Araştırma Makalesi - Gönderim Tarihi: 13.09.2019; Kabul Tarihi: 01.04.2020

A TWITTER-BASED ANALYSIS OF HASHTAG AND MENTION ACTIONS AS AN INDICATOR OF TURKISH GENERAL ELECTIONS' OUTCOMES

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Abstract

Social media provides a large-scale data that have substantial prospective to define collective actions such as social trends, political participation and complex phenomena in real world. When people use these channels, they leave a huge amount of digital trace that can be easily reached by researchers. This digital trace bestows us a unique possibility to observe and reveal collective actions at unpreceded measures. In this research, we have aimed to test if the daily Twitter activities (tweet, retweet, mention) can serve as a significant indicator regarding Turkish election results, an argument already engaged in previous studies. To test it, we have applied a method that was developed by Eom et al. (2015) based on daily tweet volume to predict the ranks of variables. We have used the fluctuations of daily tweet volumes in order to find the optimal time frame for predicted ranking of parties and candidates. We have concluded that some of our results overlap with previous studies. The correlation between the daily attention volume on acquired in this study and the election results –even though it does not directly impact the election results– shows Turkish Twitter data can be used as a proxy tool.

Keywords: Election, Political Communication, Political Participation, Attention, Social Media, Turkey

Atıf: Abanoz, E. (2020). A Twitter-Based Analysis of Hashtag and Mention Actions as an Indicator of Turkish General Elections' Outcomes. Akdeniz Üniversitesi İletişim Fakültesi Dergisi, 33, s. 73-90

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TÜRKİYE GENEL SEÇİM SONUÇLARININ BİR GÖSTERGESİ OLARAK HASHTAG VE MENTION EYLEMLERİNİN TWİTTER TABANLI ANALİZİ

Öz

Sosyal medya; gerçek dünyadaki sosyal eğilimleri, siyasi katılım ve gösteriler gibi kolektif eylemleri tanımlamak için önemli ve geniş çaplı bir veri sunmaktadır. İnsanlar bu kanalları kullandıklarında, araştırmacılar tarafından kolayca ulaşılabilecek büyük miktarda dijital iz bırakmaktadırlar. Bu dijital iz, kolektif eylemleri gözlemleme ve ortaya çıkarma konusunda araştırmacılara eşsiz bir imkân sunmaktadır. Bu araştırma, günlük Twitter aktivitelerinin (tweet, retweet, mention), birçok çalışmada ele alındığı gibi, Türkiye seçim sonuçlarına ilişkin önemli bir gösterge olup olmadığını test etmeyi amaçlamıştır. Bunu test etmek için, Eom ve arkadaşları (2015) tarafından günlük tweet hacmine dayalı olarak değişkenlerin sırasını tahmin etmek için geliştirilen bir yöntem seçilerek uygulanmıştır. Partilerin ve adayların tahmini sıralamasında en uygun zaman aralığını bulmak için günlük tweet hacimlerindeki dalgalanmalar kullanılmıştır. Çalışma sonucunda, elde edilen sonuçlardan bazılarının önceki çalışmalarla örtüştüğü görülmüştür. Bu çalışma sonucunda elde edilen günlük ilgi miktarı ile seçim sonuçları arasındaki korelasyon –seçim sonuçlarını doğrudan etkilemese de– Türkiye'de Twitter verilerinin bir gösterge olarak kullanılabileceğini göstermiştir.

Anahtar Kelimeler: Seçim, Siyasal İletişim, Politik Katılım, İlgi, Sosyal Medya, Türkiye

Introduction

Social media provides a large-scale data that have substantial prospective to define collective actions such as social trends, political participation and complex phenomena in real world. Web-based services and social media have changed the process of interacting with others, making relationship and acquiring information for people. When people use these channels, they leave a huge amount of digital trace that can be easily reached by researchers. This digital trace bestows us a unique possibility to observe and reveal collective actions at unpreceded measures. One of the most important

collective attentions in social media can be seen during electoral campaigns which are a period that political parties and their supporters try to maximize the influence of their messages over voters. Researchers show that citizens are in tendency to expose more political discussions on social media(Brundidge, 2010).This situation leads online selective exposure, inescapable facing of different views and disappearing the space between political and apolitical communication. The digital trace of these actions can be used as a social sensor to forecast the outcomes of electoral campaigns or elections.

Creating data for political parties and politicians in social media can be heuristically conceived as if people's attention to them. Notwithstanding, it cannot guarantee that all this attention can be interpreted as a support for parties or politician in elections. In this case, it is important to analyze the dynamics of collective attentions towards political parties and politicians in social media. Also, it is showed that in some cases the signal of social attention is related by election results, but the reliability of this relationship has to be evolved(Gayo-Avello, 2013). In this stage, it is important to separate the signal from the noise on social attention. For this purpose, we have aimed to test if the daily Twitter activities (tweet, retweet, mention) can serve as a significant indicator regarding election results, an argument already engaged in previous studies(Borondo, Morales, Losada, & Benito, 2012; DiGrazia, McKelvey, Bollen, & Rojas, 2013; Caldarelli et al., 2014; Eom et al., 2015). To locate the correlation between daily Twitter activities and election results, we have applied a method that was developed by Eom et al. (2015) based on daily tweet volume.In their quantitative method, the consecutive daily tweet volumes were used as a proxy of collective attentions to political parties. After collecting the consecutive daily tweets volumes, Eom et al. (2015) checked the distribution and correlation of volumes to separate noise from data in the fluctuation. And in our research, we utilized the very same equation as they used in this process.This method helped lead us to the predicted ranking of parties. We have used the fluctuations of daily tweet volumes in order to find the optimal time frame for predicted ranking of parties and candidates.

The research questions of this study are defined such as;

RQ1: Can Social media attention on Twitter be a proxy for Turkish elections' outcomes like other countries examples?

RQ2: Can actions such as hashtags2 and mentions3 on Twitter result different proxy results for Turkish elections' outcomes?

Finding the answers for them, it was worked on three different election that are based on different proxies for collective attention during election period. The first proxy that we used had multiple hashtags that are made up off political parties' and their leader names, and election campaigns' slogans during the general election in 2015. The second proxy has only #yes and #no hashtag that enables to analyze each side of constitutional referendum in 2017. The third proxy consists of mention actions for each presidential candidate during presidential and general election in 2018.The list of hashtags and usernames that are used for each proxy can be found on the Table 1 in method section.

In the literature, there is a growing attention on the relation between social media and electoral outcomes. The originality of this work is to shed light on the two new aspects of the subject by focusing on the consecutive elections (in one country) and different actions such as using hashtags and mentions. This approach allows us to deeply analyze the relationship between social media attention and elections outcomes.

1. Social Media and Political Participation

Social networks are pathways that help people's decision-making and cooperation processes by flowing information among people. Hence, they connect disparate people who might have similar world views. Advances in computing power and new social technologies have only recently facilitated the development of forms of networked communication that are automating and accelerating the social signals that pulse through the human network on a daily basis (Aral, 2012). How and what extent do the flow of these signals –tweets, likes, shares and so on– show people's decision?

There is a considerable amount of research on this question as well as on social media data. Borondo and colleagues (2012)analyzed user activity on Twitter, during the 2011 Spanish presidential electoral process and found that such activity is correlated with

2 Hashtag symbol (#) is a metadata tag on social media to categorize the social media activities on a specific theme or concept. Users can use the hashtag symbol anywhere in text.
3 Mentions symbol (@) is a metadata tag that is immediately followed by user's name on social media to refer or add another user into the conversation or content.

the election results. They introduced a new parameter called Relative Support (RS) – an indicator of the comparative strength of the two political parties or candidates– to study political sentiment on Twitter. Although they cannot make certain that the campaign on Twitter determined the election outcomes, their results suggest that there is a strong correlation between the activity taking place on Twitter and the election results. Caldarelli et al. (2014)confirms this finding in their research where they used the RS method to present a multi-scale analysis of the Twitter evolution in the period before the 2013 Italian general election. In their analysis, they are able to detect a strong presence of the Movimento 5 Stelle (M5S) party in Twitter space and the relative weakness of the Scelta Civica (SC) party. The SC party came in the 4th place while the M5S won the 2013 election. This indicates there is a correlation between the party's Twitter activity and the election results. Caldarelli and colleagues also analyzed the relationship between Twitter usage and the election results by breaking Italy down into three macro-areas (North, Center and South). A strong correlation was found between the election vote ratio and the volume of tweets on each parties' leaders at the macro-area level.

DiGrazia et al. (2013)worked on 2010 and 2012 U.S. Congressional elections and showed that there is a statistically significant relationship between tweet volumes and electoral outcomes. They retrieved a random sample of around 547 million tweets posted between August 1 and November 1, 2010 and around 3 billion tweets posted between August 1 and November 5, 2012. They created Twitter variables constructed from the number of tweets that contained the Republican and Democratic candidates' names. They also collected 2010 and 2012 election outcomes, socio-demographic and electoral control variables. They used these variables in three ordinary least square regression (OLS) models (DiGrazia et al., 2013). Their results indicate that even without sentiment and geo-locational analyses, the amount of attention received by a candidate on Twitter can be used as an indicator of voter behavior.

Bond and colleagues (2012) used a randomized experiment during the 2010 U.S. Congressional Elections —involving 61 million people on Facebook— and the results show that these messages directly influenced political self-expression, information-seeking and real-world voting behavior. Their results suggest that the social signal increased turnout directly by about 60,000 voters and indirectly through social

contagion by another 280,000 voters. It also suggests that strong ties are instrumental for spreading both online and real-world behavior in human social networks.

Eom et al. (2015) studied daily tweet volumes of political parties and their connection to a party's proxy of collective attention by looking at three elections: European Parliament election of 2014, Italian general election of 2013 and Bulgarian general election of 2013. For these three election cases, they tried to obtain an indication on the election outcomes simply by considering daily tweet volumes of political parties and the results. These have shown that the observed fluctuations in volumes can distort both the predictions of parties' rankings and the prediction of parties' actual votes in the elections. They identified the tweet volume is a good indicator of parties' success in the elections when considered over an optimal time window that reduces the fluctuation.Didier Grimaldi(2019)worked on the 2019 Spanish presidential election and the result of study shows thatTwitter informationcould be converted into a performant tool so that it could organize digital department of the candidates to help clarify the impact oftheir messages on the future voters.These studies suggest that social media provides an adequate data that can be used effectively as an indicator on election outcomes.

Another reason for the proliferation of researches that focus on the relationship between politics and usage of social media platforms is that political actors increasingly utilize social media platforms as campaigning tools during elections (Bossetta, 2018; Caetano, Lima, Santos, & Marques-Neto, 2018; Franco-Riquelme, Bello-Garcia, & Ordieres-Mere, 2019; Gaumont, Panahi, & Chavalarias, 2018). Twitter that is one of them is broadly used to express political view by users and is assuming important roles in politics (McGregor, Mourão, & Molyneux, 2017). Candidates, parties and users prefer to disseminate their ideas through Twitter during the election times (Baviera, Sampietro, & García-Ull, 2019).As the study of Barberá and Rivero (2015) showed, the political view of individuals who actively participate in the Twitter conversation is positively affected. Because of these, this study is designed and focused on Twitter activities during the election times.

2. Method

The analyze method on this paper is based on the fluctuations that were observed during election periods. The evolution of fluctuation which can be interpreted as a daily attention volume of users' towards to a party, side or candidate can be described by means of Brownian4 motion(Metcalfe, Speetjens, Lester, & Clercx, 2012).This motion can be measured by the ratio of two consecutive daily attention volumes. We consider distributions of daily attention volume V_p for each day during the data collection period. Data should follow log-normal distribution to provide relevant information about election results. To test this assumption, we check if the logarithmic ratio follows a normal distribution. Afterwards, to find an optimal interval in order to clearly see the daily attention volume's prediction power, we apply method that considered the attention volume $\overline{V}_p(\lambda)$ of a party, side or candidate $p$averaged from the day before the election to |λ| days before.

In this study, we prefer to use a social media data that were collected from Twitter and there are two main reasons behind this decision. The first one is that with over 11 million active users, Turkey has one of the highest rates of Twitter usage in the world (Minto, 2013). The second one is that social media usage is rather political in Turkey according to Pew (PEW, 2012; Budak & Watts, 2015). 57% of social media users in Turkey share their views about politics in social networking sites, compared to a median of 34% across the globe.

We have collected tweets during the election days that are publicly accessible and that contain hashtags or mentions of parties' and their leaders' names as well as election campaigns' slogans with the stream option of Twitter's Application Programming Interface (API). We collected data for Turkish General Election 20155 (E15), Turkish Constitutional Referendum 2017 (R17) and Turkish General Election 2018 (E18).Table 1 contains the list of the political parties' names, leaders' names and election campaigns' slogans that were used during the three general elections.

4 Brownian motion is the stochastic motion of particles induced by random collisions with molecules and becomes relevant only for certain conditions.
5 Two general elections were held in Turkey in 2015. The first one on June 7, 2015 and the second one on November 1, 2015. This study only focuses on the first election.

Table 1. The list of hashtags and usernames for each election

	AKP	CHP	HDP	MHP
E15	#akparti #onlarkonusurakpartiyapar #ikinciyaribasliyor #basbakandavutoglu #akp #milletgeliyor	#chp #yuzyilinprojesi #yasanacakbirturkiye #kilicdaroglu #oyveringitsinler	#hdp #demirtas #bizlermeclise #senibaskanyaptirmayacagiz #bizlerhdp	#mhp #bizimleyuruturkiye #mhpgeliyor #devletbahceli #oyummhpyecunku
R17	YES #evet	NO #hayir		
E18	Recep Tayyip Erdoğan @RT_Erdogan Meral Akşener @meral_aksener	Muharrem İnce @vekilince Temel Karamollaoğlu @T_Karamollaoglu	Selahattin Demirtaş @hdpdemirtas Doğu Perinçek @Dogu_Perincek	

These three elections are really important for Turkish political life. The most important result of E15 is that the Justice and Development Party (AKP), which has been holding majority position in the parliament since the 2002 general election, for the first time, has lost its parliamentary majority with 40.87% of the national vote and 258 seats –18 seats short of accomplishing single majority. On R17, people vote #yes or #no on constitutional amendments that would change the parliamentary democracy into a presidential system. It is the most significant change since the Turkish Republic was declared in 1923. E18 is the first election that hold presidential and parliamentary election in the same time after the system was changed from a parliamentary democracy into presidential one. People vote for 6 candidates to select the first elected president of Turkey.

The first day of data collection for E15 was May 8th, 2015 and the last day was June 7th, 2015. We collected data that is made up off 3,632,246 activities that are produced by 636,955 unique users. The data collection period for R17 was between March 16th

and April 16th, 2017. This data collection has 3,103,639 observations that were produced by 458,643 unique users. The E18 election data was collected between June 1st and June 24th, 2018. Between these dates, 3,527,398 activities that were produced by 462,910 unique users were collected.

The limitations of this research are about the Twitter rate limit and the focus on the volume of activities. The stream option of Twitter's API has a rate limit which is around 500 tweets for each minute. Because of that limit, if there is a higher activity than this rate, then one cannot get to the part which is over the rate limit. We only focused on the volume of activities and it is independent from the characteristics of the shared contents such as context and emotion of activities.

3. Findings

As shown on Fig. 1, in the time series of daily attention volumes, there are strong fluctuations before the election days. Some of these fluctuations match with the time of a new slogan's launch. This shows that twitter users pay attention to these parties' campaigns during election season. In addition, there are also other peaks, which indicate that daily attention volume can be affected by other factors such as the topics of political agenda, economy and speculation.

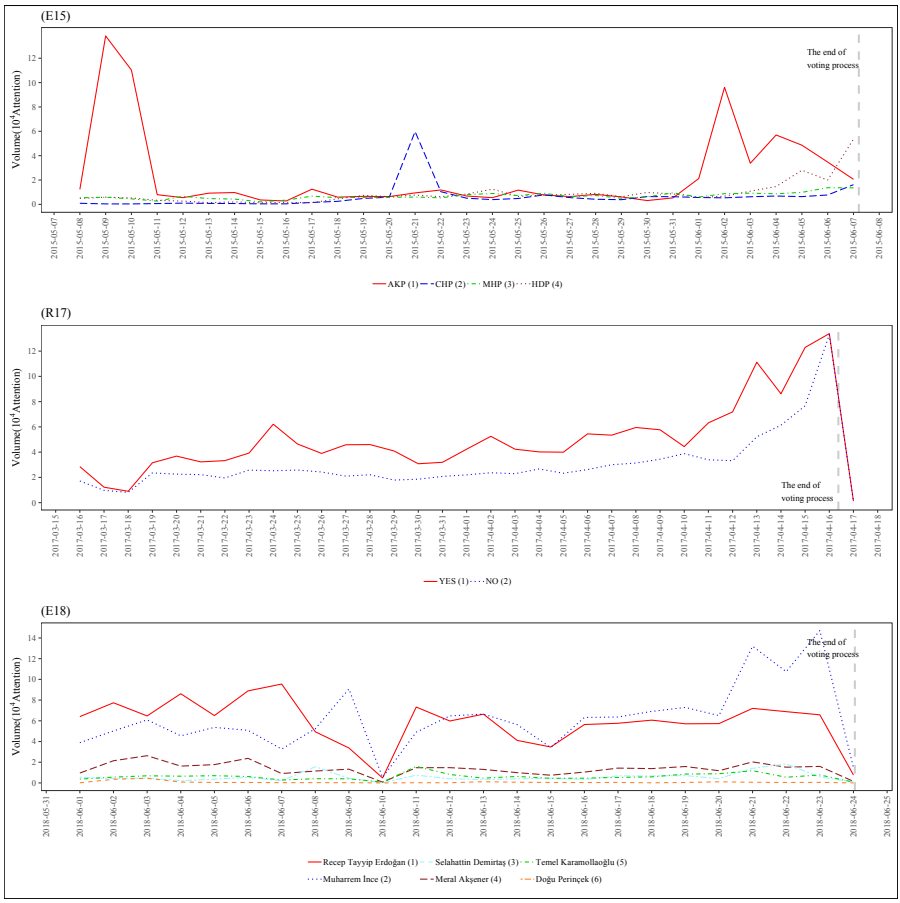

Figure 1. Daily attentions volume for each election. The ordering of parties, sides and candidates (the number in parentheses) are based on actual election results of them. Gray dashed line shows the end of the voting process on each election day.

When we look into the high peak points on Fig. 1 Panel E15, the fluctuation on AKP's daily attention volume, on May 31st, has been observed because it has fallen on the second anniversary of the Gezi Events. Hashtags such as gezi2yaşında(literally Gezi is 2 years old), Ali İsmail Korkmaz6, GeziyiUnutma (literallyNever Forget Gezi) and GeziyiHatırla (literallyRemember Gezi) have formed these peaks. Similarly, the fluctuation on People's Democratic Party's (HDP) daily attention volume, on June 5th,

6 During the Gezi protests in the city of Eskisehir, a university student was clubbed to death.

has been observed because of an explosion occurred during an HDP meeting in the city of Diyarbakır. Such fluctuations seen on these daily attention volumes, prove that they get influenced by sensational events. In addition to this, the peak points of daily attention volume on pre-election days match with the parties' new election slogans. Fig. 1 Panel E15 shows thatthe peak on Republican People's Party (CHP) experiences between May 17th and May 24th happens due to the launch of their slogan The project of the century.

When the high peak points are examined on Fig. 1 Panel R17, the fluctuation on #yes's daily attention volume, on March 24th, has been detected because of that new hashtag which is Güzel Bir Geleceğe Evet (literally Yes for a beautiful future) was emerged.Similarly, the fluctuation on #no's daily attention volume, on May 16th, has been observed because of a new hashtag that is YarınHayırÇıkacak (literally No Will Win Tomorrow) sprawled before the end of voting process. This situation shows that both #yes and #no side have tried to affect citizens' decisions via collective actions with creating new hashtags.

When the high peak points are considered on Fig. 1 Panel E18, the fluctuations on daily attention volume of candidate, especially Recep Tayyip Erdoğan and Muharrem İnce, coincide with appearing of candidate on mass media and their rallies. The fluctuation on Recep Tayyip Erdoğan's daily attention volume, on June 7th, has been detected because he attended a television program that is a partner broadcast of Turkish CNN affiliate, CNN Türkand KanalD. The significant part of the messages is related with paid military exemption bill. In a similar way, the fluctuation on Muharrem İnce's daily attention volume, on June 21st, coincide with his huge rally in city of İzmir. This is the largest rally that held by him during the election period and it is broadcasted by televisions. As mentioned before, this data is based on the mention activities towards each candidate and all these examples clearly show that there is a relationship between the visibility of the candidate and the peak points on his/her daily attention volume.

These strong fluctuations on Fig 1 have made it harder for us to predict the ranking of these parties, sides and candidates. Thus, we need to apply equation that shows the relation between predicted ranking and real election outcomes. But before applying it

to determine of optimum interval, we should check whether the data follows a normal distribution.

To check if the logarithmic ratio follows a normal distribution, we apply this equation:

$$r_p(t) = log\left(\frac{V_p(t+1)}{V_p(t)}\right)$$

where r is logarithmic ratio, t is the day and $t+1$ is the two-consecutive attention volume of the party, side and candidate (Eom et al., 2015, p. 9).We can see the cumulative distribution functions of r for each party, side and candidate (A, C, E) and their normal distribution on Quantiles-Quantiles (Q-Q) plots (B, D, F) in Fig 2. Q-Q plots demonstrate the logarithmic ratio $r_p(t)$ possesses normality as the points mostly lie on the y=x line.

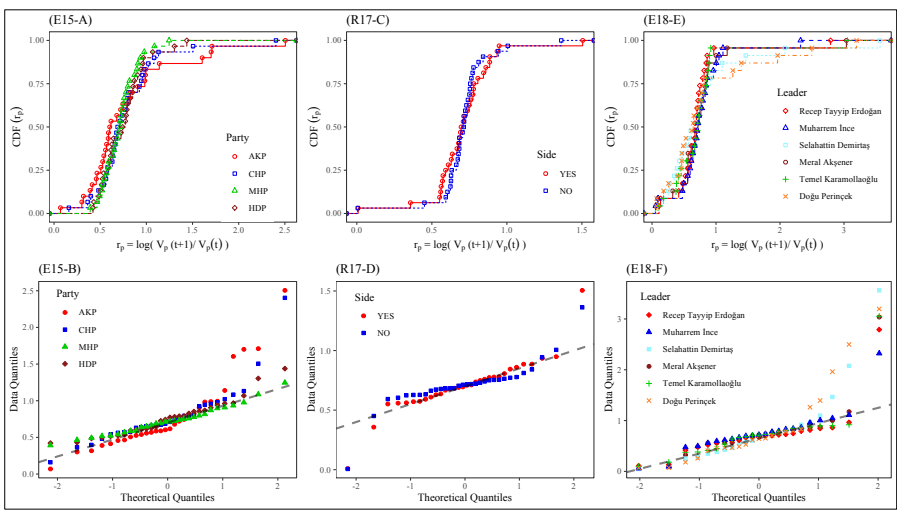

Figure 2. Normality of the logarithmic ratio $r_p(t) = log(V_p(t+1)/V_p(t))$ of two consecutive attention volumes of party, side and candidate p. Cumulative distribution functions (CDF) of the log ratio are represented A, C and E, and Q-Q plots of log ratio $r_p(t)$ are also represented in B, D and F.

As it seen in Fig. 2 Panel B, D and F, the logarithmic ratio follows a normal distribution so we can find an optimal interval in order to clearly see the daily attention volume's prediction power. For this, we apply method that considered the attention volume $\overline{V}_p(\lambda)$

of a party, side or candidate $p$averaged from the day before the election to |λ| days before as follows (Eom et al., 2015, p. 13):

$$\bar{V}_p(\lambda) = \frac{1}{|\lambda|} \sum_{t=t_e-|\lambda|}^{t_e-1} V_p(t)$$

Here t_e is the election day, λ is the negative integer, and |λ| is the absolute value of λ that represent the number of days to wait for election day (i.e., $\lambda = -6$ means six days before the election day). Fig. 3 displays the raking of parties, sides and candidates ordered by $\bar{V}_p(\lambda)$ for each time interval from day before the election to the |λ| days before election.

When Fig. 3 is examined, it is seen that only two of three election processes have optimum interval. In E15 case, the optimal length of accurate prediction is around 7 days that are from $\lambda = -16$ to $\lambda = -9$. This optimal interval is very close to the results obtained in the previous study(Eom et al., 2015).This result shows that using multiple hashtags provide a good proxy for election results. In R17 case, the optimal length of accurate prediction is around 30 days that are from $\lambda = -30$ to $\lambda = 0$ which is really long as never before. This data frame is also made up off hashtags but in this case, there are only two hashtags which are #yes and #no that are related with the referendum sides. When R17 and E15 results are evaluated together, it is concluded that the daily attention volume has more predictive power when there are only two options. This situation can be interpreted as the social signals that pulse through the social media on a daily basis become more distinguishable and measurable in the case of when society divided between two options. In E18 case, the optimal length of accurate prediction is 0 day. This data is based on Twitter mentions for each candidate and this result shows that mentions aren't a good indicator as much as hashtags.

Although it is observed that the signals that people create on social media for the candidates do not overlap with the results of the election. There can be many different reasons for this situation but from in this research in this study we can say that there is a relationship between daily attention volume of candidate and his/her appearance on television or in a rally. The most important findings that support this idea are that SelahattinDemirtaş, the presidential candidate of HDP, is in prison so he couldn't get

enough chance to arrange a rally or go on television as much as other candidates. As a result of this circumstance, there may be a significant difference between the vote rate and the level of attention during election period. When we examine Fig. 3 Panel E18, we can see that there is change on the predicted order of Dermitaş from $\lambda = -16$ to $\lambda = -14$ and the reason for this situation is the campaign that is organized by HDP on Twitter. During this campaign, the hashtag Demirtaş'aSoruyorum (I am asking to Demirtaş) has gotten attention from social media users. This condition is also supporting the relationship between daily attention volume on social media and appearance on television or rally. We should point out that in-depth examination of this relationship is beyond the scope of this research.

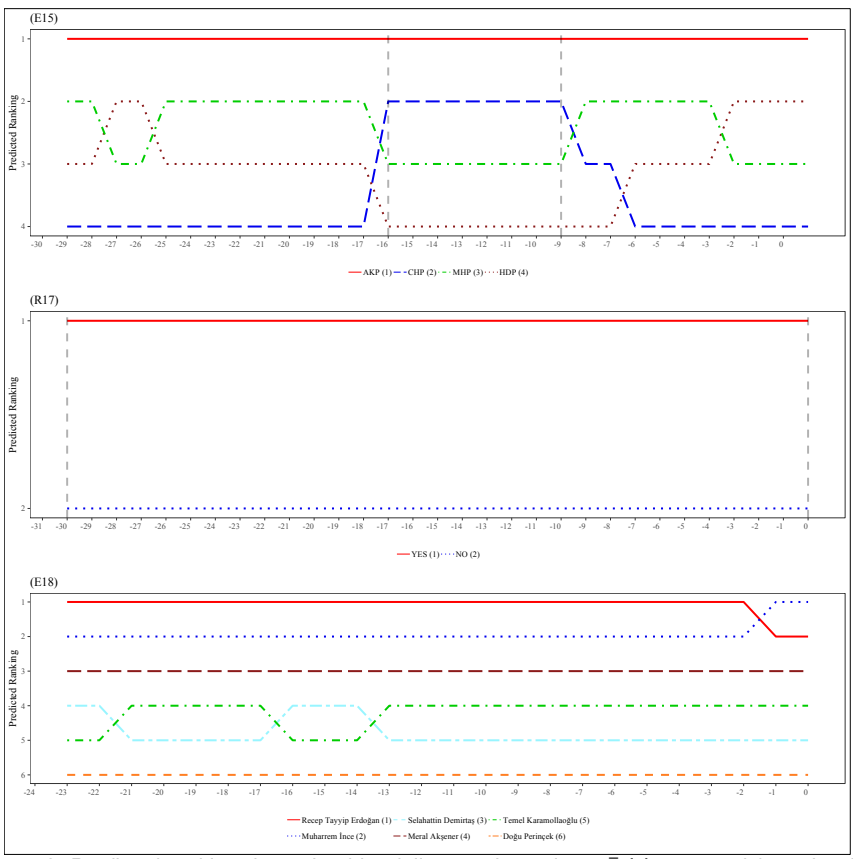

Figure 3. Predicted ranking determined by daily attention volume $\overline{V}_p(\lambda)$ averaged from the day before the election to the t days before the election. The numbers in parentheses represent the

actual rankings of the parties, sides and leaders in the elections. The optimal time interval is located between the gray horizontal dashed lines.

Conclusion

Social networks are communication pathways that somehow connect people (Ferguson, 2013, p. 10). Therefore, users are influenced by the expressive ones who are connected to each other within the same network (Romero, Galuba, Asur, & Huberman, 2011; Bond et al., 2012; Kwon, Stefanone, & Barnett, 2014; Lee, Choi, Kim, & Kim, 2014; Varol, Ferrara, Ogan, Menczer, & Flammini, 2014). This notion makes it possible to project a correlation between the volume of network activities and the election results(Borondo et al., 2012; Caldarelli et al., 2014; Eom et al., 2015). In this paper, the correlation between three elections outcomes in Turkey and the users' activities on Twitter have been studied and we have concluded that some of our results overlap with previous studies. The correlation between the daily attention volume on acquired in this study and the election results –even though it does not directly impact the election results– shows Turkish Twitter data can be used as a proxy tool.

We can conclude particularizing the main outcomes of this research that are different from other studies. This study focuses on multiple elections in the same country on different timeframes. More importantly, we use different proxies for each election to understand that how the result will be affected depending on the change of indicators that are used to determine social signals. Our research result has shed light on that a single hashtag provides a better accurate interval for election outcomes than multiple hashtags. At this point, it should be noted that the strength of the social signal in the presence of two options is much stronger than in the case of multiple options. As a natural result of this situation, accurate interval on two option case are longer than the accurate interval on multiple options case. The study also highlights that different proxies lead a variety of accurate interval for election outcomes. Hashtags provide both similar results that is obtained previous studies and longer accurate interval result unpresented. Mention activities on Twitter could not show an accurate interval for election outcomes.

Indicating of constraints of the study is an important element for the evaluation of the results. We haven't interested in meaning of message and sentiment analysis can be applied on social media prediction research as an indicator of voters' sentiment towards candidate, sides and parties. We only have some part of total activity on social media and furthermore we have only gotten activities from citizens who are active during the election periods.

Funding

I gratefully acknowledge the support of The Scientific and Technological Research Council of Turkey (2214-A).

Acknowledgments

The author thanks DiMeNet Research Group at Annenberg School for Communication, University of Pennsylvania and SMAPP Research Group at New York University for providing support to data collection in the present study.

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