

HOW MODERN NEWS AGGREGATORS HELP DEVELOPMENT COMMUNITIES SHAPE AND SHARE KNOWLEDGE

(最新のニュースアグリゲーターが開発コミュニティ
の知識の形成と共有にどのように役立つか)

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BACKGROUND

- Software developers need awareness of the latest news related to their profession
- News channels play an important role in knowledge exchange
- These modern news aggregators offer a blend of gamification and social network features that
 - Increases developer social capital in a community
 - Enables faster dissemination of curated content
 - Such as Hacker News and Reddit
- Up to now, there have only been a small number of studies of news aggregators for software developers
- There is little understanding of on news aggregators
- A study to understand more about modern news aggregators
- Used Reddit and Hacker News aggregators in this study
 - enable users to post links with a short description and support commenting as well as voting on posts and comments

AIM

- To understand programming-related news aggregator (r/programming and Hacker News)

RESEARCH QUESTIONS

- RQ1: What motivates developers to participate in programming-related news aggregators?
- RQ2: What are the characteristics of the content posted in programming-related news aggregators?
- RQ3: What suggestions do the participants have to improve the community and features of programming-related news aggregators?

METHOD

- Interviews
- Survey
- Content analysis

INTERVIEWS

- Recruited active members of the r/programming community for the interviews
- Interviewed 22 participants (response rate of 10%), identified as P1 - P22
 - All participants work in the software development industry
 - Their experience in industry ranges from 3 to 25 years
 - Interviewees belong to different ethnic groups (living in South America, North America, Europe, Asia, and Oceania)
 - Together, they speak 12 different languages
- Interviews were conducted via video calls and e-mail
- Focused on five main topics:
 - (1) The interviewees' perceptions about what motivates them to use the news aggregator
 - (2) Reasons to contribute (i.e., posting news, commenting, and voting)
 - (3) The content they commonly read and what the learning outcomes are
 - (4) The differences among news aggregators(e.g., Reddit, Hacker News)
 - (5) Pitfalls and challenges they face, as well as advice for newcomers

SURVEY

- Aimed at measuring the qualitative findings
- Had to indicate their agreement with statements derived from the interview analysis
- Answer options ranged from strongly disagree to strongly agree
 - Also allowed users to respond "do not know" or "does not apply"
- The survey contained 21 statements and demographics questions
- Shared the survey on five social networks: Medium, Hacker News, Reddit, Twitter, and Facebook
- Obtained 99 answers
- Were from 32 different countries
- All participants are involved with software development activities

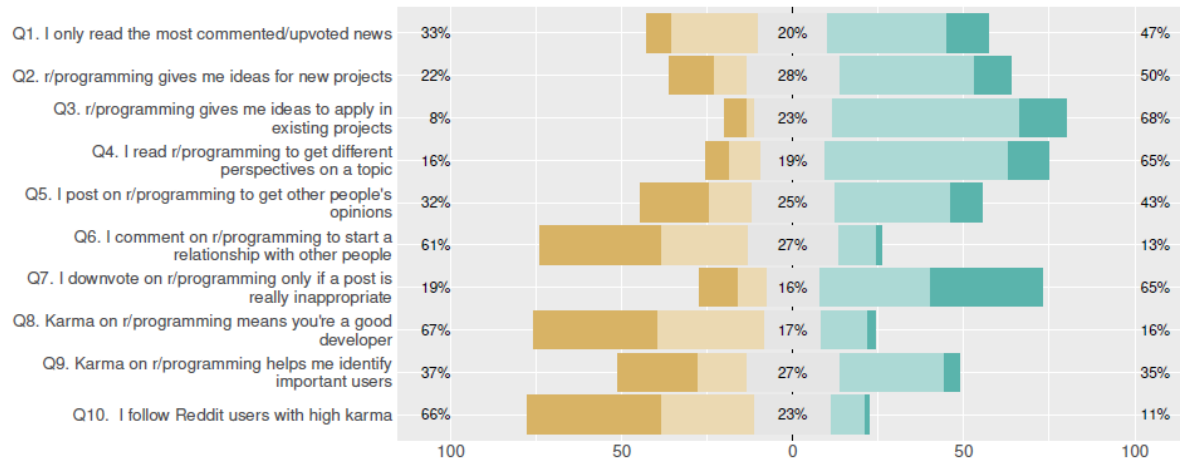


Figure 1: Responses to our survey (part 1).

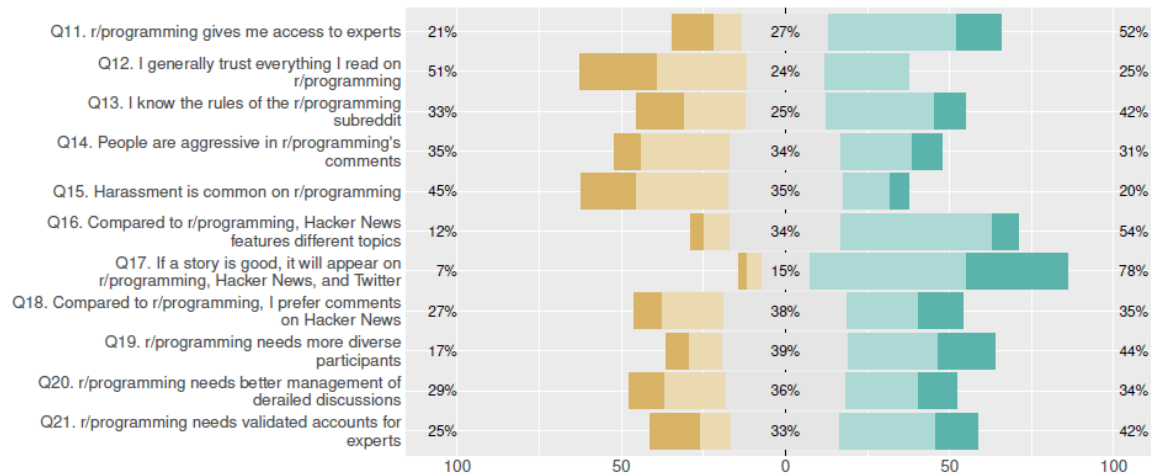


Figure 2: Responses to our survey (part 2).

CONTENT ANALYSIS

- Collected all posts and comments posted between 1 January 2016 and 30 April 2017
 - 492,752 posts from Hacker News
 - 44,640 posts from r/programming
- Randomly selected a sample of
 - 300 posts from Reddit's r/programming
 - 300 posts from Hacker News

RESULT

1. Motivations to participate (RQ₁)
2. Characteristics of the content (RQ₂)
3. Improving the community (RQ₃)

1. Motivations to participate (RQ1)

Participants reported motivations to post, comment, vote, and read

- a) Motivations to post
- b) Motivations to comment
- c) Motivations to vote
- d) Motivations to read
- e) Impact of the news aggregators

MOTIVATIONS TO POST

- Main reasons for participants to post
 - Self-promoting own work
 - Sharing relevant content
- Other reasons:
 - Promote their own work to get feedback and possibly improve the content created
 - To share third-party content that might be interesting to others
 - Part of their jobs as community members
 - Shared with the goal of discussing the topic
 - Gamification also may play a role

MOTIVATIONS TO COMMENT

Table 2: Descriptive statistics about our datasets

	Min	Q1	Median	Q3	Max
comments/post HN	0	1	2	3	5,771
comments/post r/prog	0	0	1	5	2,094
score/post HN	0	0	0	0	2,530
score/post r/prog	0	0	1	7	15,385
posts/user HN	0	0	1	1	3,729
posts/user r/prog	0	0	0	0	866
comments/user HN	0	0	1	5	7,464
comments/user r/prog	0	1	2	5	4,679

- Median number of comments per user
 - 1 on Hacker News (q1=0; q3=5)
 - 2 on r/programming (q1=1; q3=5)

- Have something that they consider useful to add
- To start a conversation

MOTIVATIONS TO VOTE

- Main reasons to upvote:
 - Upvote posts that they consider interesting
 - See voting as a way to filter good posts so that other people find them
- Other reasons:
 - To see more comments and discussion
 - To make readers learn something new
 - To have a more complete profile
 - To bookmark a post for later
 - Agree with a comment
 - Make a good point(for posts or comments that go against their beliefs)
- Downvoting is not seen as a common activity, as it may be seen as demotivating
 - When a post or a comment is inappropriate, off-topic, offensive, impolite, or spam

MOTIVATIONS TO READ

- Main reasons:
 - Provide relevant content
 - Make them aware of the trending topics
- Other reasons:
 - To get up-to-date with technologies
 - As a source of ideas for future books, blog posts, and products
 - Also for the discussion that may happen

IMPACT OF THE NEWS AGGREGATORS

News aggregators impact on lives of the participants

1. Valuable marketplaces with good ideas that developers can take advantage of
2. Also afforded our participants different opportunities
3. To evaluate new technologies at work
4. To try technologies they had never tried before
5. To see how other developers are building software and learn from their experience
6. To ask for help
7. To be part of a bigger community
8. Enable people to meet experts from many different fields

2. Characteristics of the content (RQ2)

- a) Characteristics of the content
- b) Overlap and differences
- c) Content reliability

CHARACTERISTICS OF THE CONTENT

a)PURPOSE

- r/programming:
 - Aiming at learning
 - Publicizing software
- Hacker News
 - Publicizing news
 - Announcements of new software versions
 - Asking for feedback, help, and questions
 - Sharing opinions
- Other posts that:
 - Advertising products and services
 - Sharing collections
 - Threat alerts
 - Humor

CHARACTERISTICS OF THE CONTENT

b) THEME

- r/programming
 - 88% of posts being IT-related
 - 74% focused on development, 15% on technology in general, 6% on security, and 4% on artificial intelligence
- On Hacker News
 - 55% of posts being IT-related
 - 48% of them focusing on development, 36% on technology in general, 10% on security, and 7% on artificial intelligence

CHARACTERISTICS OF THE CONTENT

c) TECHNOLOGY

- Related to similar topics
 - Programming/Markup Languages appearing as the most mentioned technologies
 - JavaScript (7.3%) and Java (6.9%) are the most common, followed by C++ (4.8%), Python (4.8%), C (4.4%), and React (3.6%)

d) DEVELOPMENT ACTIVITY

- Classified according to the development activity they are related to
- Most of them are related to
 - Programming activities
 - DevOps
 - Configuration management
 - Testing
 - Design/architecture

CHARACTERISTICS OF THE CONTENT

e) SOURCE

- Blog posts (r/p: 47%; HN: 36%) are the most frequent type of source
 - Majority: personal blogs (r/p: 88%; HN: 87%)
 - Companies' official blog posts (r/p: 12%; HN: 13%) - only a small proportion
- Hacker News - news websites
- r/programming - software project home pages or repositories
- Other common sources:
 - Static web pages
 - Other aggregator posts
 - YouTube videos
 - Q&A sites
 - Wikipedia pages, online courses, crowdfunding platforms, Twitter posts, pictures, online tools, and other subreddits, among others

OVERLAP AND DIFERENCES

- Overlap between the two news aggregators differs:
 - 34% of the posts posted on r/programming were also posted on Hacker News
 - 5% of the posts posted on Hacker News were also posted on r/programming
- Hacker News has more general terms while r/programming is more focused on programming
- General topics:
 - 50% of Hacker News posts
 - less than 15% of r/programming posts
- 54% of our survey respondents agreed -contain different content

CONTENT RELIABILITY

- A known problem in any social network is the number of fake or wrong news
- Observed that such a problem is not perceived by the participants
 - because technical articles are easier to trust
 - bad opinions (and bad code) can be easily identified
 - HOWTOs are straightforward
- read posts and comments with a grain of salt
- None of our survey respondents strongly agreed with the idea of trusting all technical content one can find in r/programming
 - 25% agreed, 24% were neutral, and 51% disagreed

3. Improving the community (RQ₃)

1. Moderation and code of conduct
2. New features
3. The role of karma
4. Pitfalls and advice

MODERATION AND CODE OF CONDUCT

- Suggested different types of moderation
 - To avoid users that are always negative
 - To police (and punish) bad behavior
 - To reduce negative criticism
 - To remove posts that are not entirely focused on programming(in case of r/programming)
 - The introduction of a code of conduct

NEW FEATURES

- News aggregators could provide detailed analytics on their posts as well as on the community as a whole
- Other suggestions:
 - To provide credentials for experts in different fields
 - Add "subreddits" to Hacker News
 - Improve the user interface when it comes to showing large discussions
 - Promote deeper content with more discussions
 - Improve user diversity
- The survey participants agreed with most of these suggestions

ROLE OF KARMA

- For many, karma is not the main reason they post on r/programming
- Indirect effects of karma :
 - A motivating factor for users to participate
 - Users respect other users with high karma
 - Serves as a measurement of how good or interesting that link really is
 - To track relevant users
 - To track what posts attract more attention
 - To be able to create a new subreddit (which requires an undisclosed amount of karma points)
- Survey respondents do not tend to follow users with high karma(only 11% do so)

PITFALLS AND ADVICE

- Most participants advised
 - Should not engage with trolls
 - To avoid being part of flame wars
 - Participants should be positive and always pose opinions constructively
 - Watch for new trends
 - Avoid click baits
 - Read the comments of a good post
 - Post the primary source of the content
 - Be critical when applying something elsewhere
 - Look for the right sub-community to follow and post
 - Should know the rules of their news aggregator

RECOMMENDATIONS

(for software developers and users of news aggregators)

- Incorporate r/programming and Hacker News in the reading activities
 - Efficient way to stay up-to-date
 - Learn about technologies
 - Discuss different points of view on the practice of software development
- Be part of the community
 - Upvotes and comments
- Share findings and new ideas
 - Make sure that the content is coherent
 - Prepared to deal with feedback

RECOMMENDATIONS

(to improve the quality of the services)

- A better moderation system
 - Deal with derailed discussions
 - Avoid single worded comments
- An analytics system for frequent posters
 - Knowing the characteristics of popular posts and the demographics of their readers
- Provide different levels of upvoting
 - Can classify regular, good, and amazing posts

RECOMMENDATIONS

(future work that can be tackled by software engineering researchers)

- Further understand the behavior of developers through news aggregators
 - Provides a first step towards understanding the role of news aggregators
 - As researchers who aim to improve the practice of software development
 - Important to be aware of the discussions on news aggregators
- Study peripheral participation in news aggregators
 - How newcomers (or readers) may move from peripheral to central participation (posters or moderators) to maximize their own and others' learning
- Look beyond formal documentation and Stack Overflow as sources for developer knowledge
 - Suggest researchers to include Reddit and Hacker News in their datasets when studying developer knowledge sources

LIMITATIONS

- Use of news aggregators may vary over time
 - Collected data from 01 January 2016 to 30 April 2017
 - Interviews were conducted in June and July of 2017
 - Results only reflect the use in this time frame
- Cannot be generalized to news aggregators other than r/programming and Hacker News

CONCLUSION

- News aggregators are popular and many see them as essential knowledge resources
 - Lacked insights on the role they play in software development
 - How they could be improved
- To understand more about news aggregators
 - Interviews and survey
 - Characterized developers' motivations for participating, the challenges they face, and the content they read and share
- Programming-related news aggregators form a community of practice for software developers
 - Developers now have a global place to discuss software
- Such discussions are not new and happened before in other sites
 - The size of the community, the scale of the interactions, and the new social features that emerge are disrupting and are likely to going to change how development communities share and shape knowledge