Which social media interactions indicate positive opinions about cited publications? A comparison of user survey and sentiment analysis

Motivation

One of the central questions in Altmetrics study is: which social media actions could be the best signal of positive stance towards scientific outcome? To investigate this question, a two-level study was performed.

- We conducted an online survey and analyzed the results of more than 3,400 participants.
- We performed sentiment analysis of comments in social media platforms. We investigated comments to social media posts (i.e. Reddit posts, YouTube videos, Google posts) that cite scientific articles and the comments section on the PLOS journal webpage.

Experimental Setup

Starting point: exploratory survey on the professional social media usage of researchers.

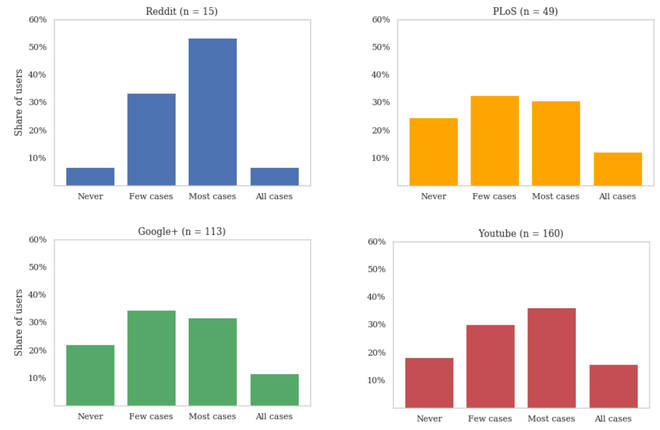
- **Setup**: online survey conducted between March and May 2017.
- **Questionnaire**: ~20 questions on the intensity of researchers' social media usage for work in more than 90 social media platforms.
  - Types of actions: liking, bookmarking, sharing, downloading, writing, commenting and other [overall 107 unique "social media – action" pairs]
  - Question: *„The […] social media-related actions do not always express a positive stance - for example to share a post on Facebook does not automatically mean that the sharer thinks that post's content is highly relevant; it could also be shared because it is perceived as strikingly bad. So, when you are performing the following actions, in how many cases does that indicate a positive stance on the respective target?"*

Survey Results

Survey Statistics

- 3,427 participants (6% response rate).
- **Age**: 19 to 89 years (median 38).
- **Country**: Germany (51%), US (10%), UK (5%) and Italy (5%).
- **Role**: Professors (44%), Research assistant + PhDs (31%) and PostDoc (19%).
- **Discipline**: Economics (60%) and Social Sciences (22%).

In how many cases is a comment sign of a positive stance?



Sentiment Analysis Results

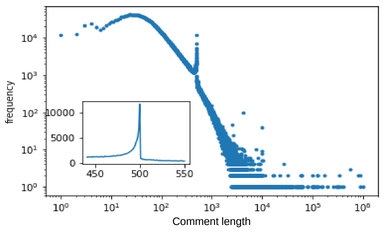
Data statistics

Number of Comments

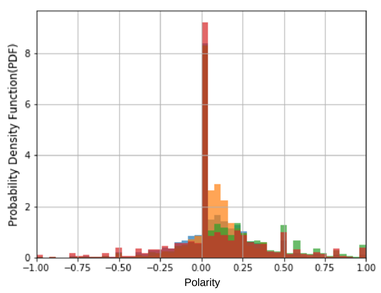
Service	Overall	English	no language
YouTube	**4,336,304**	3,805,983	45,321
Google+	**8,373**	7,509	213
Reddit	**723,360**	716,389	1,550
PLOS	**23,065**	23,014	51
	5,091,102	**4,552,895**	**47,135**

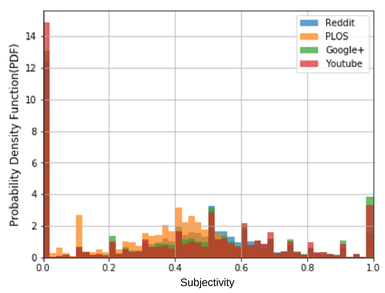
Text Length Statistics

Service	Mean	Median	Max
YouTube	143.08	68	1,000,066
Google+	200.97	84	54,071
Reddit	269.93	131	14,086
PLOS	1062.20	420	5,9884



Polarity and Subjectivity of comments

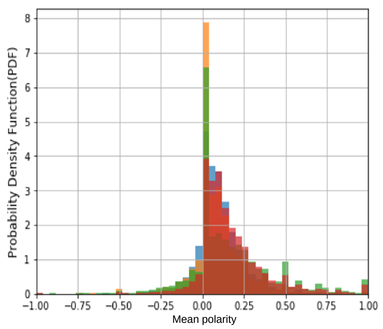


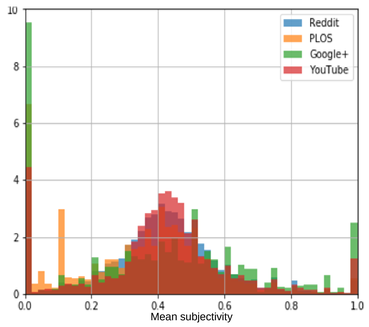


What is the best sign for positive stance?

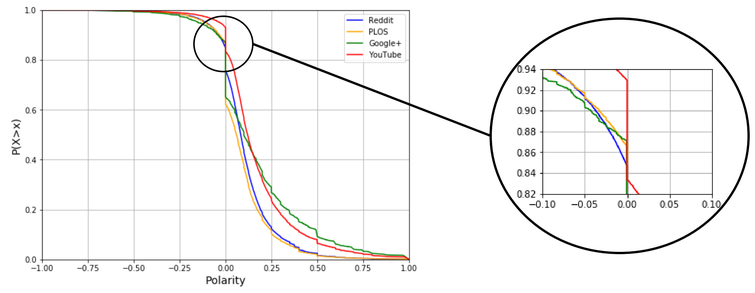
Mean polarity and subjectivity of all comments to a post/video were calculated.

- YouTube and Google+ have higher polarity score on average than Reddit or PLOS Comments
- For only 7% of the videos on YouTube, the mean sentiment among comments is negative.





What is the percentage of posts that are not negative?



Conclusions

- Respondents to the survey usually view more often comments on **Reddit** posts as a sign of a positive stance than those on PLOS, Google+ and YouTube (could also be due to the lower number of people using Reddit).
- The sentiment analysis revealed that **YouTube** videos have the highest fraction of positive sentiments per publication, followed by Google+ comments. Results suggest that YouTube comments counts can potentially be used as an expression of positive stance towards a scientific outcome.
- Further qualitative analysis is needed. The focus groups interviews and comments' text analysis will expand on these findings.

Acknowledgements

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