Please Sign to Save... : How Online Environmental Petitions Succeed

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Abstract

Social media have become one of the key platforms to support the debate on climate change. In particular, Twitter allows easy information dissemination when running environmental campaigns. Yet, the dynamics of these campaigns on social platforms still remain largely unexplored. In this paper, we study the success factors enabling online petitions to attain their required number of signatures. We present an analysis of e-petitions and identify how their number of users, tweets and retweets correlate with their success. In addition, we show that environmental petitions are actively promoted by popular public campaigns on Twitter. Finally, we present an annotated corpus of petitions posted by environmental campaigns together with their corresponding tweets to enable further exploration.

Introduction

The discourse on climate change is often focused on the impact it has on the environment and on wildlife Solomon et al. (2009). To bring these issues in the public spotlight, social media campaigns have proved to be an effective instrument to raise awareness and mobilize masses Pearce et al. (2009). To further push for concrete actions from governments or public entities, many campaigns resort to e-petitioning Mosca and Santucci (2009), whose success is also much easier to assess: reaching or not a required number of signatures. Information about the number of signatures obtained for a given e-petition is often publicly available via e-petitions aggregators websites such as `thepetitionsite.com`, `avaaz.org`, `change.org` etc., and can be used as a proxy for the performance of the public campaigns and petitions themselves.

In this work, we tackle two main research questions.

RQ1: *Which types of the public campaigns use petitions in their agenda?* To answer this question, we study several environmental campaigns than were run in the beginning of 2015, measuring the incidence of e-petitioning as an instrument for campaigning across different types of campaigns (awareness, mobilization). We find that petitioning is particularly important during mobilization campaigns.[1]

RQ2: *What makes a petition promoted by a public campaign successful?* We answer this question by making a feature analysis and comparing tweets that belong to public campaigns to individual tweets. We propose a set of social and contextual features and show how the required number of signatures for an environmental petition is correlated to its outcome. Additionally, we release an annotated corpus with the petitions, their tweets and outcomes[2]. For this study we focus on Twitter, which remains one of the main channels for social media campaigns, also providing relatively easy access to campaign data.

Climate Change Discourse on Social Media. Climate change is a highly discussed topic. Kirilenko and Stepchenkova (2014) overview the climate change domain, its polarization, discussion over time etc. Olteanu et al. (2015) study how various climate related events are highlights by various media sources. Variety of public campaigns use social platforms to increase awareness or mobilize people Mahmud and Gao (2014). Tufekci (2013) describes how the on-line attention can be driven towards particular politicized persona, while Gonzalez-Bailon and Wang (2013) analyse information transmission during protests. Hestres (2013) studies public mobilization and online-to-offline social movement strategies for two major environmental movements. Unlike the prior work, we analyze a over 100 environmental campaigns as well as their effect on the petition success.

Characterizing E-petitions. Various works were conducted to analysis the e-petitions on various petition aggregators. Hale, Margetts, and Yasseri (2013) describe a temporal analysis of 8K petition on the UK No. 10 Downing Street and make an observation towards early signs of successful petition (large number of signatures during the first days). Huang et al. (2015) analyse "power" users that produce petitions. The authors have shown that only 1% of general topic petitions on `change.org` reaches their goal. However, to the best of our knowledge, we are the first to analyze which factors predict the success of an environ-

[1] Mobilization campaigns refer to the campaigns whose primary goal is to engage and motivate a wide range of partners, allies and individual at the national and local levels, towards a particular problem or issue. While awareness campaigns refer to the campaigns whose primary goal is to raise peoples awareness regarding a particular subject, issue, or situation.

[2] https://github.com/toluolll/PetitionsDataRelease

mental petition based on the internal and external attributes of the corresponding public campaign on Twitter. On the other hand, analysis of the e-petitions can be compared to the crowdfunding, since in both fields desired and obtained support can be analysed. Etter, Grossglauser, and Thiran (2013) study various prediction techniques for Kickstarter campaigns. Later, An, Quercia, and Crowcroft (2014) analyse investor activity on Kickstarter and make recommendations of projects based on their activity on Twitter. Unlike aforementioned works, we focus on the climate change and animal welfare petitions, as a part of the environmental public campaigns on Twitter.

In this work, we found that 25% of the petition posted with environmental campaigns hashtags on Twitter obtained their required number of signatures. Moreover, we identify a number of features that can act as indicators for the success of the petitions. This information might be of a great interest to the environmental activists and campaign leaders as it can influence the success of the message they are conveying to the public. It should be noted that the techniques presented below are not restricted to the environmental domain and could be applied to any related setting.

Data Collection, Cleansing and Insights

Our study is based on the collection of roughly 7,500 tweets and retweets belonging to 240 petitions related to campaigns on environmental causes, which were posted from January 2015 to April 2015. Specifically, we consider a tweet to be related to a given petition if it contains the word "petition" in its content. This filter is generic to capture mentions from the tweet text and URL itself while having small ambiguity.

Campaigns dataset and petition tweets: In order to analyze **RQ1**, we have used an annotated corpus of such campaigns for a given period on Twitter[3]. Our campaign corpus consists of 101 public environmental campaigns with over 850K unique tweets. We assume that each campaign has a uniquely identified hashtag, e.g., #saveafricananimals, #tweet4dolphins etc. Moreover, all the campaign hashtags are labeled by (a) a high-level goal, e.g., awareness or mobilization type, and (b) a user engagement pattern over time, e.g., one-day campaigns, ever-growing, annual, inactive[4]. These are the main categories that will be used in our analysis. Among those, "ever-growing" campaigns are the most interesting ones since they have constantly growing number of people that are involved in their action on Twitter.

We extracted all "petition" tweets from the annotated collection of environmental public campaigns tweets. Here we present an example of a tweet with a petition URL: *".@thetimes Petiton: Call for Safer Storage of Nuclear Waste in over 80 USA cities. http://tiny.cc/okzicx #SaveFukuChildren"*. Such tweets were identified in 39 (out of 101) campaigns. 15K tweets belonged to unique unresolved links (excluding tweets with broken links). In addition, we resolved, stored and annotated all petition URLs. As a result, we found 294 unique petition links and 158 broken or outdated links. For valid petition links, we have stored their resolved URL. We further used this information to eliminate URLs that point to the same petition. This process has resulted in 240 unique petitions.

Tweets with petitions: Regarding **RQ2**, it should be noted that the campaign tweets collection does not account for the overall distribution of the petition tweets across the whole Twitter. Therefore, we collected additional data as we describe below. To minimize the bias in our collection, we further collected tweets that contain one of 240 petition via `backtweets.com`. For this task, we used the collection of the extracted URLs with their resolved links (if applicable) and requested `backtweets.com` to return all historical tweets that mention the given URL. Clearly, this still results in only a subset of the petition tweets since it does not account for the URL redirects and shortening. However, we aim for a best effort collection, which gives us a clearer picture on the distribution of the petitions tweets. As a result, we enriched the tweet collection with over 1,700 new tweets without campaign hashtag.

Thepetitionsite.com. To compare campaign petitions with other environmental petitions, we additionally collected all the environmental and animal welfare petitions from the major petition aggregator[5] `thepetitionsite.com` and corresponding tweets from `backtweets.com`. This resulted in over 2'800 petitions with the following properties: (a) 35% of them are successful; (b) 79 of them are in the campaign dataset, (c) 186 of them are mentioned on Twitter with their direct URLs.

Dataset preprocessing To be able to compare petitions with each other, we use both campaign and non-campaign tweets. A petition p is characterized by its signature goal $S(p)$, collected signatures $C(p)$, $SignatureRate = \frac{C(p)}{S(p)}$ and the following set of Twitter related features $T_i(p)$:
(1) Number of unique users posted the petition url; *(2)* Number of tweets with url; *(3)* Number of followers of the users posting petition tweets with/without a campaign hashtag; *(4)* Number of tweets with campaign hashtags vs without.

Petition analysis

Given the list of petitions corresponding to campaigns on environmental issues on Twitter (described above), we first present an analysis on the petitions usage within different types of public campaigns and then analyse petition success by its visibility on Twitter.

Petitions and tweets stats

Table 1 includes the basic figures extracted about our list of petitions[6]. Surprisingly, we notice that failed petitions aimed to gather only about half as much signatures as successful campaings. Furthermore, in our data, about a quarter of the

[3]https://github.com/toluolll/CampaignsDataRelease

[4]Ever-growing campaigns have constantly growing number of users posting with the hashtag. One-day campaigns have the most user activity that happens primarily on the first mention of the hashtag. Annual campaigns are mentioned annually, e.g., yearly, monthly. Inactive campaigns have very low user engagement overall.

[5]Accessed on the 16th Feb 2016

[6]Latest petition signatures reassessment is on 28 Jan 2016.

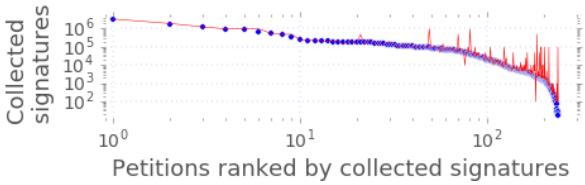

Figure 1: Zipfian for the final number of signatures received by each petition. Red line indicates required number of signatures. The change in the slope of the Zipf's law happens at 1K signatures, i.e., a threshold for a petition to make an impact.

petitions were successful, as opposed to only 1% as found by Huang et al. (2015) across a broader range of petitions. Overall, the tweets corresponding to the successful petitions are more likely to be passed on, i.e., they are retweeted about 4 times more frequently.

After a deeper inspection of the petition collection, we have identified that over 6% of the petitions in our dataset have a low signature goal $S(p)$, e.g., under 1,000 required signatures, out of which 13% are identified as successful. On the other hand, around 50% of the petitions have a high initial goal (over 30,000) among which 35% are successful. Additionally, we have observed 39 petitions to reach over 100K signatures and 130 petitions to collect over 10K signatures. Distribution of the petitions by their collected signatures versus their rank is shown on Figure 1 and follow a Zipf one.

	Successful	*Failed*
Petitions	61	179
Original tweets	601	716
Original tweets users	245	313
Retweets	4828	1451
Retweets users	3965	1207
Median $S(p)$	50000	15000
Median $C(p)$	62997	6226
Petition tweets without campaign hashtags		
Tweets	1054	707
Users	626	472

Table 1: Global statistics of the petition dataset of environmental campaigns. We show the data for the successful and failed petitions, as well as total numbers. Users are unique people who tweeted the petition URLs at least once. $S(p)$ and $C(p)$[8] for successful and failed petitions are highlighted in the table. Additionally, we show statistics of the petition tweets that does not have a campaign hashtag.

Petitions in public campaigns on Twitter

Following subsection provides insights regarding **RQ1**. In our data, with only two exceptions, all the petitions were promoted by mobilization campaigns. The two exceptions are "#talkfracking" and "#worldlovefordolphins", which are both awareness campaigns. Interestingly, these petitions with public campaigns hashtags were directed towards long-term plans, e.g., preventing "covering up" hydraulic fracturing by some organizations, or legalizing hemp farming.

As described in Data Collection section, the campaign corpus is also annotated according to user engagement patterns for each campaign, and consists of four main types: one-day campaigns, ever-growing, annual, inactive. We have found that "ever-growing" campaigns ("#saveafricananimals", "#tweet4dolphins" etc.) are the most active at tweeting about the petitions. The rest ∼15% of the campaigns are mainly "inactive" ("#savethereef", "#votegreen2015"). Not surprisingly, "one-day" campaigns do not tend to use petitions as their instruments since usually it is required to react fast. Among campaigns with petition we also identified one "annual" campaign ("#worldlovefordolphinsday") that is advertising multiple "Protect Dolphins" petitions that tend to have a high failure rate. Overall, there is no clear distinction between campaigns in terms of having dominantly successful petitions. However, mobilization and "ever-growing" campaigns were most active in promoting them on Twitter.

Campaign petitions on Twitter

After data collection, cleaning and preprocessing, we extracted a number of features from the tweets containing a petition URL. This process is explained in Section in detail. To answer **RQ2**, we built a binary decision tree classifier[9] over our petition tweets collection using our set of features.

On average, the tree has a relatively high branching uncertainty factor, however, a few paths were more useful at predicting the petition success. We observe that the higher the signature goal, $S(p)$, of a particular petition, the more likely it is to succeed. In particular, for the signature goal between between 100K and 300K 88% of the petition were successful. However, setting a high petition goal may not guarantee its success. Success might also be correlated with various external factors, i.e., problem that a petition tries to address, external promotion (Facebook etc.), location of the petition owner etc. This observation is opposite to the Kickstarter[10] campaigns Etter, Grossglauser, and Thiran (2013), where failed campaigns have about three times as much goal(money in their case) compared to successful ones.

In particular, over 92% of the petitions with $S(p)$ higher 100K obtained their required number of signatures. Regarding $T_3(p)$, the lower the average number of followers a campaign activist has the less likely the petition is to attain the required number of signatures. Similarly, the higher the average number of followers a user posting the petition URL without campaign hashtags has the more likely the petition is to attain the required number of signatures. We observe that the average number of followers is 10x higher for users outside of the campaign compared to campaign activists.

Further Insights Towards RQ2 Since it is not trivial to provide step-by-step instructions on how to drive your petition towards success in general, we would like to highlight the additional insights from our analysis.

[9] http://scikit-learn.org

[10] www.kickstarter.com

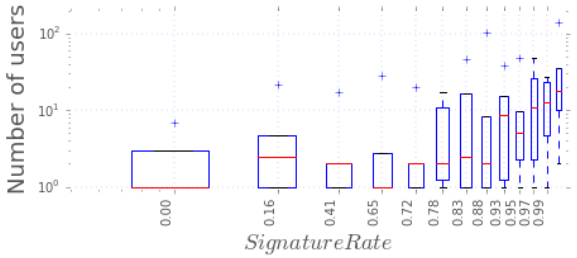

Figure 2: $SignatureRate$ against number of unique users posting about a petition on Twitter.

Does petition success correlate with the number of tweets? - Yes. We observed uniform distribution for the petitions with 0 tweets found on `backtweets.com` in terms of $SignatureRate$. On the contrary, for the petitions with several tweet carrying its direct URL, $T_2(p)$, we observed a very high fraction of successful petitions (88%). Pearson correlation for petitions with multiple tweets is 0.64 with $p < 0.05$. This effect is particularly strong when we consider only retweets or tweets without campaign hashtags, $T_4(p)$. We observed similar behavior for *thepetitionsite.com*.

Does the number of users posting about the petition affect its success? - Yes. We binned the petitions from the campaign corpus based on the $SignatureRate$, and extracted the average number of unique users posting about the petition in each bin. Figure 2 shows a boxer plot with 25th, 50th and 75th percentile for each bin. As a result, Pearson correlation is over 0.7 for the bin mean values ($p < 0.003$).

Is it common to post (a) identical tweets without acknowledging original tweets or (b) retweet? - Retweet. In our petition tweets dataset we have not identified any duplicated tweets, i.e., tweets that are identical. Moreover, as it is shown in the Table 1, a number of retweets for the successful petitions is several times greater than the failed ones.

Which word features are more representative for tweets with successful petitions? - Uppercased. We discovered that tweets with successful petitions have more words and uppercased words on average, by 9% and 12% correspondingly. We compared the distribution of the uppercased words between the collections of successful and failed petitions by computing the relative change for each word. We define it as follows: $RelativeChange = \frac{W_{succ} - W_{fail}}{W_{fail}}$, where W_{succ} and W_{succ} are the term frequencies of uppercased word W for tweets with successful and failed petition. Top words from the successful collection: "ACTION", "URGENT", "WAZA", "PETITION", "SIGN", while failed ones did not uppercased those at all.

Conclusions

In this paper, we introduced a dataset of environmental petitions that were promoted by major environmental campaigns on Twitter. We studied the use of petitions as one of the instruments of a public campaign. We proposed a model to identify successful petitions and highlighted the main aspects to obtain the required number of signatures. Although our dataset is limited in size, we could observe the petitions spread within the environmental campaigns and identify the major factors that lead to the success of the petitions. Our findings provide helpful directions for all public campaigns, its participants, petition initiators and signers.

We plan to enhance the petition dataset by repeating the collection process over a larger timespan. Another interesting future direction is to study the user aspect of the petition promoters on Twitter. In particular, we would like to identify the relations between petition signers and users who promote petitions on Twitter. The main difficulty here is to obtain this information for a large number of petitions.

In this work we quantify the positive effect of the intense petition promotion on Twitter, e.g., high number of retweets, unique users, user followers and attention uppercased words correlate with the success. The next step would be to explore time series properties of signatures, as well as to give actionable feedback on how to increase the number of signers.

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