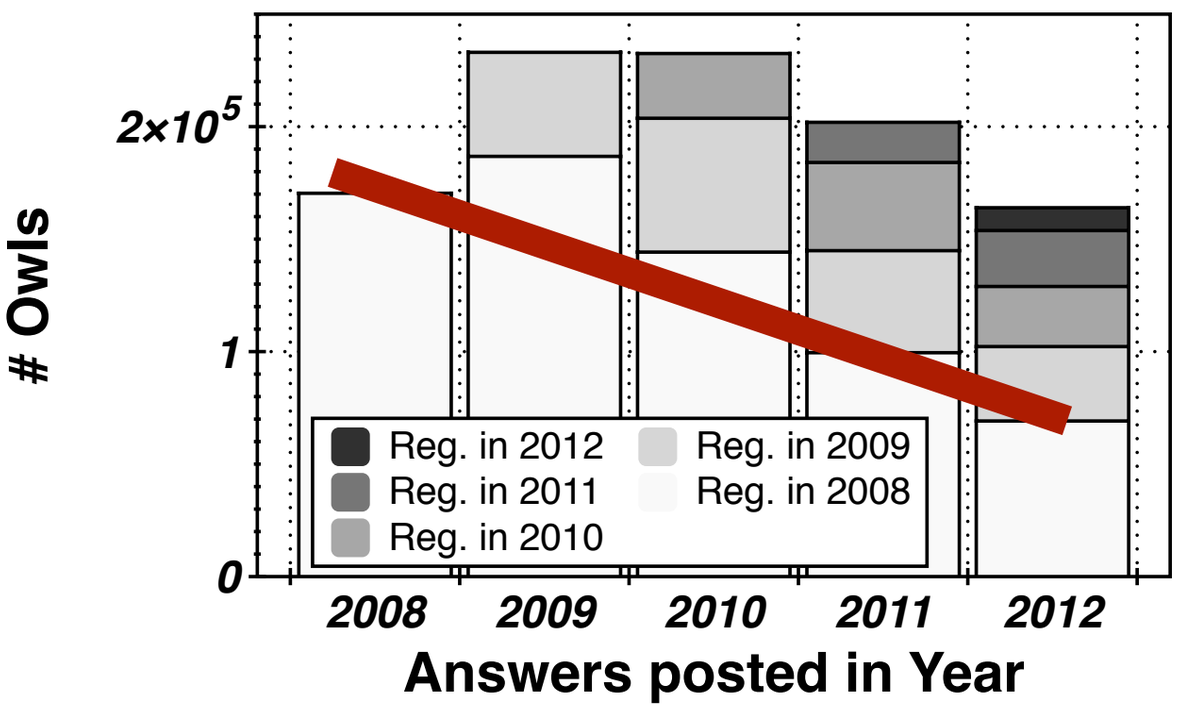




Answers post by each group

NOTE: Comparable #registrations

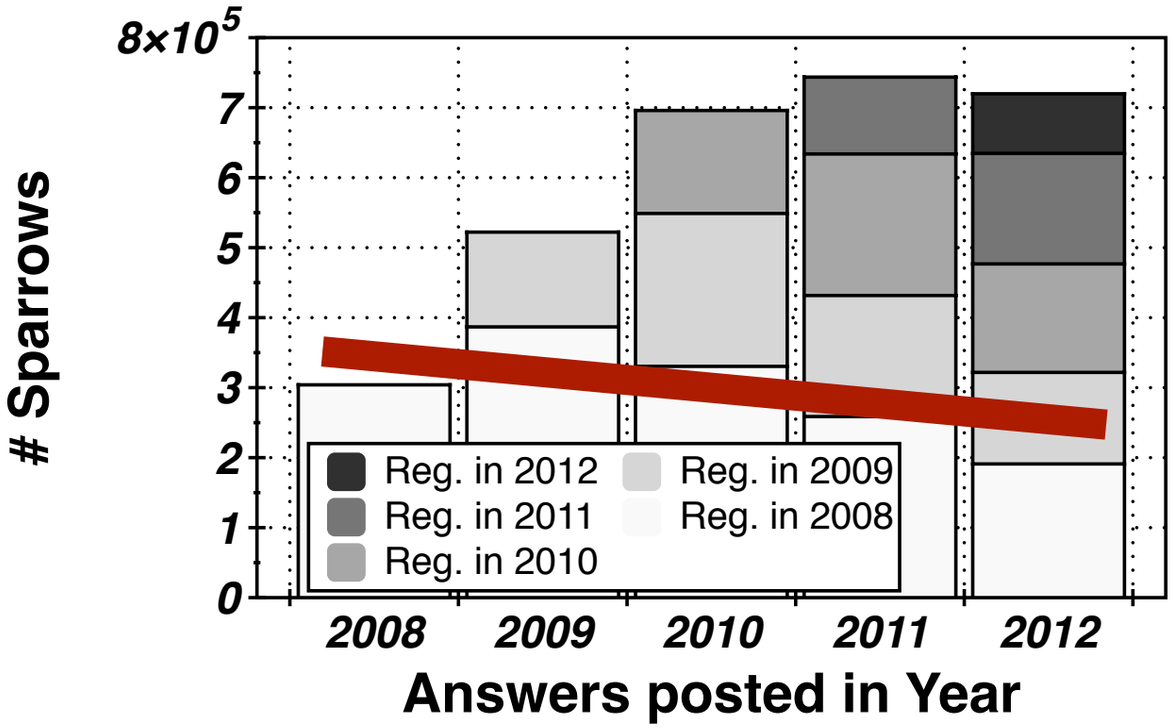


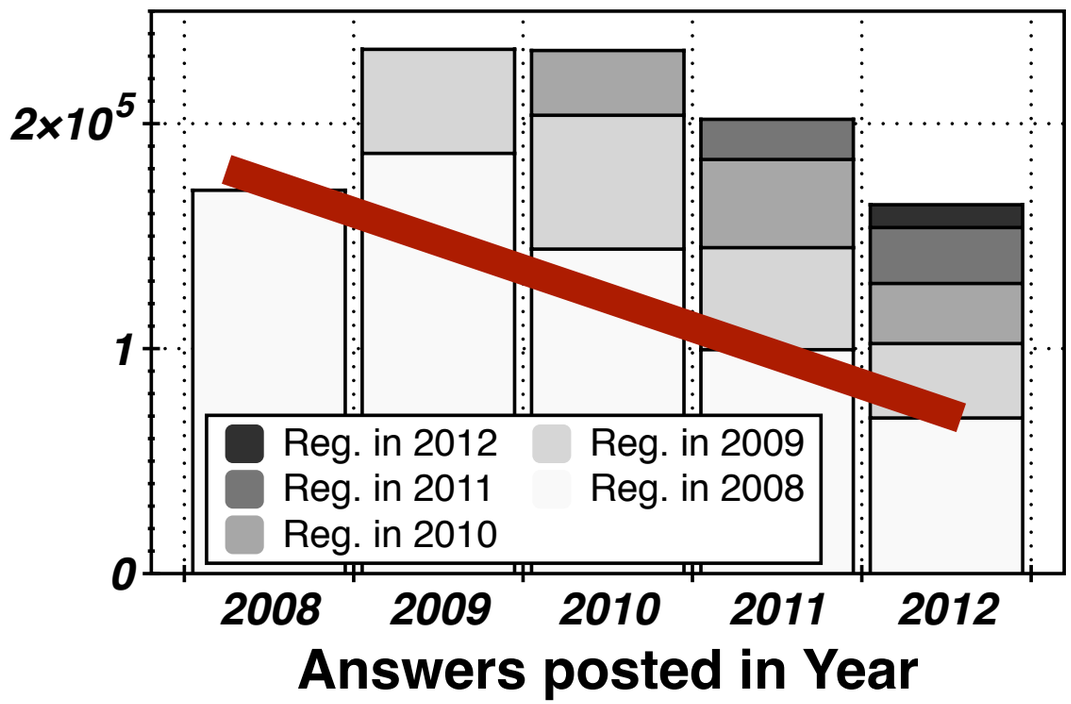


Activities of owls decrease much faster than that of sparrows

Answers post by each group

NOTE: Comparable #registrations





Gamification incentives can more effectively retain Sparrows than Owls

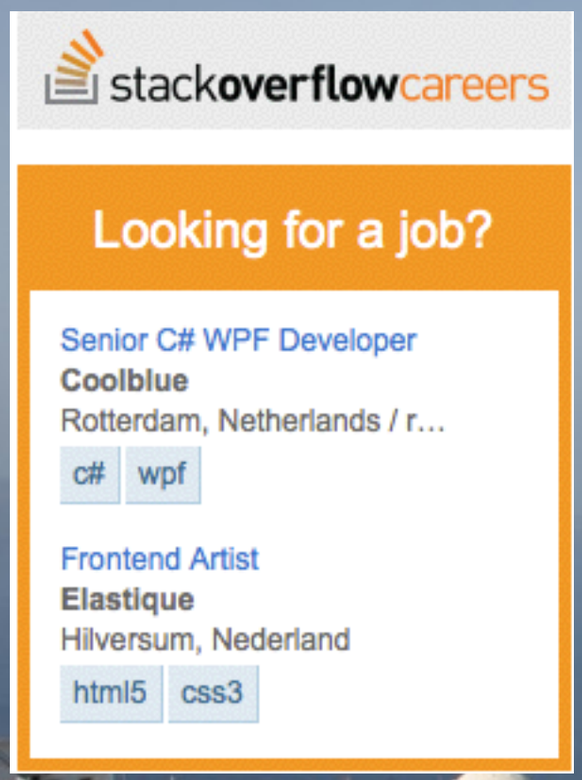
Insights

Q&A systems are important, modelling their users can be useful.

Expertise might be there, but we need a right way to find it.

We provide an expertise metric, which can be a good start!

Insights



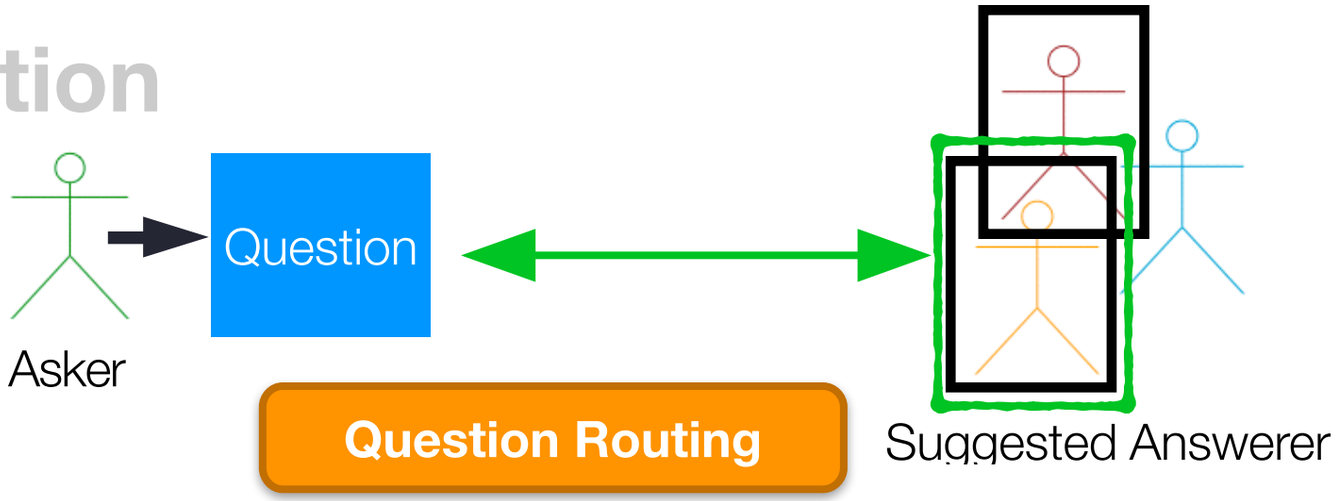
Q&A systems are important, modelling their users can be useful.

Expertise might be there, but we need a right way to find it.

We provide an expertise metric, which can be a good start!

Outline

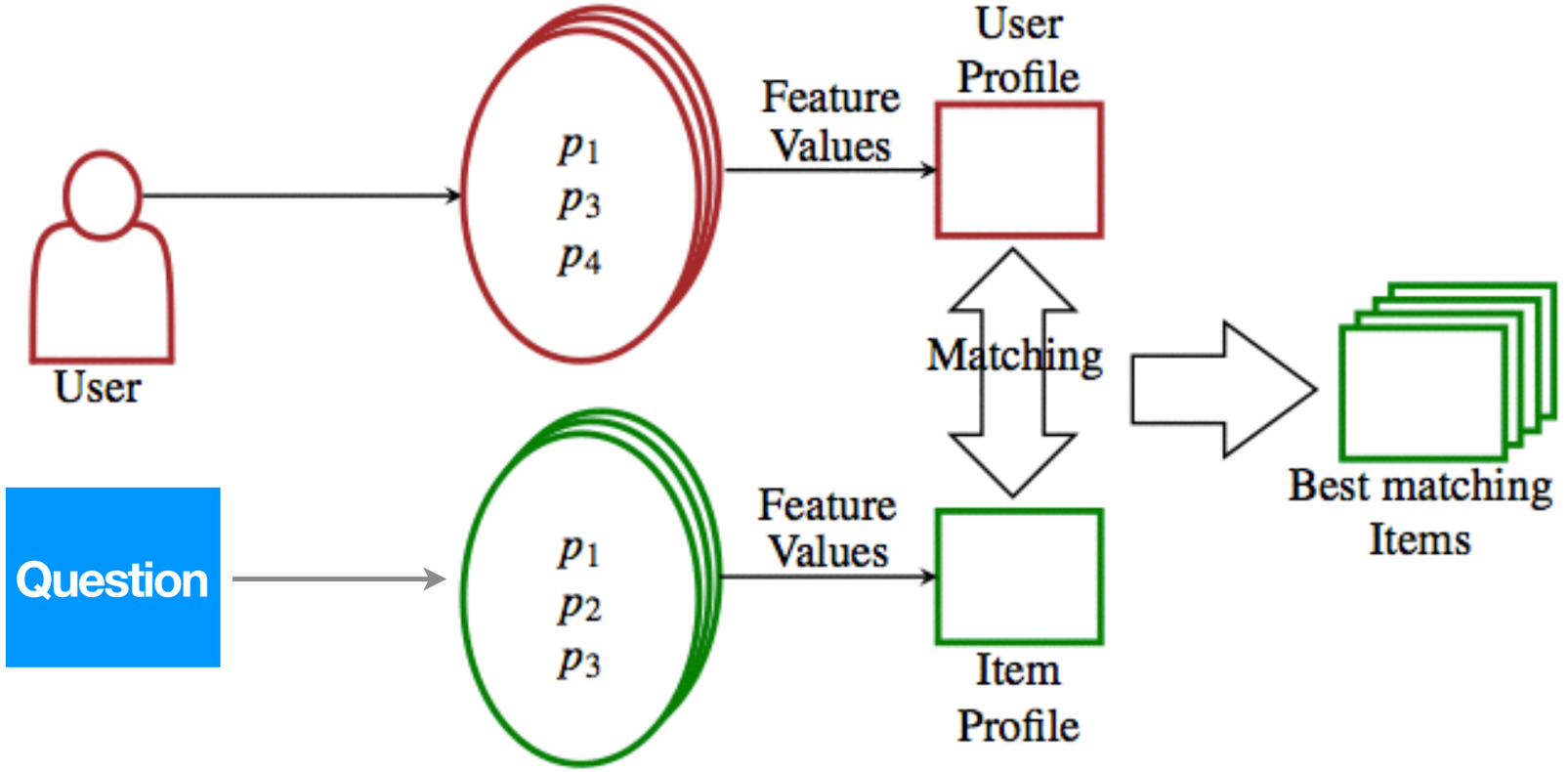
- Collaborative QA (CQA)
- Expertise Recognition
- **Question Routing**
- Question Editing



General Introduction

- Question Routing systems aim at routing questions to users that are suited to answer them.
- Usually formulated as a recommendation problem

  given a question, recommend potential answerers for it



Engagement vs. Expertise

- Q1: can we always route questions to engaged users (engaged in answering to questions)?

- Q2: can we always route questions to experts?

Engagement vs. Expertise

- Q1: can we always route questions to engaged users (engaged in answering to questions)?

- Q2: can we always route questions to experts?

Expertise might be useful to be considered in question routing; however, it is scarce resource.

Engagement vs. Expertise

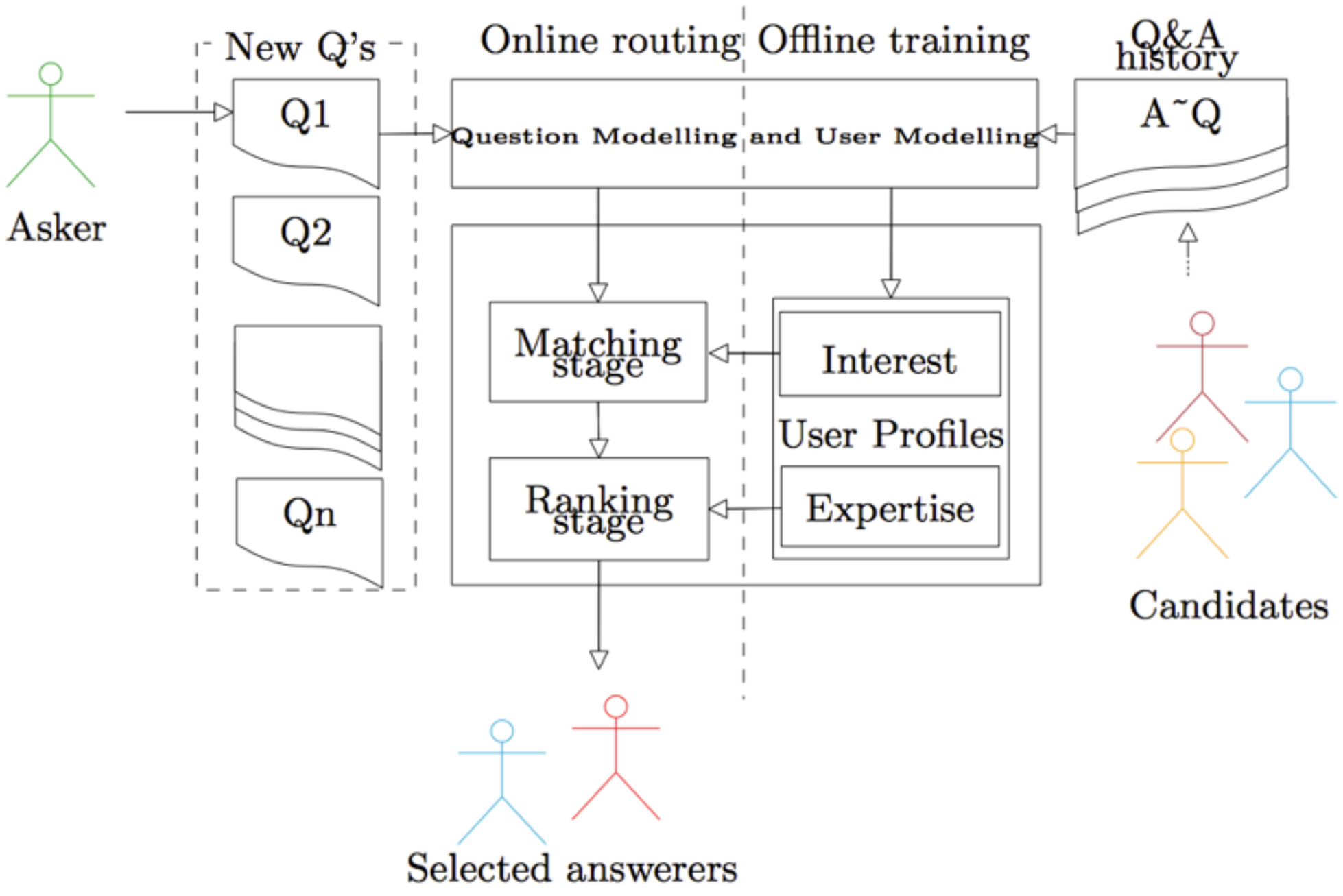
- Q1: can we always route questions to engaged users (engaged in answering to questions)?

- Q2: can we always route questions to experts?

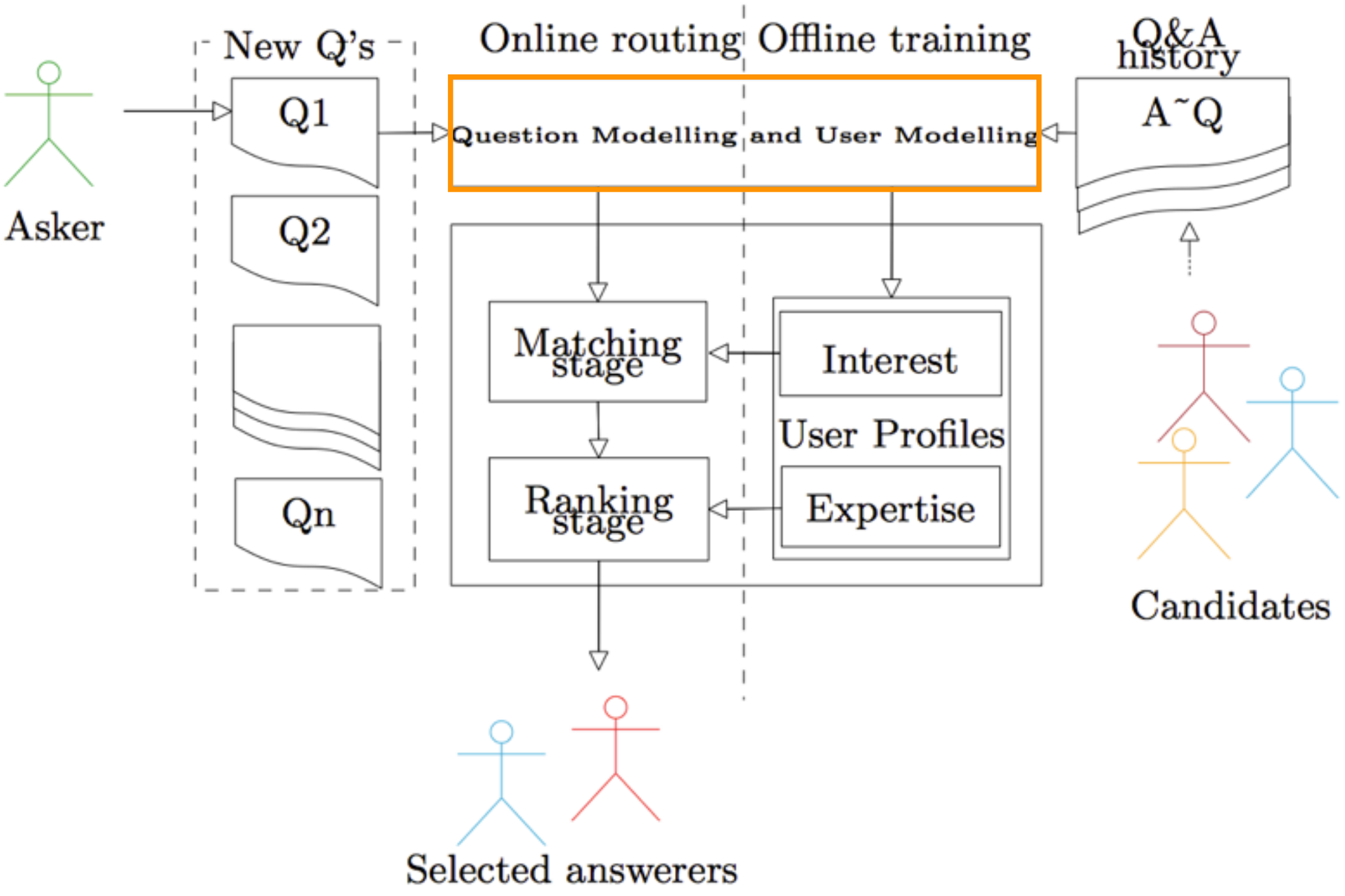
Expertise might be useful to be considered in question routing; however, it is scarce resource.

- Question routing accuracy is important!

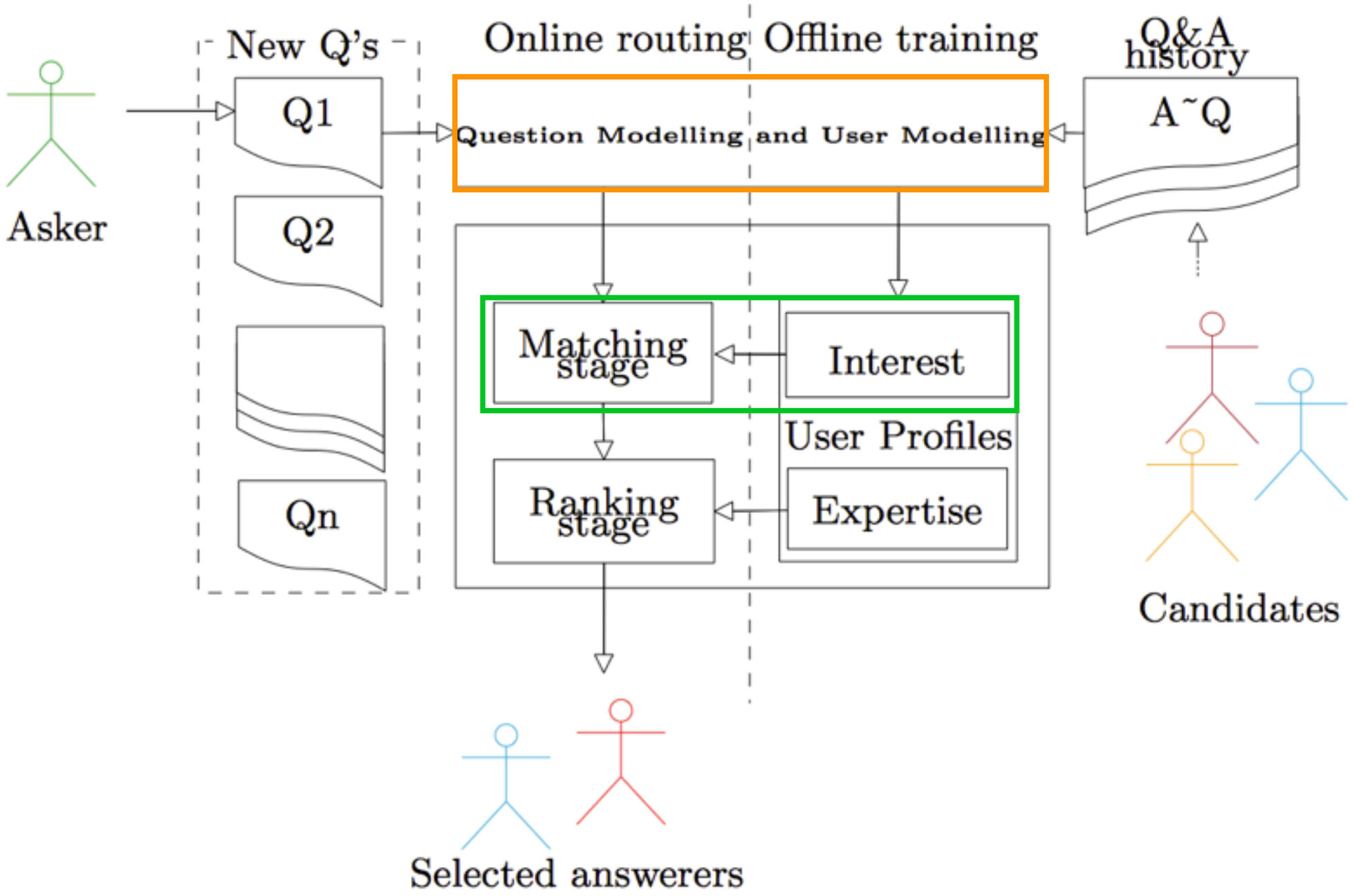
Three stage QR process



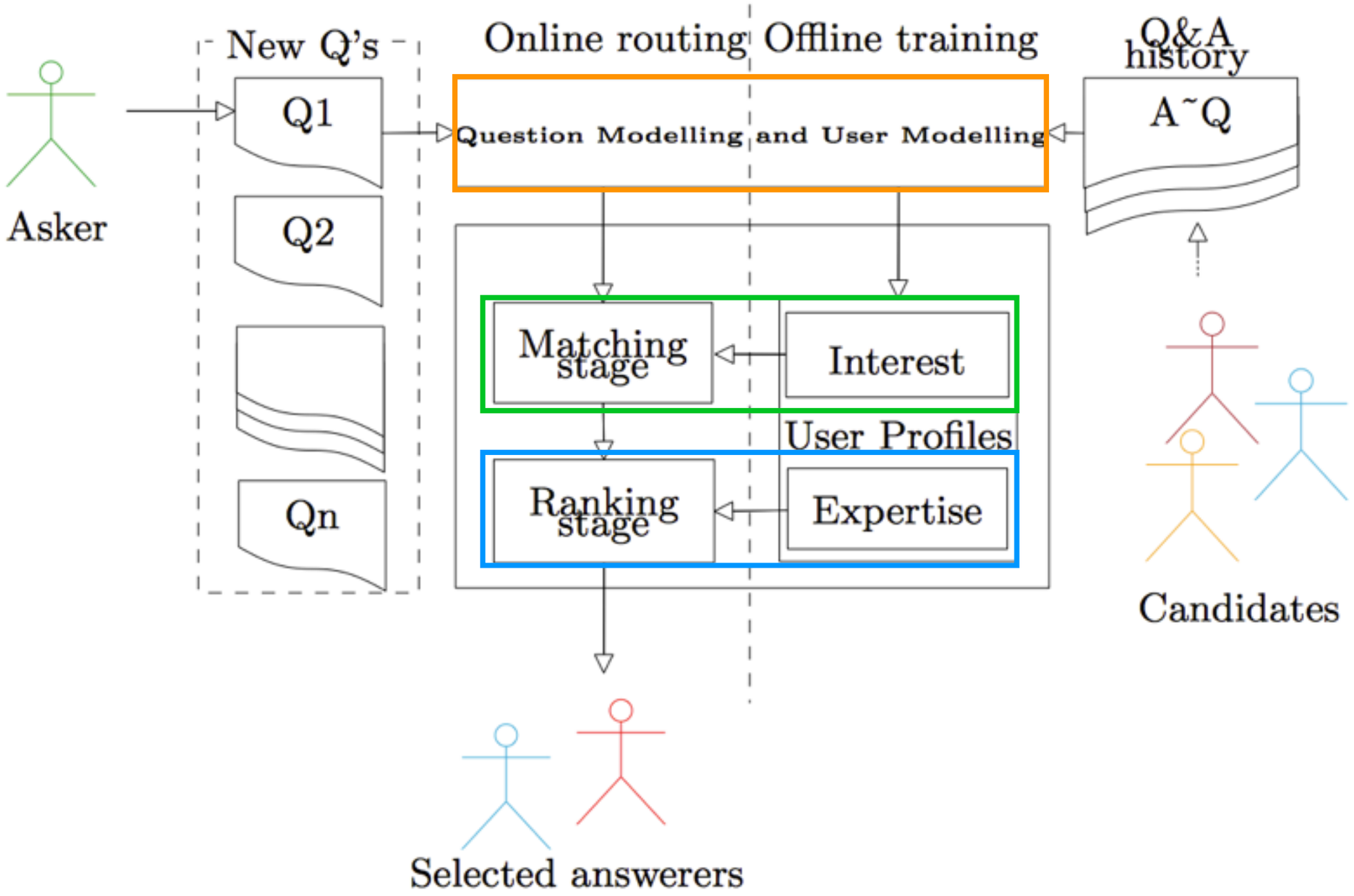
Three stage QR process



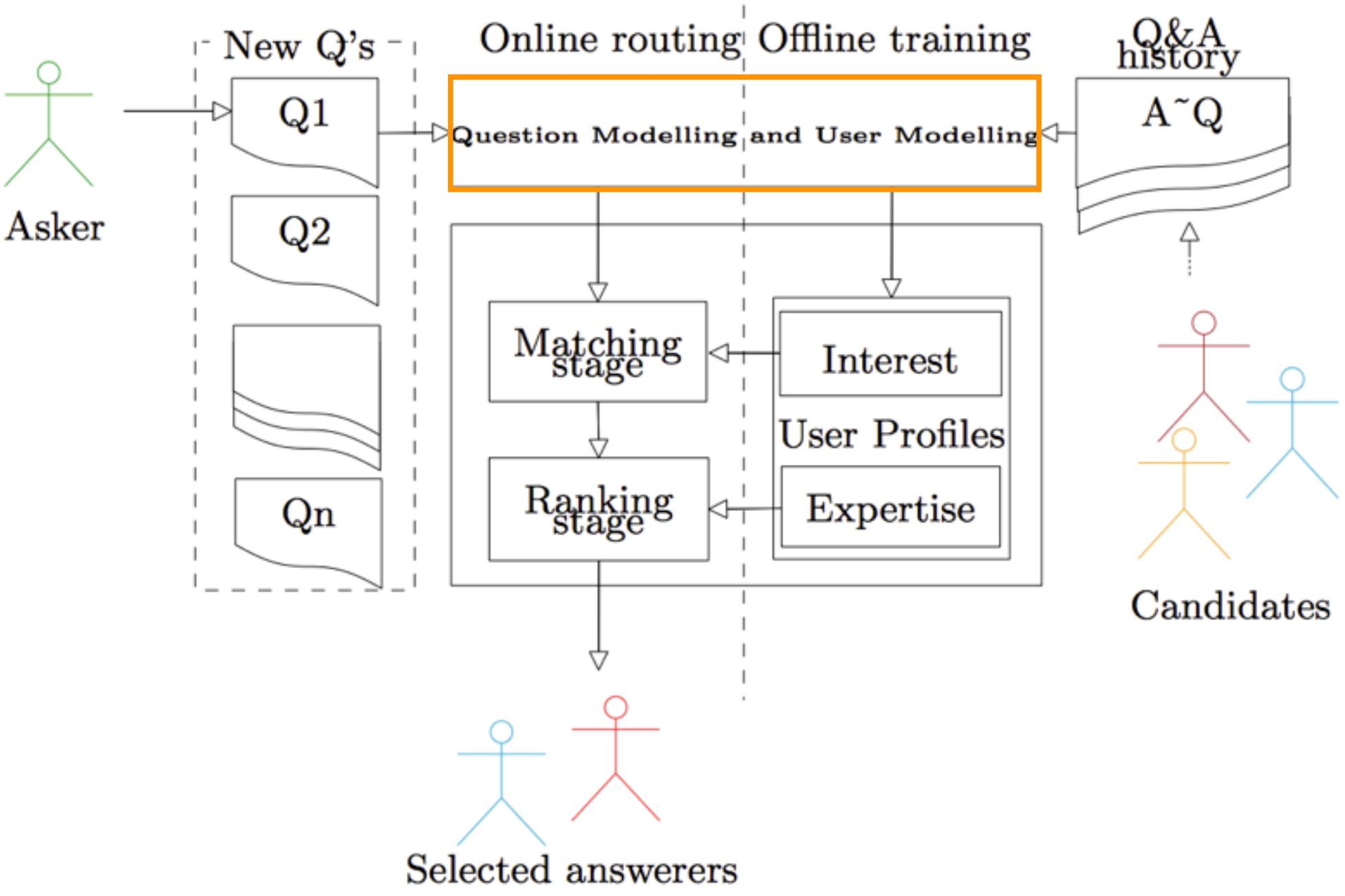
Three stage QR process



Three stage QR process



Three stage QR process: modelling

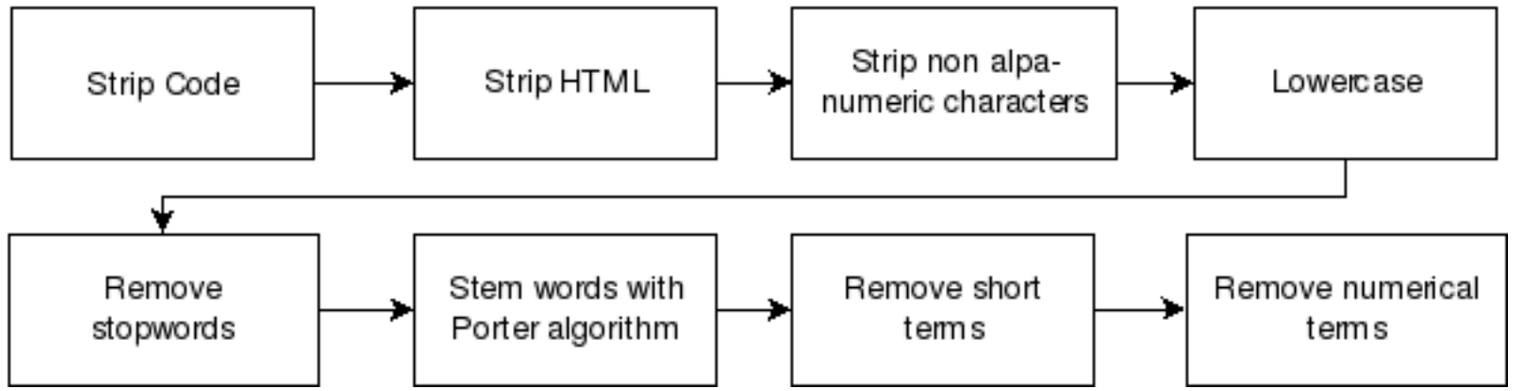


Question and user modelling

- Activity-based and content-based model
- For content-based model, we adopt vector space model (VSM)

Text processing for vector space model representation

- Text processing



- VSM
  - TF-IDF

q	Question
q_1	How to program power in Java
q_2	How to program square in C#
q_3	How to calculate power in C

p	word	DF	TF_{q1}	TF_{q2}	TF_{q3}	$TF-IDF_{q1}$	$TF-IDF_{q2}$	$TF-IDF_{q3}$
p_1	how	3	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$			
p_2	to	3	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$			
p_3	program	2	$\frac{1}{6}$	$\frac{1}{6}$		$\log\frac{3}{2}\cdot\frac{1}{6}$	$\log\frac{3}{2}\cdot\frac{1}{6}$	
p_4	power	2	$\frac{1}{6}$		$\frac{1}{6}$	$\log\frac{3}{2}\cdot\frac{1}{6}$		$\log\frac{3}{2}\cdot\frac{1}{6}$
p_5	in	3	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$			
p_6	Java	1	$\frac{1}{6}$			$\log 3\cdot\frac{1}{6}$		
p_7	square	1		$\frac{1}{6}$			$\log 3\cdot\frac{1}{6}$	
p_8	C#	1		$\frac{1}{6}$			$\log 3\cdot\frac{1}{6}$	
p_9	calculate	1			$\frac{1}{6}$			$\log 3\cdot\frac{1}{6}$
p_{10}	C	1			$\frac{1}{6}$			$\log 3\cdot\frac{1}{6}$

Question and user modelling

- Activity-based and content-based model
- For content-based model, we adopt vector space model (VSM)
- Each user is represented by the averaged vector of all questions he answered to

Question and user modelling

- Activity-based and content-based model
- For content-based model, we adopt vector space model (VSM)
- Each user is represented by the averaged vector of all questions he answered to

Model				Matching Strategy
Category	**Representation**	**Question Content**	**User Interest**	
Activity-based	Activity-Answer (AA)	NA	#answers	Match question to most active user
	Activity-Interest (AI)	NA	#answers per tag	
Content-based	Content-Interest (CI)	TF-IDF term VSM	TF-IDF term VSM	Cosine similarity between question and user vector
	Topic-Interest (TI)	TF-IDF tag VSM	TF-IDF tag VSM	
	General-Interest (GI)	TF-IDF term+tag VSM	TF-IDF term+tag VSM	

Question and user modelling

- Activity-based and content-based model
- For content-based model, we adopt vector space model (VSM)
- Each user is represented by the averaged vector of all questions he answered to

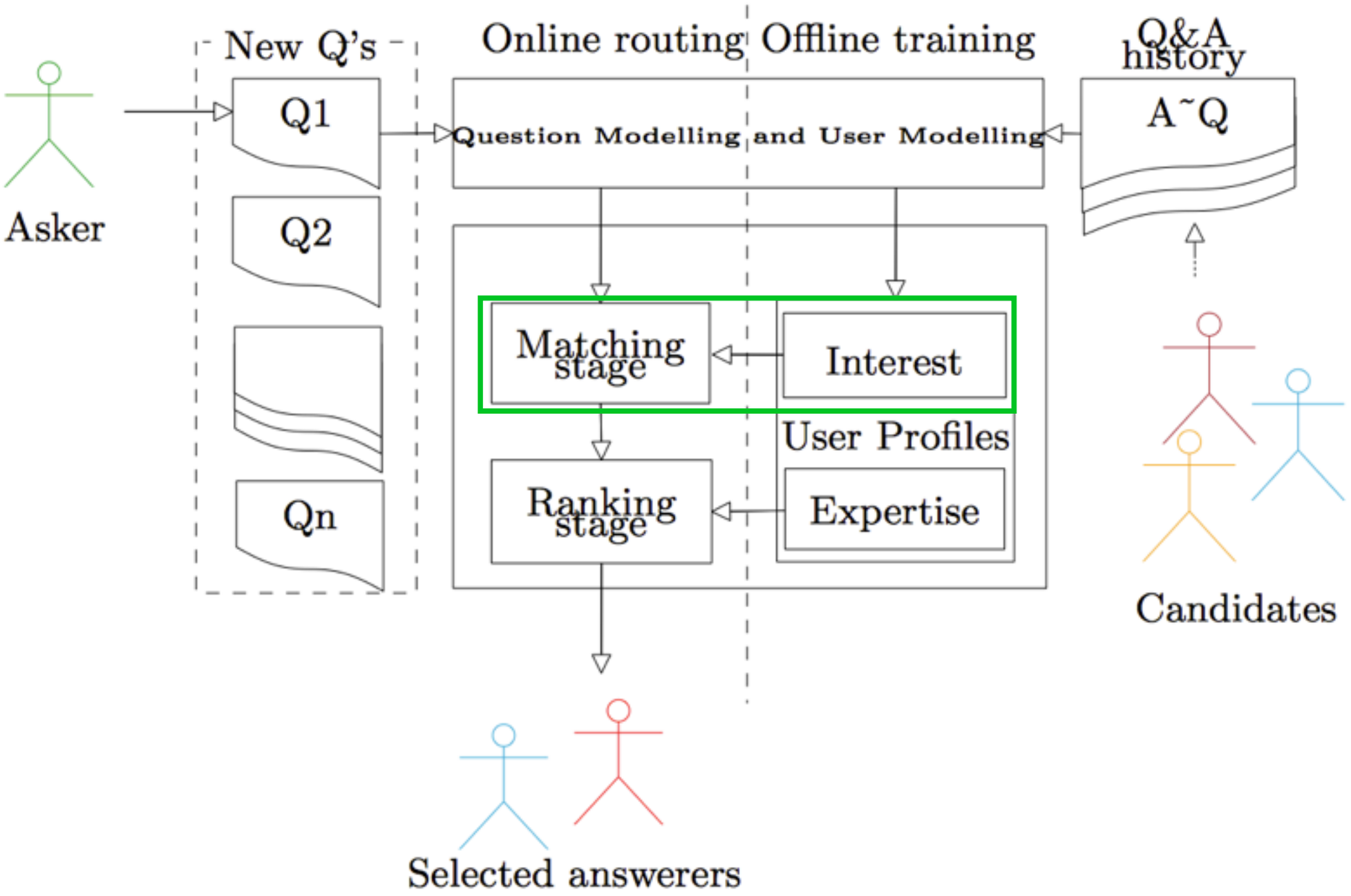
Model				Matching Strategy
Category	**Representation**	**Question Content**	**User Interest**	
Activity-based	Activity-Answer (AA)	NA	#answers	Match question to most active user
	Activity-Interest (AI)	NA	#answers per tag	
Content-based	Content-Interest (CI)	TF-IDF term VSM	TF-IDF term VSM	Cosine similarity between question and user vector
	Topic-Interest (TI)	TF-IDF tag VSM	TF-IDF tag VSM	
	General-Interest (GI)	TF-IDF term+tag VSM	TF-IDF term+tag VSM	

Question and user modelling

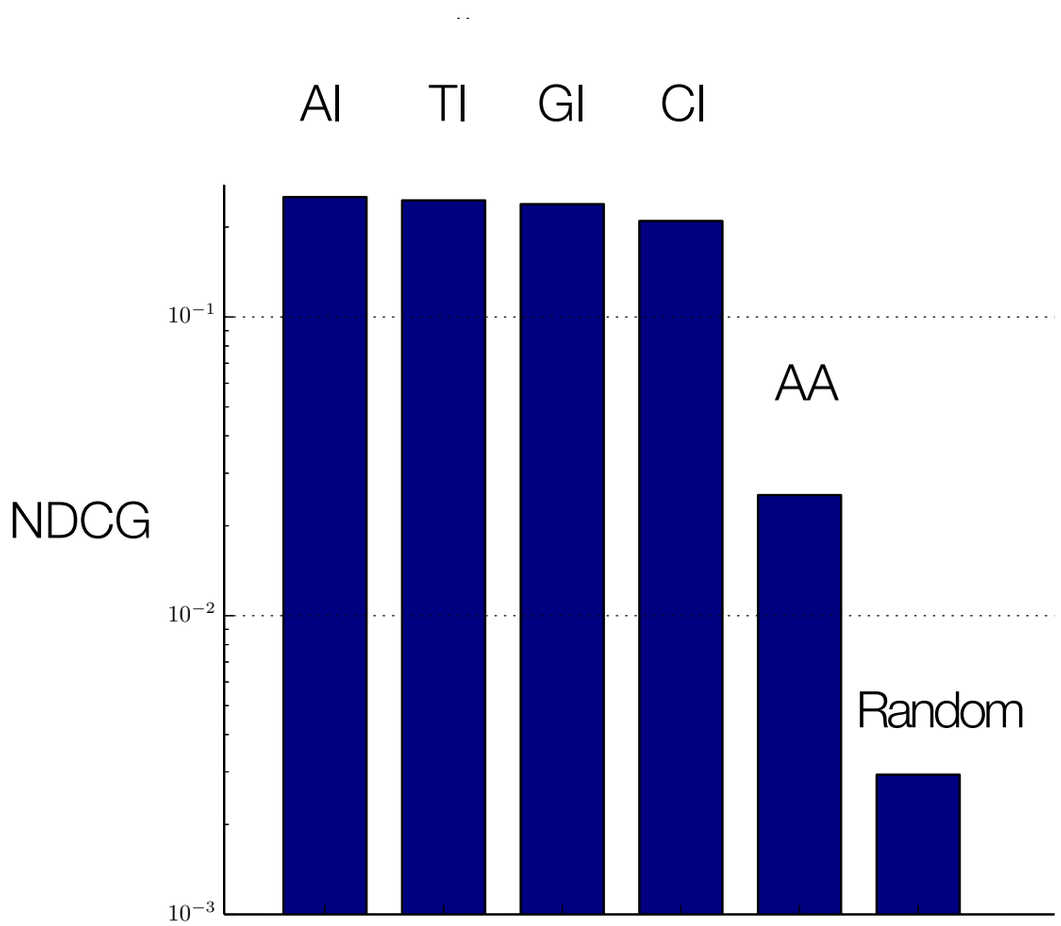
- Activity-based and content-based model
- For content-based model, we adopt vector space model (VSM)
- Each user is represented by the averaged vector of all questions he answered to

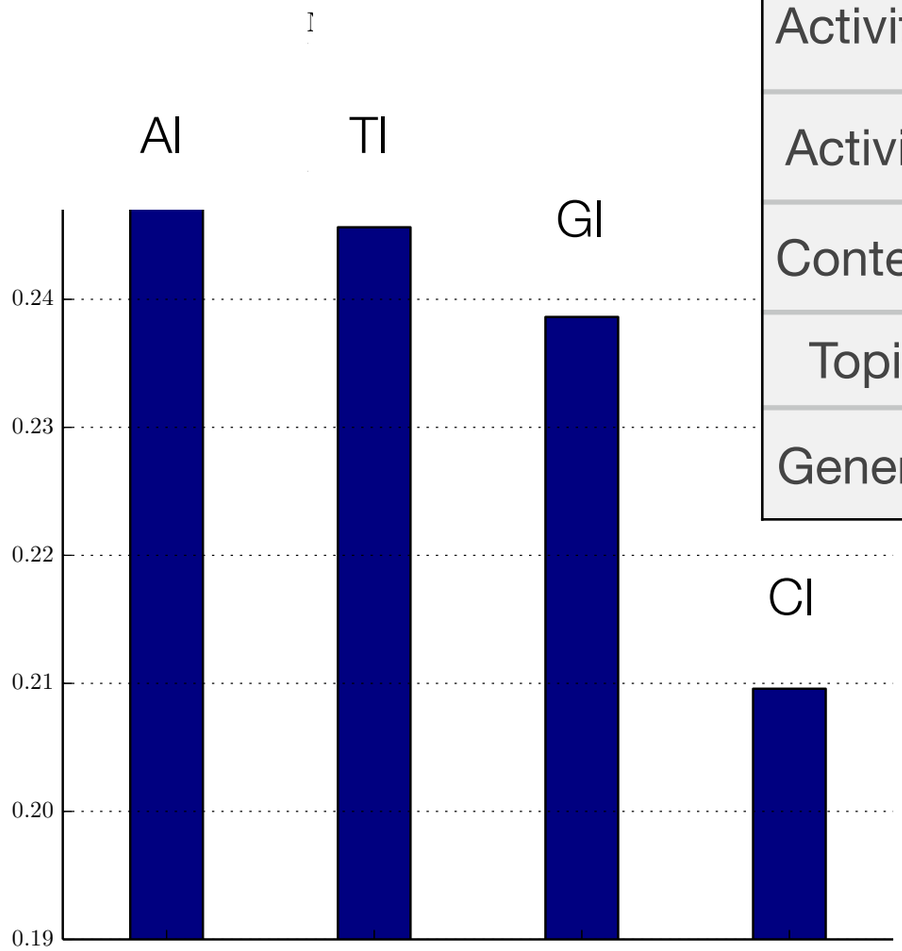
Model				Matching Strategy
Category	**Representation**	**Question Content**	**User Interest**	
Activity-based	Activity-Answer (AA)	NA	#answers	Match question to most active user
	Activity-Interest (AI)	NA	#answers per tag	
Content-based	Content-Interest (CI)	TF-IDF term VSM	TF-IDF term VSM	Cosine similarity between question and user vector
	Topic-Interest (TI)	TF-IDF tag VSM	TF-IDF tag VSM	
	General-Interest (GI)	TF-IDF term+tag VSM	TF-IDF term+tag VSM	

Three stage QR process: matching



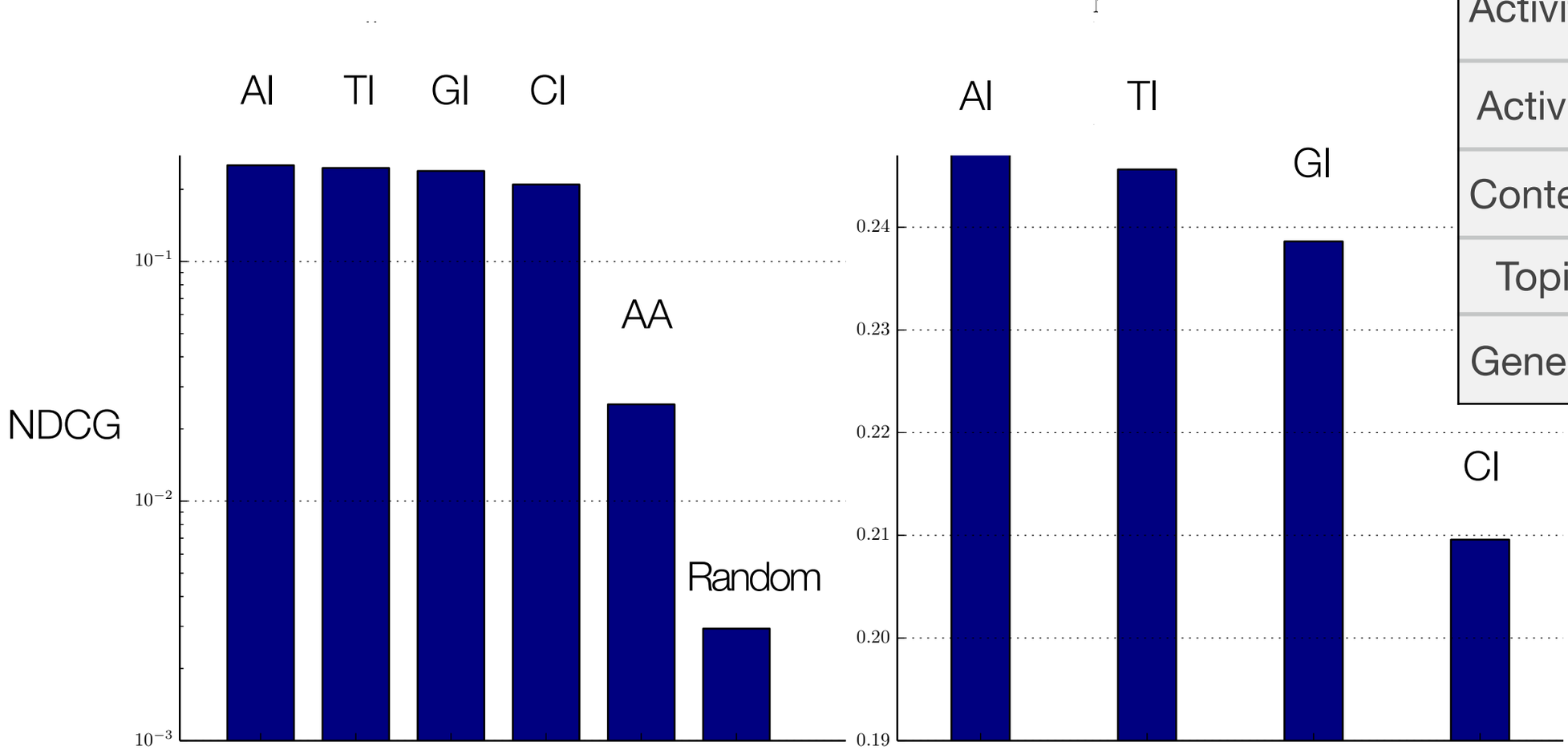
Matching question content to user interest





Representation
Activity-Answer (AA)
Activity-Interest (AI)
Content-Interest (CI)
Topic-Interest (TI)
General-Interest (GI)

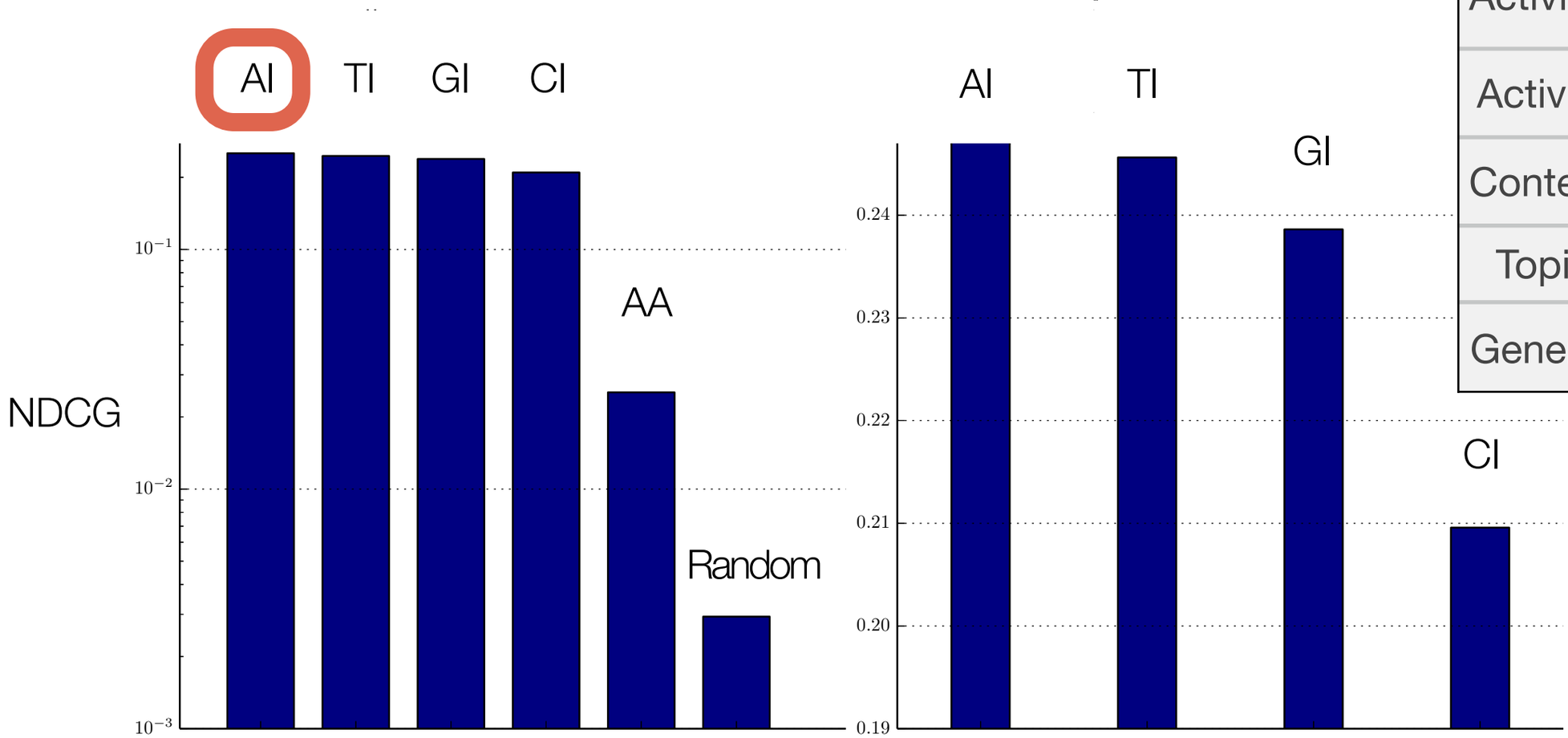
Matching question content to user interest



Representation
Activity-Answer (AA)
Activity-Interest (AI)
Content-Interest (CI)
Topic-Interest (TI)
General-Interest (GI)

Tags are more informative than terms to represent a users' interest.

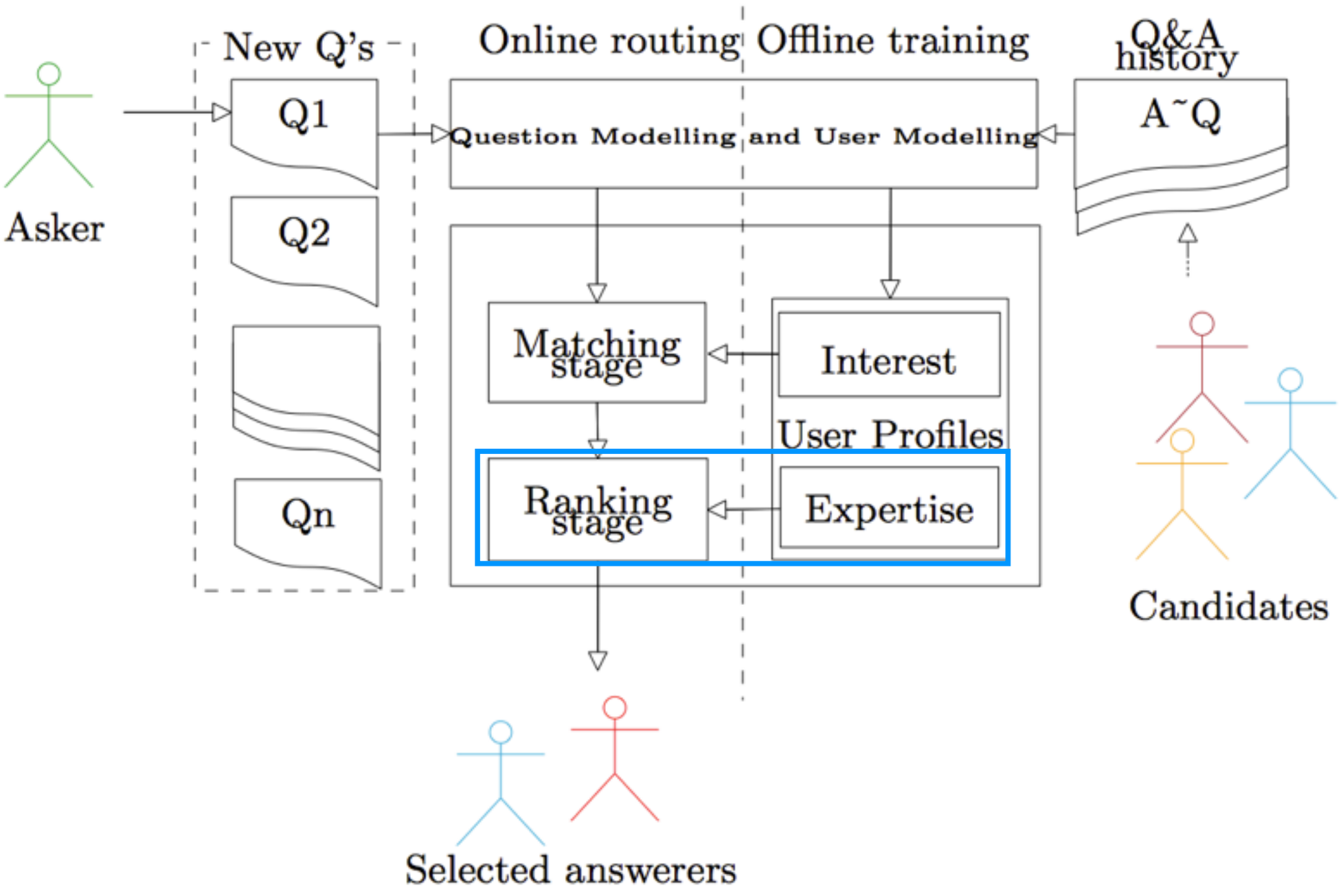
Matching question content to user interest



Representation
Activity-Answer (AA)
Activity-Interest (AI)
Content-Interest (CI)
Topic-Interest (TI)
General-Interest (GI)

Tags are more informative than terms to represent a users' interest.

Three stage QR process: ranking

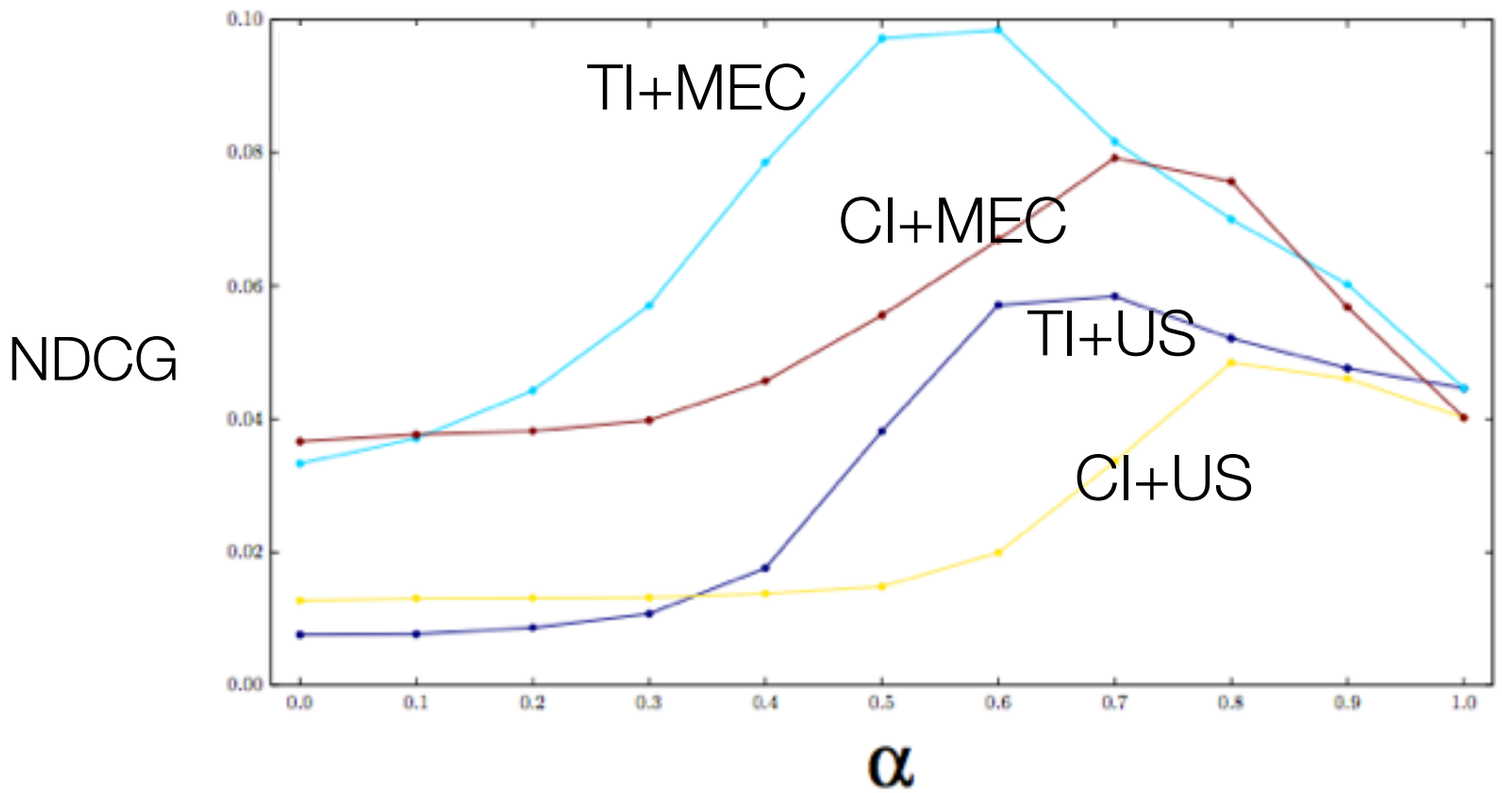


Ranking

- Rerank the recommended users after matching

$$rank(u) \leftarrow \alpha \cdot e_u + (1-\alpha) \cdot match(u,q)$$

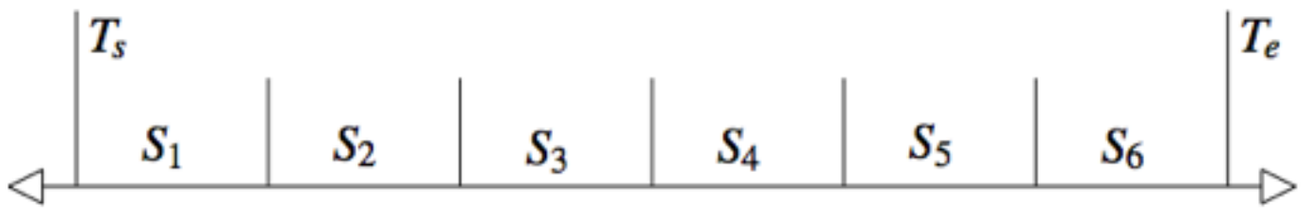
- Options for expertise e_u measurement
  - MEC
  - Score
- Learn α from historical data.



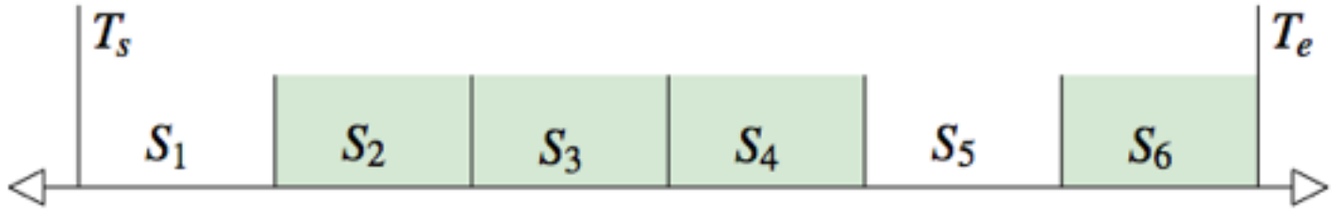
Representation
Content-Interest (CI)
Topic-Interest (TI)

Data Intensity

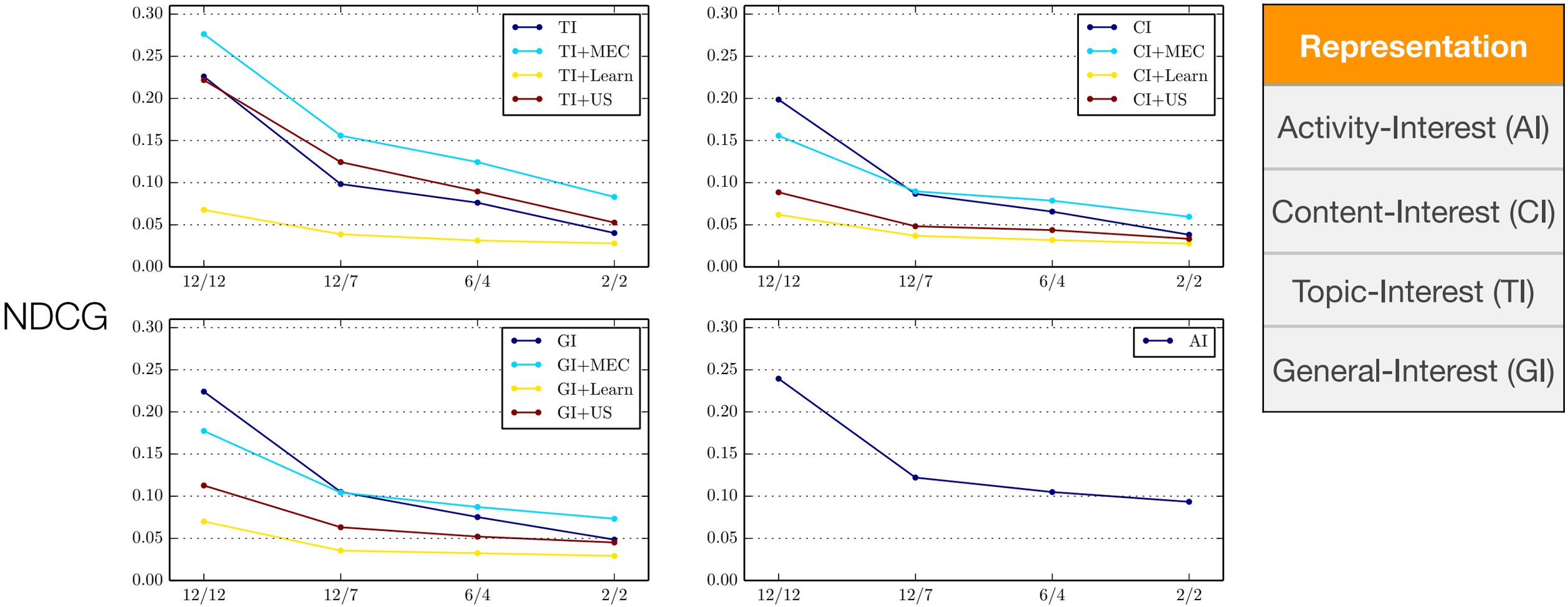
- To understand how QR performance is influenced by data intensity, we partition a six-month dataset into N equal-sized partitions.



- Datasets of different intensity levels are represented by k/N, which includes users active in k out of N partitions.
- A user must be active both in the first half [0,N/2] of the dataset and in the second half [N/2+1,N], such that the recommendation is possible. This requires that k>N/2.
- An example of 4/6 intensity:

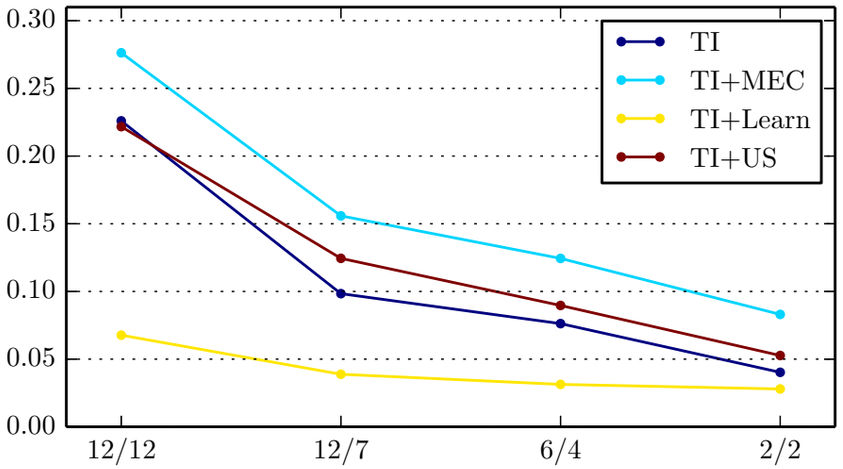


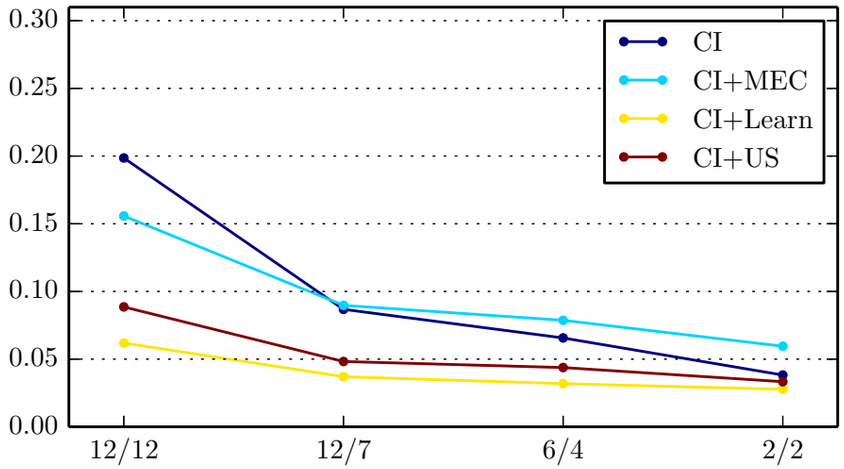
Reranking results

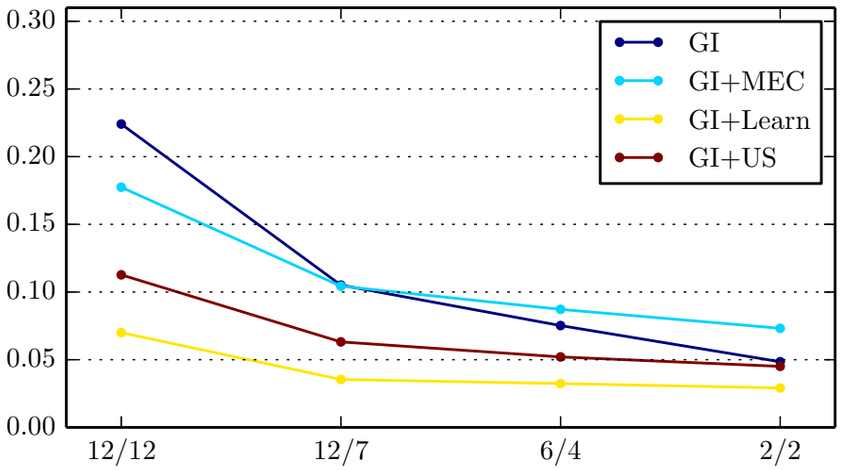


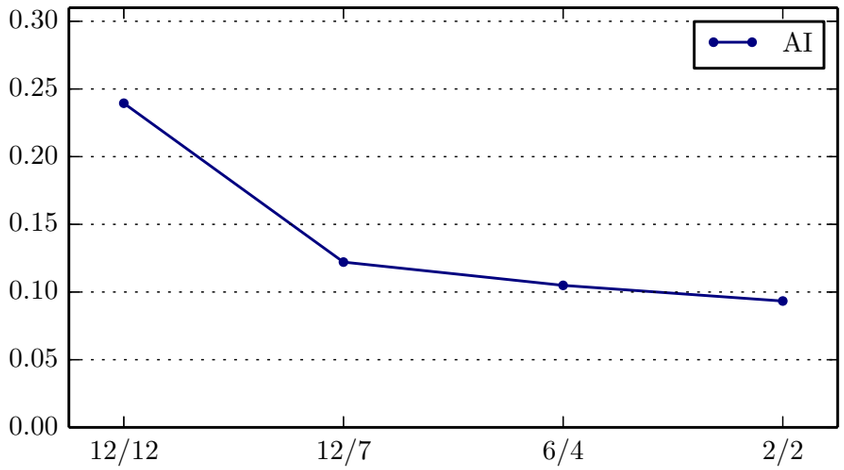
Representation
Activity-Interest (AI)
Content-Interest (CI)
Topic-Interest (TI)
General-Interest (GI)

Reranking results









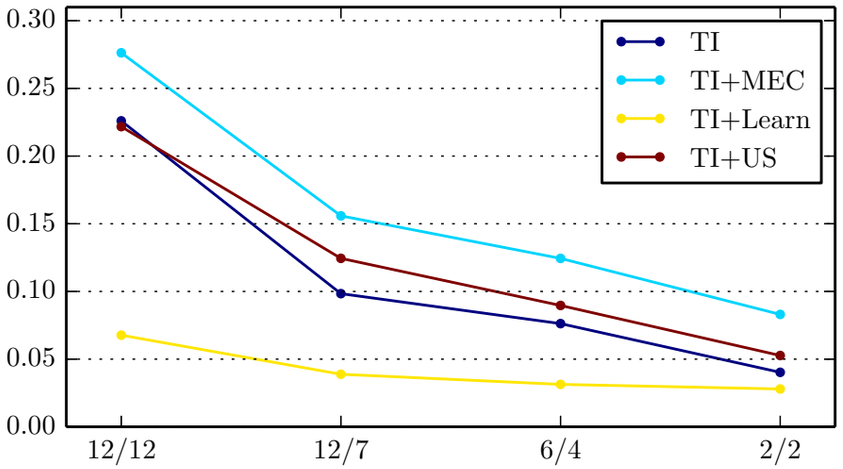
NDCG

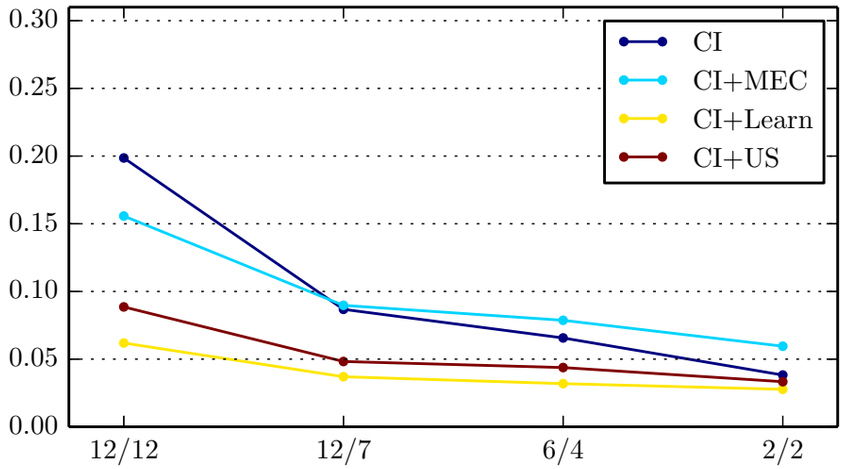
Intensity

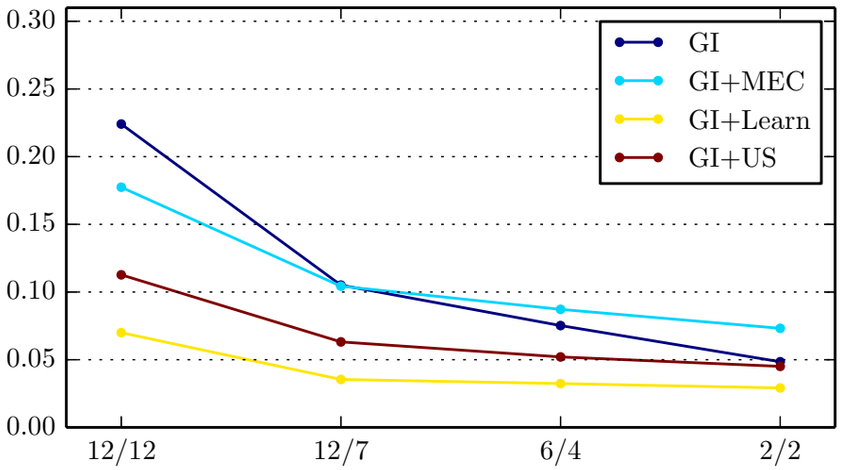
Representation
Activity-Interest (AI)
Content-Interest (CI)
Topic-Interest (TI)
General-Interest (GI)

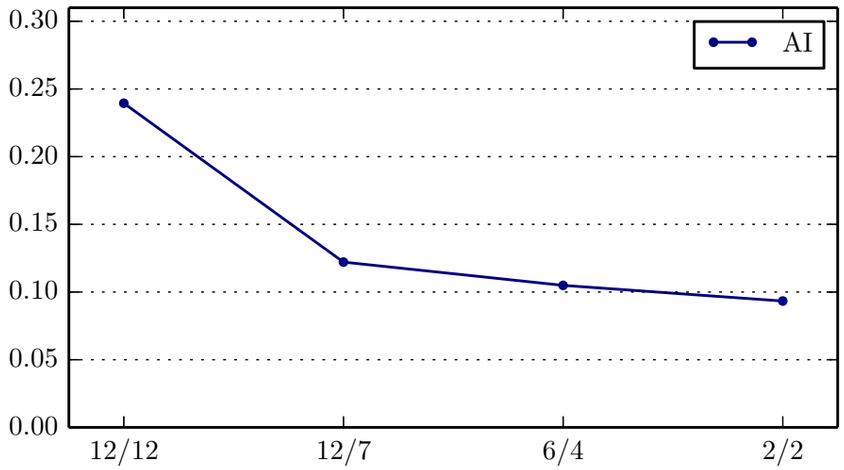
Expertise can helps, especially MEC.

Reranking results









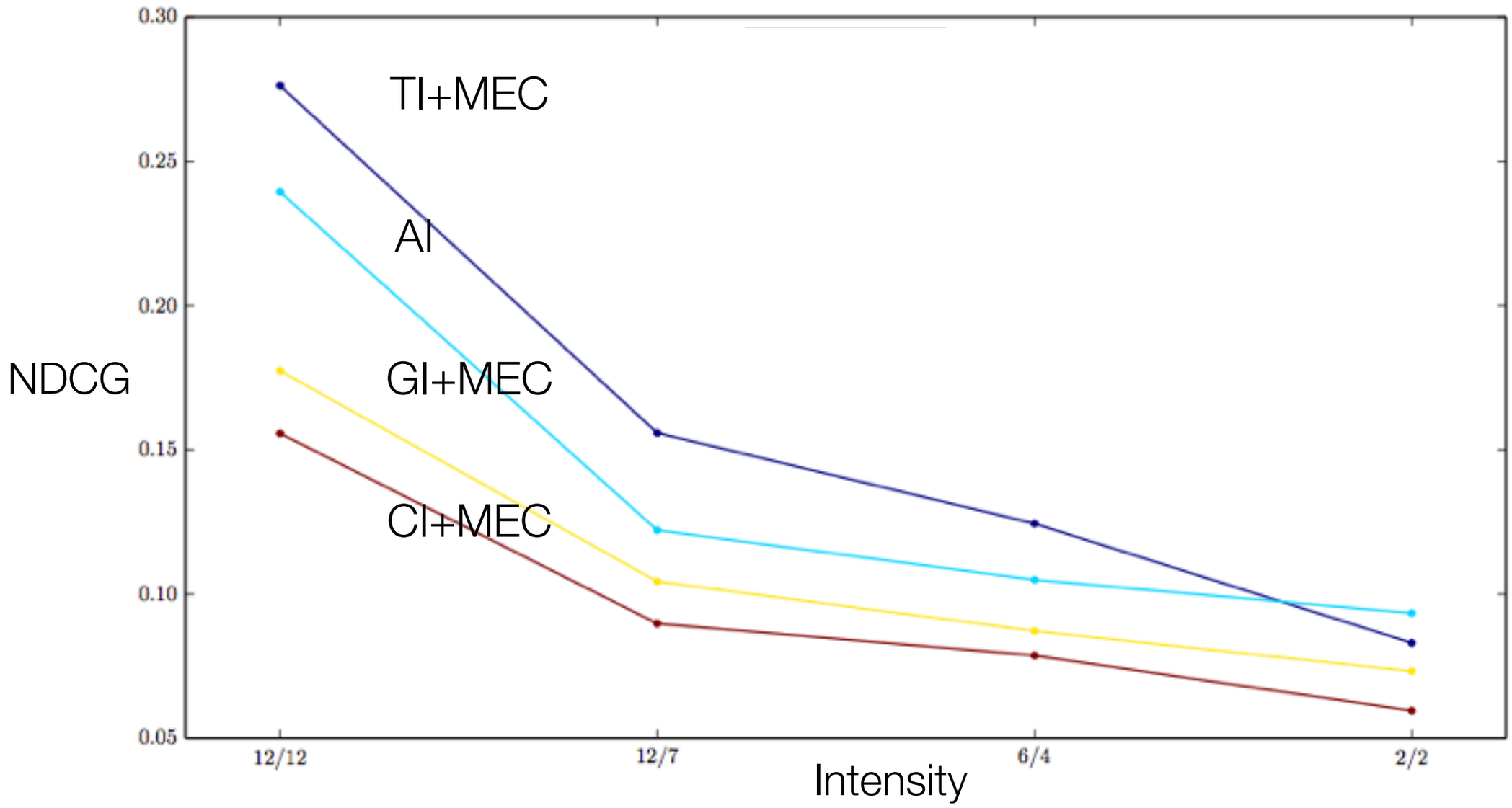
NDCG

Intensity

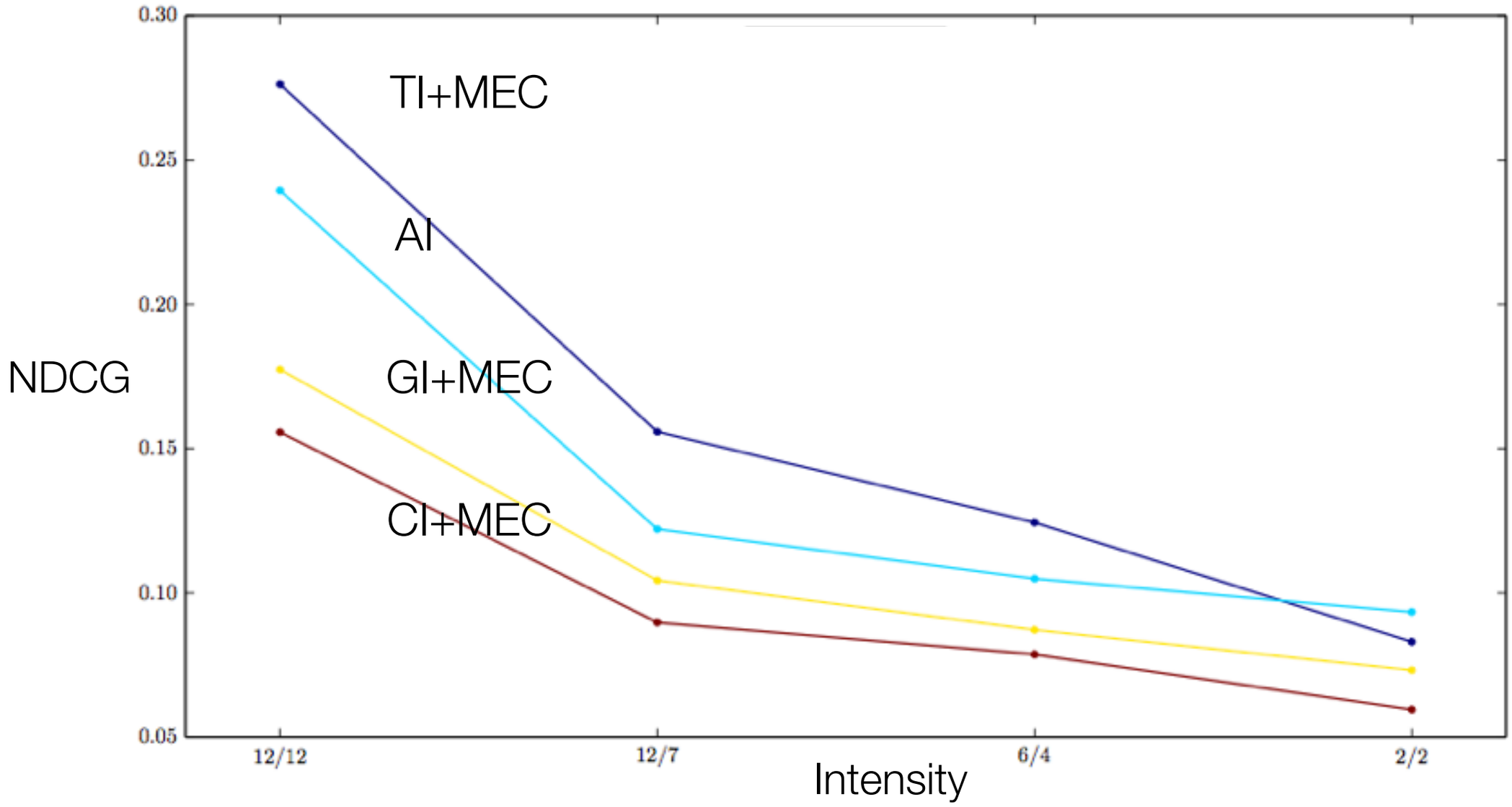
Representation
Activity-Interest (AI)
Content-Interest (CI)
Topic-Interest (TI)
General-Interest (GI)

QR performance decreases with less user related information.

Reranking results



Reranking results



With expertise measured by MEC, content-based QR outperform the best activity based QR.

Conclusions

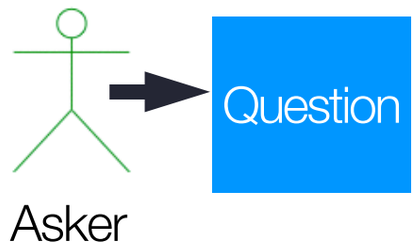
Expertise helps in question routing.

User interest is important in user modelling for question routing.

Data intensity can largely affect question routing performance.

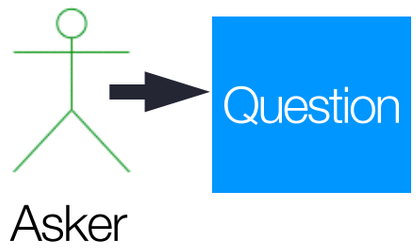
Outline

- Collaborative QA (CQA)
- Expertise Recognition
- Question Routing
- **Question Editing**



Outline

- Collaborative QA (CQA)
- Expertise Recognition
- Question Routing
- **Question Editing**



40% of the questions are edited at least once.

Question edit example

1

source | link

Button does not work after animation android

I have created a view in android and I need to animate it from bottom to top and vice versa. I have succeeded in doing this using TranslateAnimation. But the problem is that I have a few buttons on the view. WHen animated there touch point remains at the original place and doesn't get moved to the new position. So when I click the original postion of the button again the top to bottom animation runs but the button is not present there.

no xml? no code? – Jared Burrows Nov 10 '12 at 3:18

here you go!! I have added the code. – Farooq Arshed Nov 1

2

added 5920 characters in body

source | link | full

inline side-by-side side-by-side markdown

Here is the code:

```
f

private final AnimationListener slideDownAnimationListener = new AnimationListener()
    @Override
```

Question edit example

▼1 source | link

Button does not work after animation android

I have created a view in android and I need to animate it from bottom to top and vice versa. I have succeeded in doing this using TranslateAnimation. But the problem is that I have a few buttons on the view. WHen animated there touch point remains at the original place and doesn't get moved to the new position. So when I click the original postion of the button again the top to bottom animation runs but the button is not present there.

no xml? no code? – Jared Burrows Nov 10 '12 at 3:18

here you go!! I have added the code. – Farooq Arshed Nov 1

▼2 added 5920 characters in body

source | link | full

inline side-by-side side-by-side markdown

Here is the code:

```
f

private final AnimationListener slideDownAnimationListener = new AnimationListener()
    @Ove
```

An editing opportunity could indicate a lack of quality for a question

TU Delft
Delft University of Technology

Qualitative study to identify edit categories

- **600** questions with “important” edits, **3** annotators

- A question edit is important if
  - the question did not receive a good answer after the initial post
  - after the edit the question receives at least one more answer
  - the edit is not just related to spelling and formatting

- **Result: 7** edit categories were identified that substantially change the content of a question

Categories of important edits

Edit category	Added example text (excerpt)
1. Attempt	Update 1: I've tested the application with NHProf without much added value: NHProf shows that the executed SQL is ...

2. Source code refinement	Here is the code:
	`import android.content.Context;`
	`import android.graphics.Matrix;`

3. Hardware/Software details	I'm running OS 10.6.8
4. Context	EDIT: I have '`jquery-1.8.3.min.js`' included first, then I have the line `$.noConflict();`. ...

Categories of important edits

Edit category	Added example text (excerpt)
5. Problem Statement	The Error: `Exception in thread "AWT-EventQueue-0"`
6. Example	I have a list of numbers like this in PHP array, and I just want to make this list a little bit smaller. 2000: 3 6 7 11 15 17 25 36 42 43 45...
7. Solution	**EDIT 2: **Okay that’s done the trick. Using @Dervall ’s advice I replaced the MessageBox line with a

Categories of important edits

Edit category	Added example text (excerpt)
5. Problem Statement	The Error: `Exception in thread "AWT-EventQueue-0"`
6. Example	I have a list of numbers like this in PHP array, and I just want to make this list a little bit smaller. 2000: 3 6 7 11 15 17 25 36 42 43 45...
7. Solution	**EDIT 2: **Okay that's done the trick. Using @Dervall 's advice I replaced the MessageBox line with a

Edits are a good indicator of a question's quality.
Edits indicate which aspects are missing in a question.

Two tasks to aid question reformulation

Two tasks to aid question reformulation

Edit prediction
predict whether a question needs an edit.

Two tasks to aid question reformulation

Edit prediction
predict whether a question needs an edit.

Edit type prediction
predict what kind of edit the question requires.

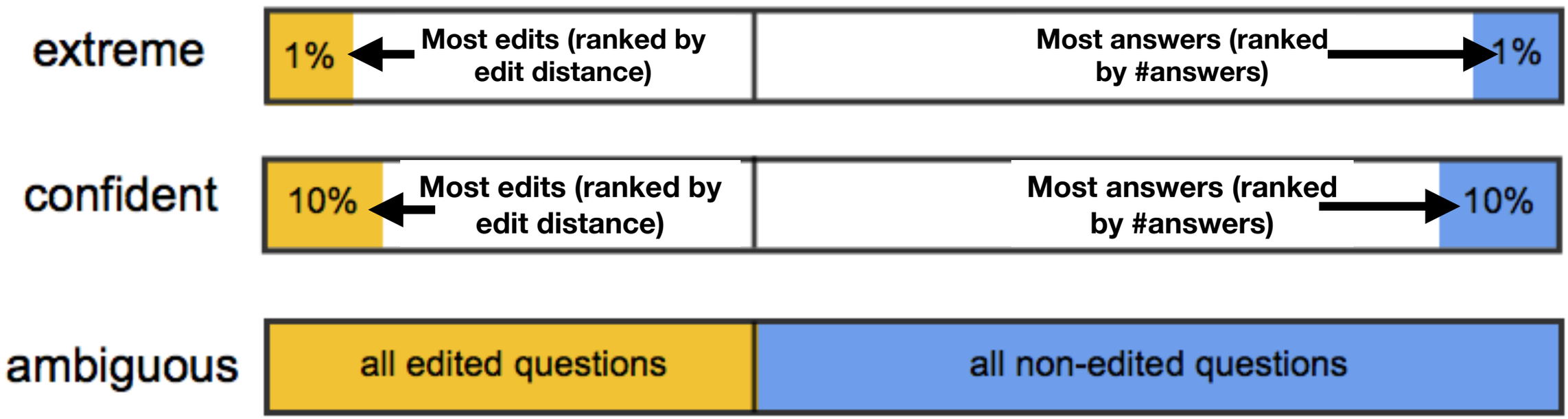
Two tasks to aid question reformulation

Edit prediction
predict whether a question needs an edit.

Edit type prediction
predict what kind of edit the question requires.

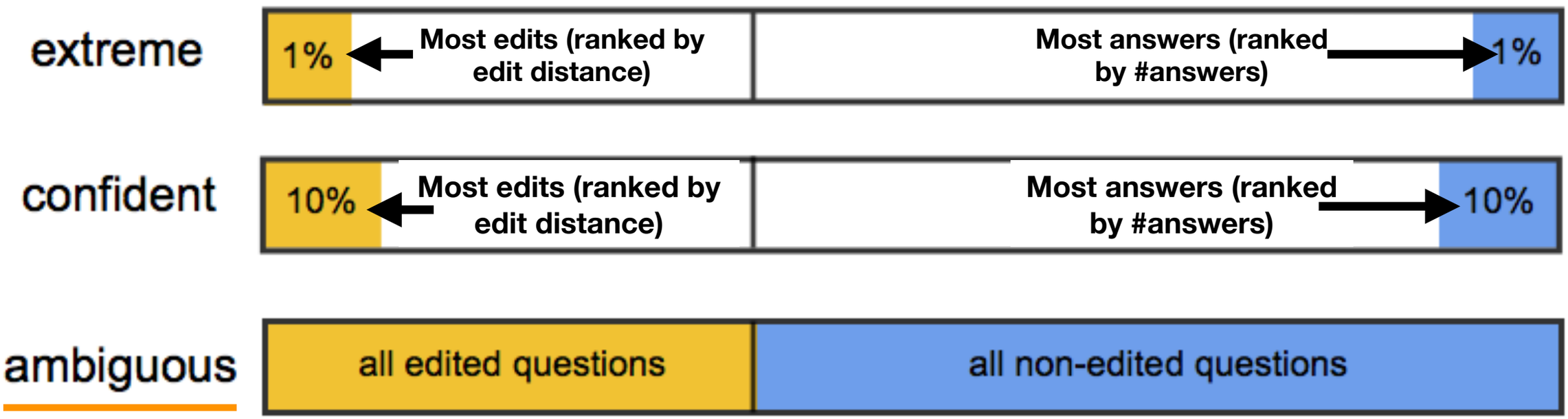
One data set, three partitions

- Stack Overflow data set: edited and non-edited questions
- Three partitions: extreme, confident and ambiguous
- Expectation: ambiguous partition is most difficult to predict correctly



One data set, three partitions

- Stack Overflow data set: edited and non-edited questions
- Three partitions: extreme, confident and ambiguous
- Expectation: ambiguous partition is most difficult to predict correctly



One data set, three partitions

- Stack Overflow data set: edited and non-edited questions
- Three partitions: extreme, confident and ambiguous
- Expectation: ambiguous partition is most difficult to predict correctly

One data set, three partitions

- Stack Overflow data set: edited and non-edited questions
- Three partitions: extreme, confident and ambiguous
- Expectation: ambiguous partition is most difficult to predict correctly

Training vs. test data: a temporal split

before 01/2013

01/2013 onwards

	#question overall	#edited questions	#non-editted questions
Training: Extreme	36.0K	18.0K	18.0K
Test: Extreme	15.0K	7.5K	7.5K
Test: Confident	85.0K	42.5K	42.5K
Test: Ambiguous	1.8M	523.0K	1.2M

Classifier: logistic regression

Features: terms (after text preprocessing)

Edit prediction results

Test partition	Precision	Recall	F1
Extreme	0.63	0.78	0.70
Confident	0.58	0.69	0.63
Ambiguous	0.51	0.65	0.57

Edit prediction results

Test partition	Precision	Recall	F1
Extreme	0.63	0.78	0.70
Confident	0.58	0.69	0.63
Ambiguous	0.51	0.65	0.57

We can predict whether a question needs an edit.

Edit prediction results

Test partition	Precision	Recall	F1
Extreme	0.63	0.78	0.70
Confident	0.58	0.69	0.63
Ambiguous	0.51	0.65	0.57

We can predict whether a question needs an edit.

The questions most in need of an edit (Extreme) are identified accurately (high recall).

Discriminative features (terms)

Unigram	Coef.
dbcontext	0.88
microsoft	0.57
com	0.55
socket	0.42

Unigram	Coef.
mental	-0.29
lexer	-0.41
string	-18.48
archiv	-19.94

Discriminative features (terms)

Unigram	Coef.
dbcontext	0.88
microsoft	0.57
com	0.55
socket	0.42

Unigram	Coef.
mental	-0.29
lexer	-0.41
string	-18.48
archiv	-19.94

A deeper understanding of a topic produces questions which require edits less often.

Two tasks to aid question reformulation

Edit prediction
predict whether a question needs an edit.

Edit type prediction
predict what kind of edit the question requires.

Constructing an edit type dataset

A binary classifier for each edit type (4 overall)

Edit category	Added example text (excerpt)
Attempt	Update 1: I've tested the application with NHProf without much added value: NHProf shows that the executed SQL is ...

Source **Code** refinement	Here is the code:
	`import android.content.Context;`
	`import android.graphics.Matrix;`

Hardware/Software **Details**	I'm running OS 10.6.8
SEC Problem statement, example, context	EDIT: I have '`jquery-1.8.3.min.js`' included first, then I have the line `$.noConflict();`. ...

Constructing an edit type dataset

- **1,000** edited questions randomly selected from the **Extreme** partition
- **3** annotators, labelling **400** questions each
- A question can have more than one edit
- Inter-annotator agreement:100 overlapping questions

Type	Code	Attempt	SEC	Details
Kappa	0.67	0.65	0.59	0.19
#questions	612	336	542	NA

(Details type not considered in further experiments)

Augmenting the training data semi-automatically

- **Positive**: augment with edited questions where the term ‘code’ (for questions of type Code) or ‘tried’ (for questions of type Attempt) was added in the edit step

Question edit example

▼1 source | link

Button does not work after animation android

I have created a view in android and I need to animate it from bottom to top and vice versa. I have succeeded in doing this using TranslateAnimation. But the problem is that I have a few buttons on the view. WHen animated there touch point remains at the original place and doesn't get moved to the new position. So when I click the original postion of the button again the top to bottom animation runs but the button is not present there.

no xml? no code? – Jared Burrows Nov 10 '12 at 3:18

here you go!! I have added the code. – Farooq Arshed Nov 1

▼2 added 5920 characters in body

source | link | full

inline side-by-side side-by-side markdown

Here is the code:

```
f

private final AnimationListener slideDownAnimationListener = new AnimationListener()
    @Override
```

Augmenting the training data semi-automatically

- **Positive**: augment with edited questions where the term ‘code’ (for questions of type Code) or ‘tried’ (for questions of type Attempt) was added in the edit step

- **Negative**: randomly select non-edited questions from the Extreme partition

- **Dimension reduction**: latent semantic analysis

- **Evaluation**: 5-fold cross-validation

Edit type prediction results

Strategy	Edit category	Nr. positive	Nr. negative	Precision	Recall	F1
No augmentation	Code	612	388	0.63	0.83	0.71
	SEC	542	458	0.57	0.62	**0.59**
	Attempt	336	664	0.39	0.45	0.40
Positive augmentation	Code	8157	338	0.63	0.92	0.75
	SEC	542	458	0.57	0.62	0.59
	Attempt	2387	664	0.40	0.49	0.44
Positive+ negative augmentation	Code	8157	8157	0.63	0.95	**0.76**
	SEC	542	542	0.55	0.49	0.52
	Attempt	2387	2369	0.38	0.56	**0.45**

Edit type prediction results

Strategy	Edit category	Nr. positive	Nr. negative	Precision	Recall	F1
No augmentation	Code	612	388	0.63	0.83	0.71
	SEC	542	458	0.57	0.62	**0.59**
	Attempt	336	664	0.39	0.45	0.40
Positive augmentation	Code	8157	338	0.63	0.92	0.75
	SEC	542	458	0.57	0.62	0.59
	Attempt	2387	664	0.40	0.49	0.44
Positive+ negative augmentation	Code	8157	8157	0.63	0.95	**0.76**
	SEC	542	542	0.55	0.49	0.52
	Attempt	2387	2369	0.38	0.56	**0.45**

We can predict what type of edit a question needs.

Going beyond the question content…

Influences of topic, user and time

So far: edit & edit type prediction based on question content alone.

Now:

- **Topic**: to what extent does the topic influence the need for a question edit?
- **User**: how does a user's knowledge & familiarity with Stack Overflow influence the need for a question edit?
- **Time**: over time, doe fewer or more questions require a substantial edit?

Topical influence

Rank	Tag	Ratio
1	asp.net-mvc-4	6.16
2	jsf	6.02
3	symfony2	5.57
4	r	4.34

Rank	Tag	Ratio
198	logging	0.44
199	testing	0.41
200	design	0.34
201	svn	0.27

Ratio = #(edited question)/#(non-edited questions)

Topical influence

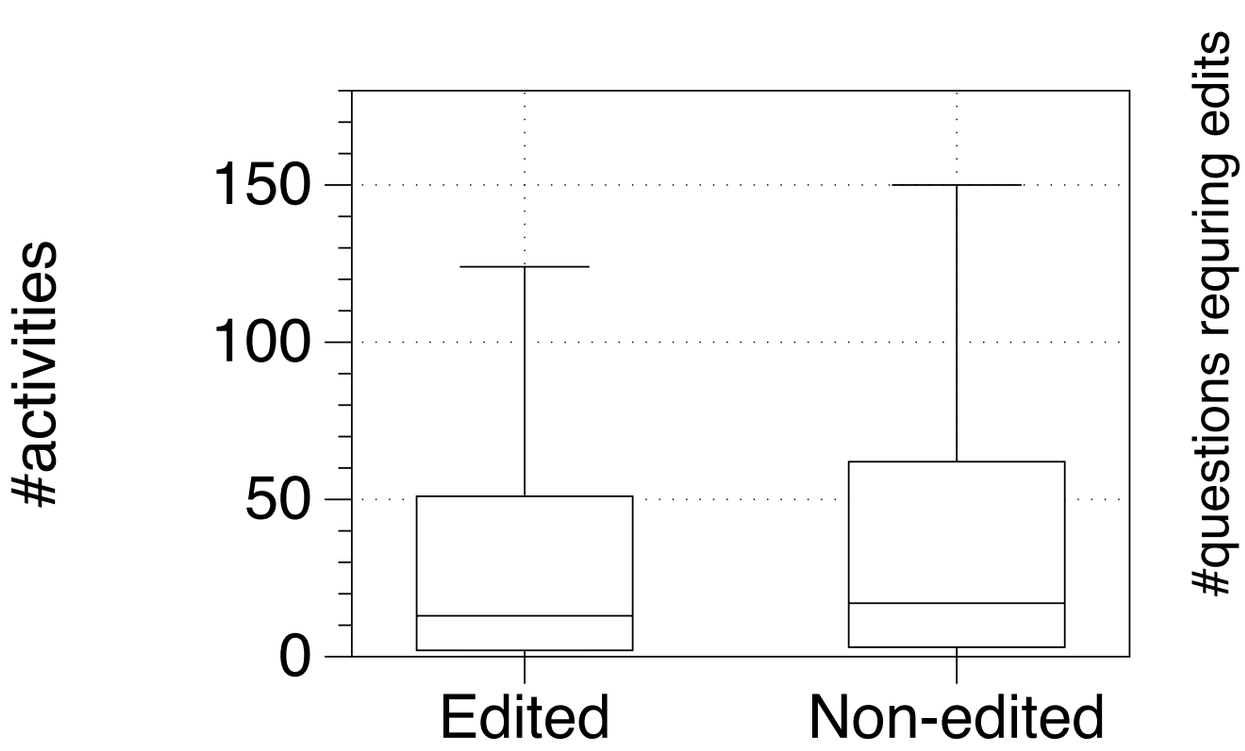
Rank	Tag	Ratio
1	asp.net-mvc-4	6.16
2	jsf	6.02
3	symfony2	5.57
4	r	4.34

Rank	Tag	Ratio
198	logging	0.44
199	testing	0.41
200	design	0.34
201	svn	0.27

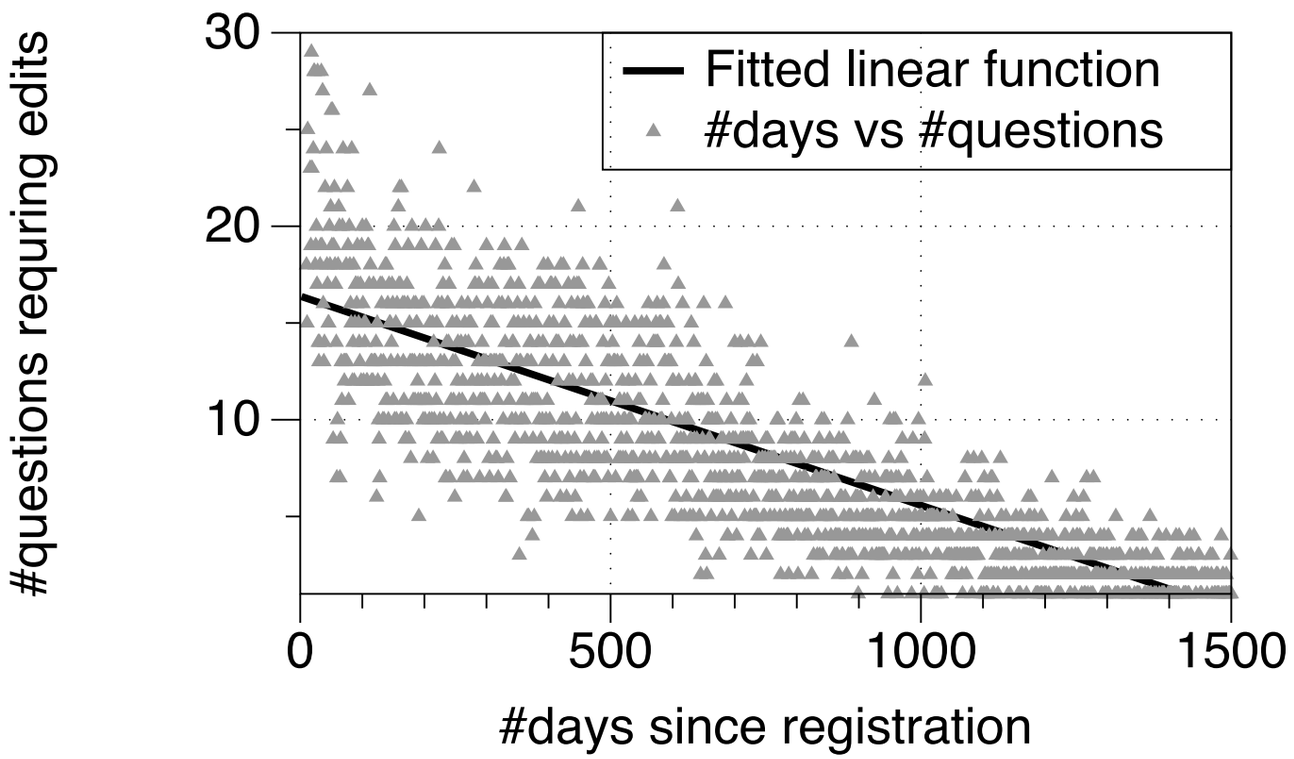
Ratio = #(edited question)/#(non-edited questions)

Topics about specific languages and frameworks are more prone to requiring edits.

User influence

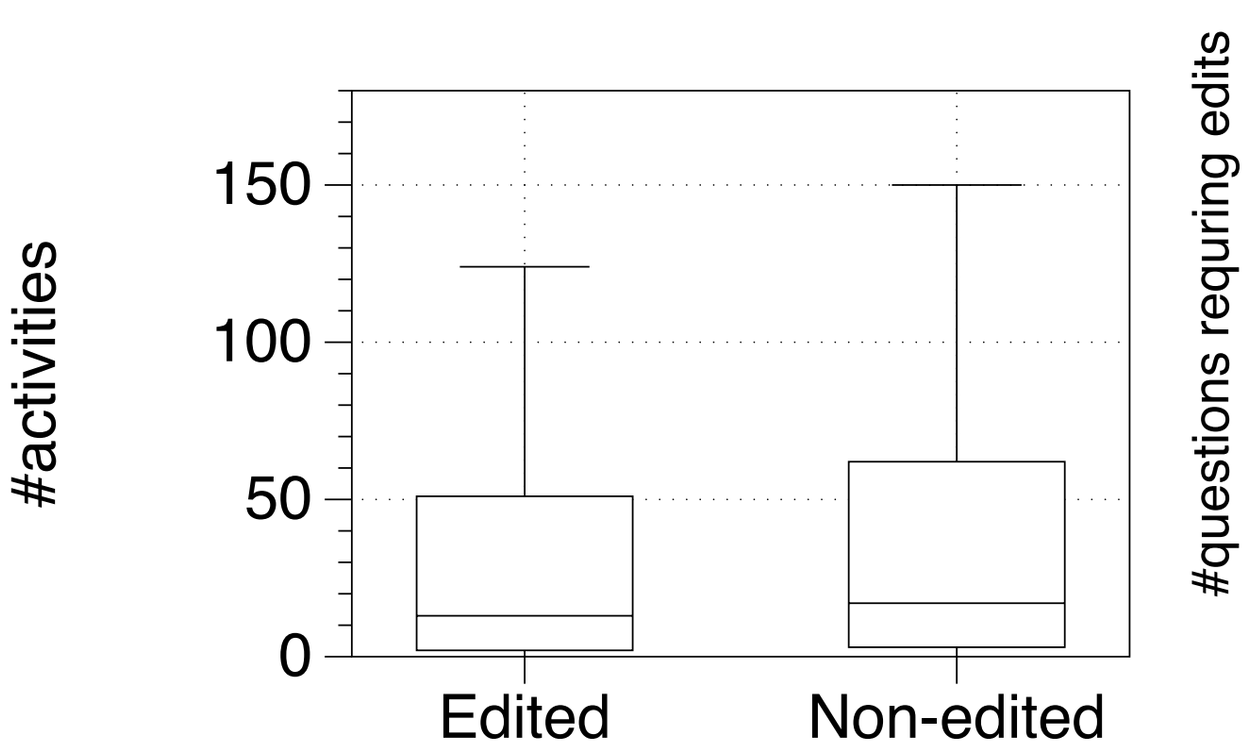


Users with more activities post questions with higher quality.

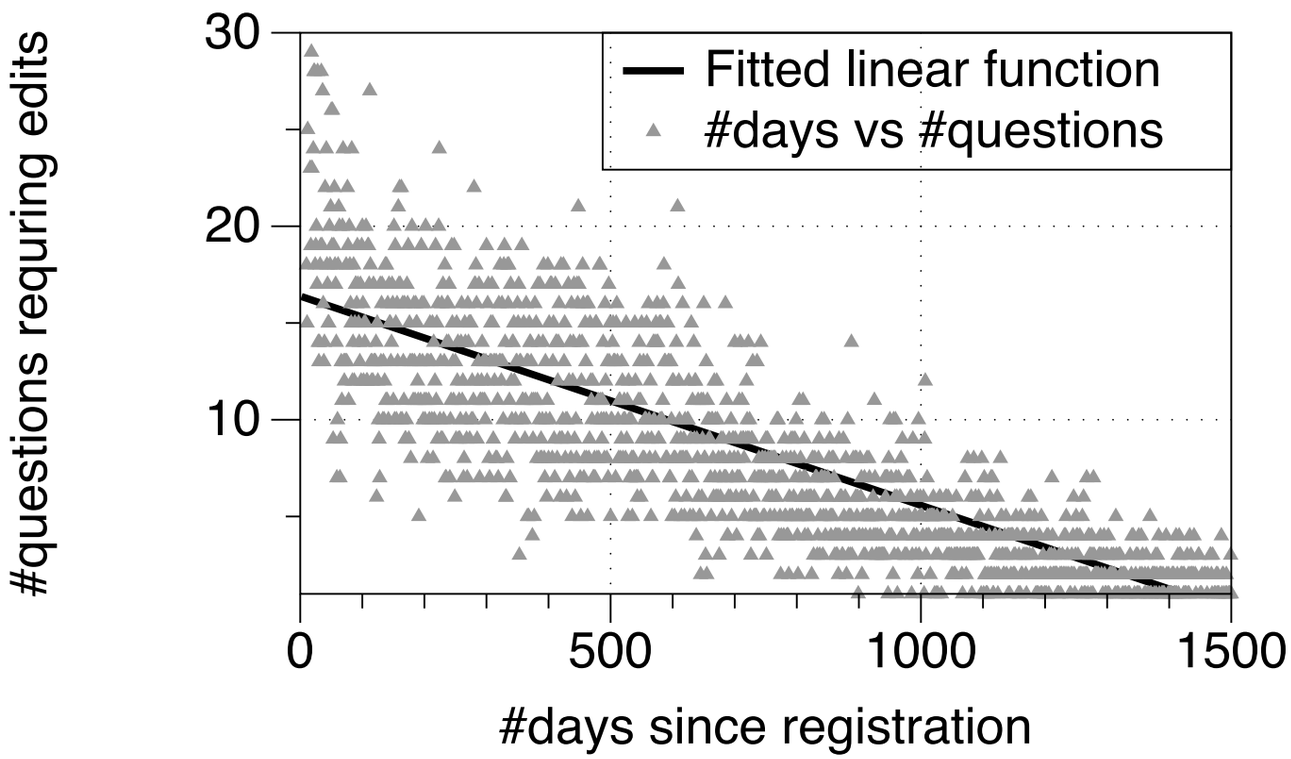


A user post less questions that need a substantial edit as time goes by.

User influence



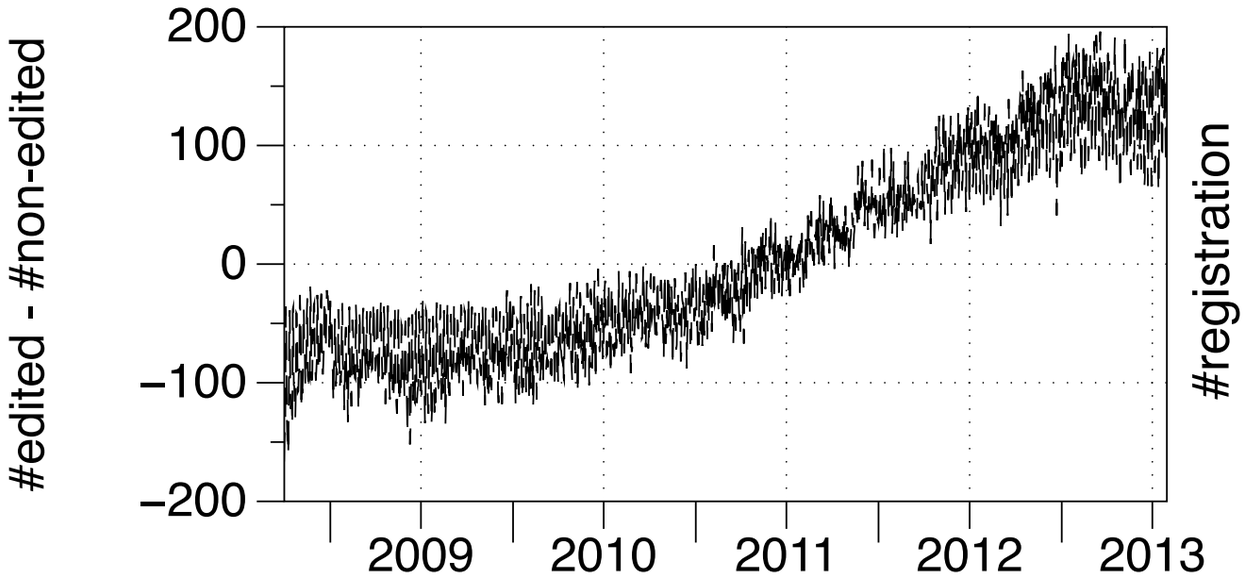
Users with more activities post questions with higher quality.



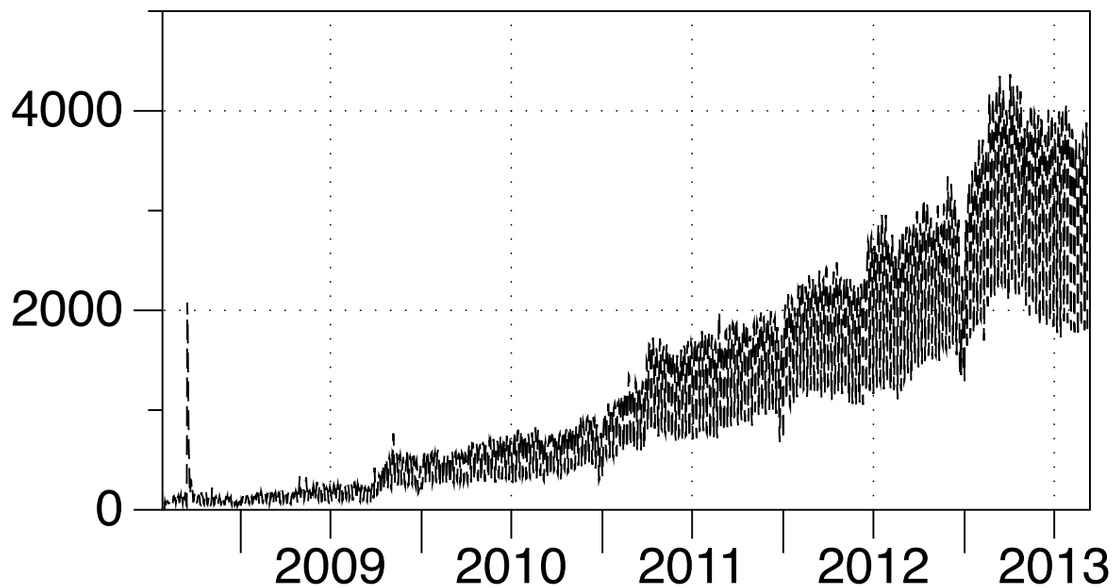
A user post less questions that need a substantial edit as time goes by.

Experienced Stack Overflow users, and users with in-depth knowledge of a topic, are less likely to post poorly formulated questions.

Temporal influence

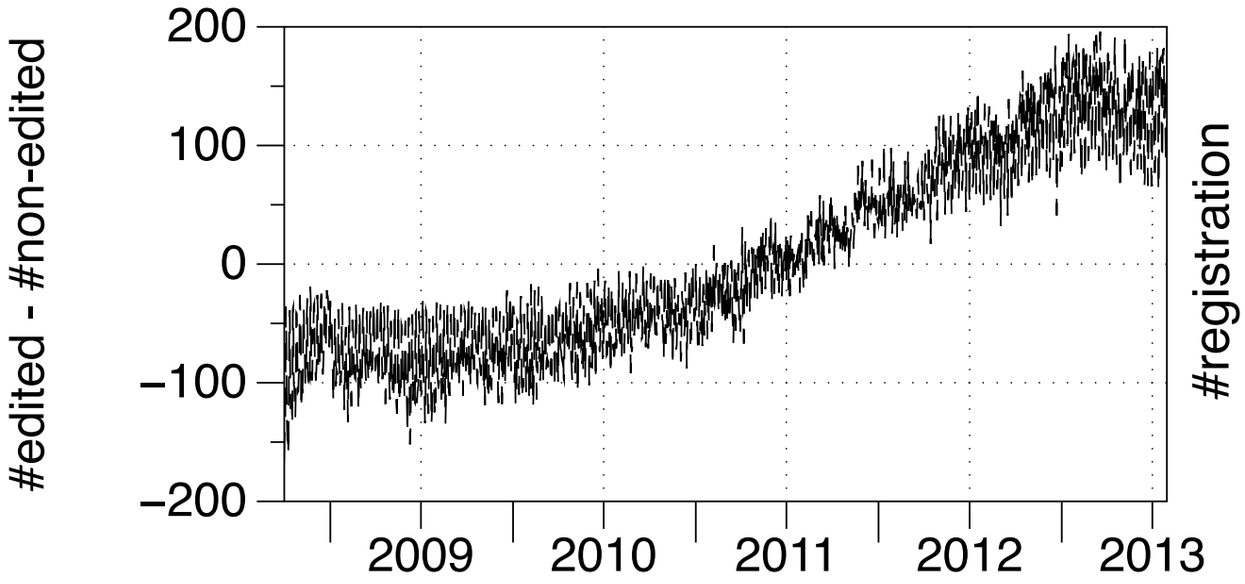


#edited questions – #non-edited questions



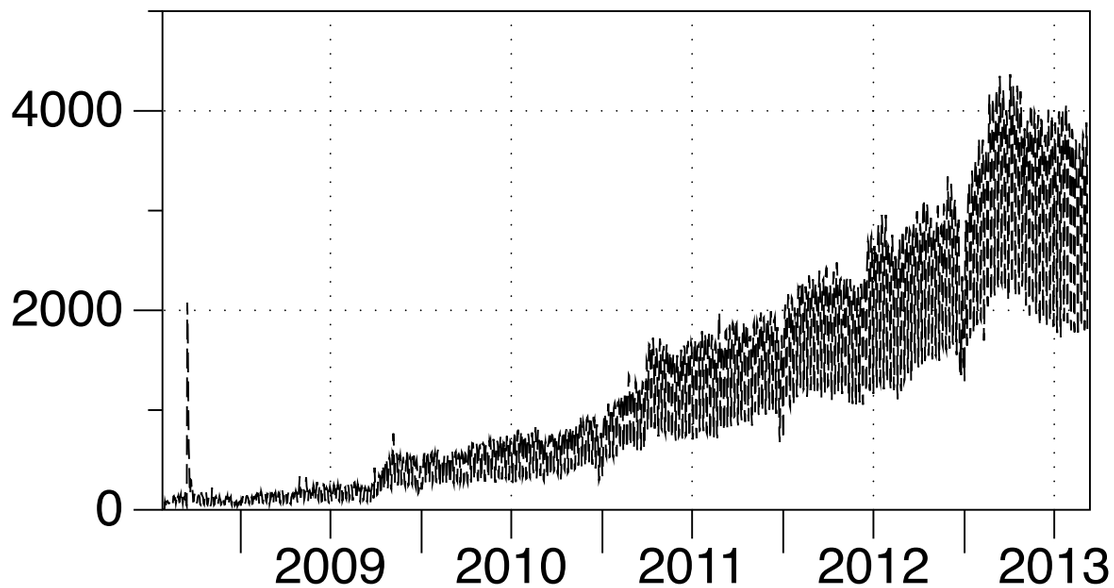
User registration over time

Temporal influence



Time

#edited questions – #non-edited questions

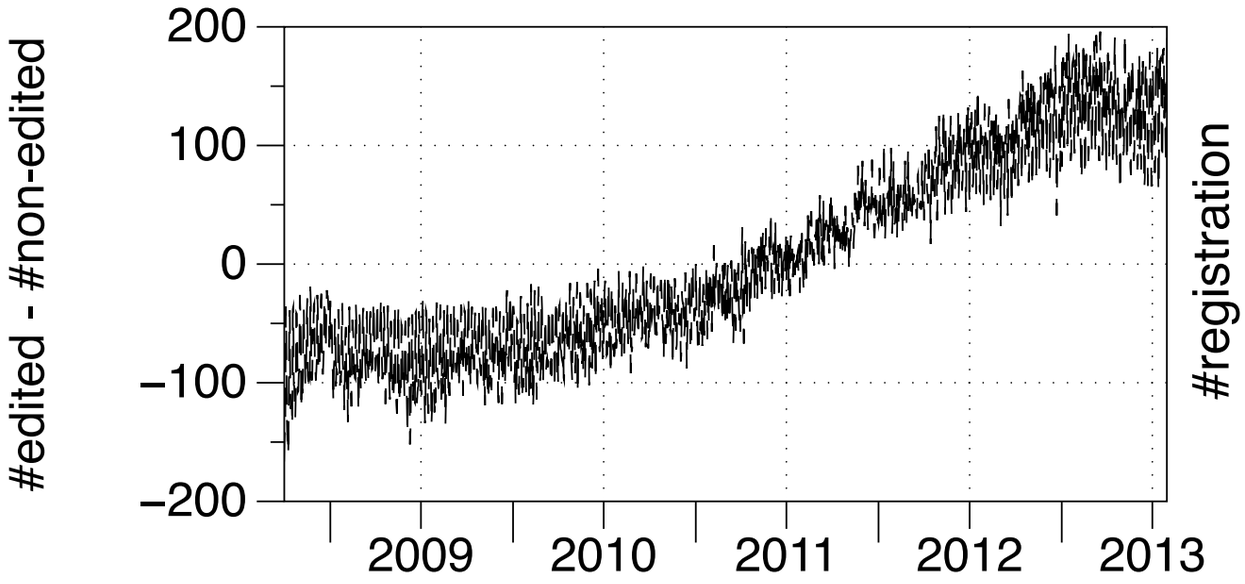


Time

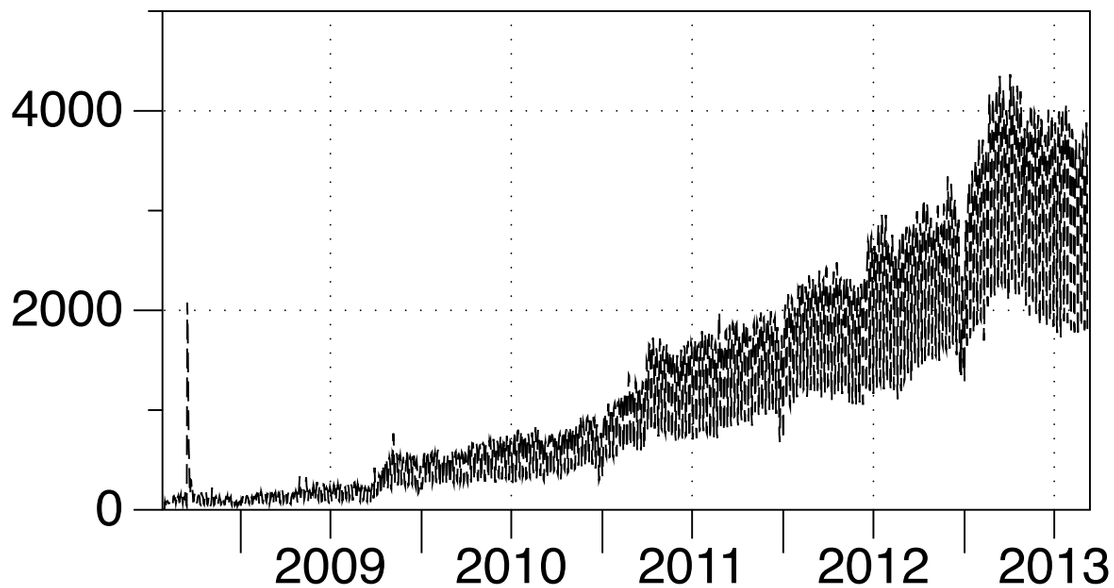
User registration over time

Over time, an individual user asks fewer questions on Stack Overflow.

Temporal influence



#edited questions – #non-edited questions



User registration over time

Over time, an individual user asks fewer questions on Stack Overflow.

Overall, the increasing popularity of the platform leads to more poorly formulated questions.

However …

- Presented signals are discriminative in edit/non-edit classification

- Adding them as features to our classifier does not lead to significant performance increases

However …

- Presented signals are discriminative in edit/non-edit classification

- Adding them as features to our classifier does not lead to significant performance increases

Thus: content information is most indicative of a question's need for an edit.

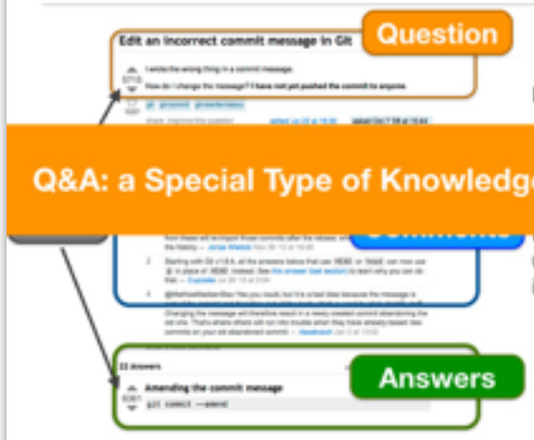
Conclusions

Question edits can be useful to improve question quality.

The need for a question edit can be predicted.

Predicting the edit type is also possible, but more difficult.

Stack Overflow: a CQA system for programmers



Highly active (Sept. 2013):
5.6M questions

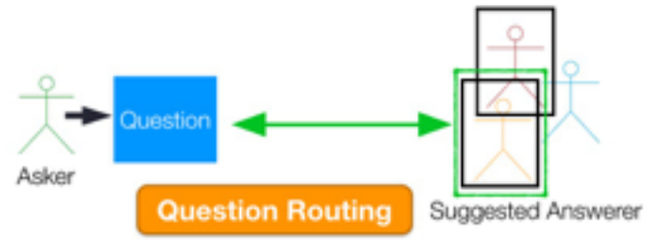
Q&A: a Special Type of Knowledge Crowdsourcing

Effective **gamification**: users earn reputation points if their posts are up-voted

Stack Overflow challenges & solutions

- 2M questions (36%) do **not** have any up-voted answer
- **Median** time until an accepted answer is posted: ~30 minutes, **average** time: ~3 days (i.e. some questions require a long waiting time)
- Remedies to decrease the time to an answer:
  - Route questions to the "right" user
  - Improve the question itself

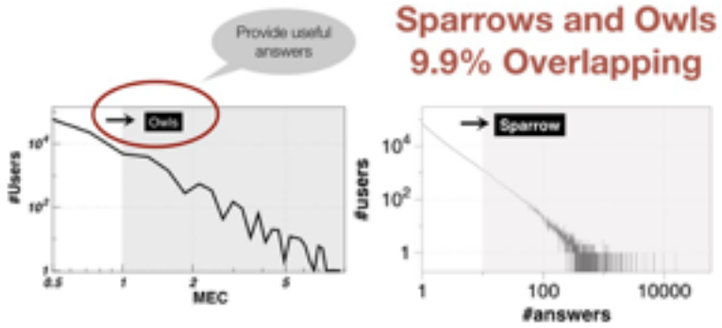
Topics to be discussed



Edit Suggestion

Expertise recognition

Distribution of Expertise (MEC) and Activeness (#answers)

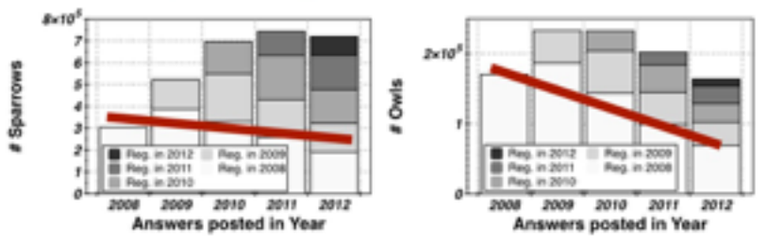


Sparrows and Owls 9.9% Overlapping

A small number of users have high MEC (provide useful answers), while others do not; MEC has a similar distribution with #answers.

ANSWERS POST BY EACH GROUP

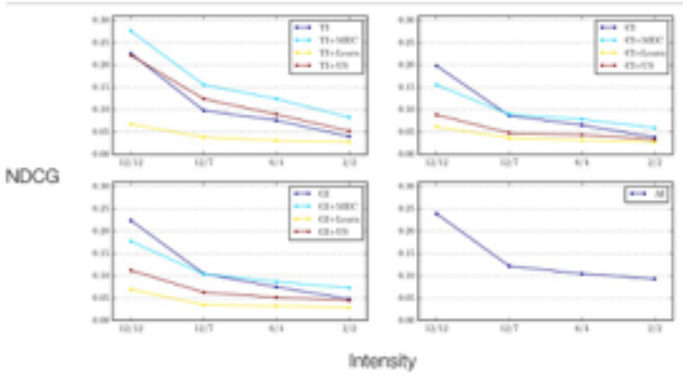
NOTE: Comparable #registrations



Gamification incentives can more effectively retain Sparrows than Owls

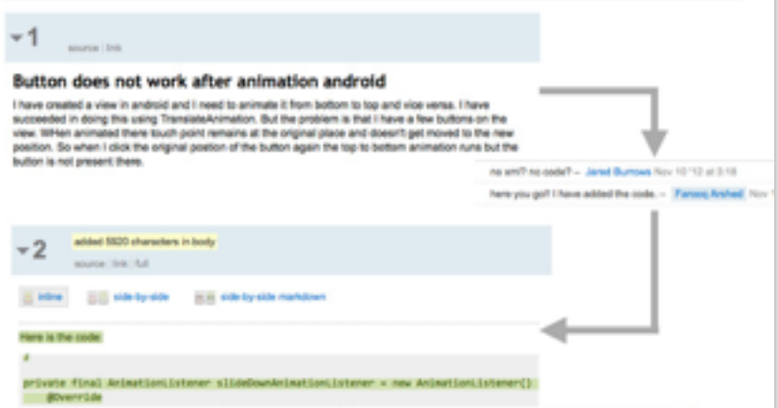
Three Stage QR Process

Reranking results



Expertise can helps, especially MEC.

Question edit example



Edits can be an indicator of question quality.

Two tasks to aid question reformulation

Edit prediction
predict whether a question needs an edit.

Edit type prediction
predict what kind of edit the question requires.