Sentiment Analysis of Twitter and How it Relates to Illini Football

STAT 385 FA2018 - Team Poisseidon

Joe Broton - jbroton2
Braden Gebavi - gebavi2
Brad Gibbons - btgibbo2
Tim Soo - soo3

November 13, 2018

Abstract

The purpose of this project is to explore sentiment analysis of twitter and how it relates to the illini football team. We will be analyzing the tweets from 12/07 to 12/17 with keywords that we thought depited tweets that a Fighting Illini Fan would include. This is in order to see how fans and students view the illini football team and their opinions on Lovie Smith. Lovie Smith has a 6-year contract with the Illini and after 3 years we have failed to make a bowl game.

Contents

1 Introduction

The topic we are addressing is sentiment analysis on live Fighting Illini Tweets. The idea is to analyze live tweets with sentiment analysis in order to further understand people's reactions to the Fighting Illini and Coach Lovie's performance. This particular topic arised naturally from our school and personal enviroments. Given his previous success with the Chicago Bears up north, we hoped Lovie Smith would be the change needed. However, after the Fighting Illini's defeat against the Iowa Hawkeyes, 63-0 and the last game's loss against Northwestern 24 - 14, we wanted to test our suspicions if students/fans were as displeased with the team on Twitter as they are in the conversations we hear around campus.

Initially, there seemed to be a buffer period in the first few seasons where the fans gave him the benefit of the doubt, as naturally, people believed it was just going to take some time getting used to the college scene, but we have a feeling that period may be over and fans' patience are wearing thin. We wanted to see fans sentiment on twitter after news of receiving Lovie Smith has been extended two more years ("Illinois Extends Contract of Football Coach Lovie Smith," n.d.).The current generation of students at Illinois probably remembers Lovie for being the coach that led the Bears to their second ever Super Bowl in 2006 so it is interesting see what kind of reactions fans are tweeting about him now that he is struggling to revive the university's football program. If the struggles continue, there is an expectation that he will be replaced.

Our data is a collection of 908 live non-retweeted tweets from Fighting Illini Fans ranging from 12/07 to 12/22. We will be analyzing the data through sentiment analysis. Sentiment analysis requires an understanding of Regex. The reason for this, is to identify patterns, and using these patterns to extract specific portions of tweets that we would like to analyze. Furthermore, Regex helps us also to split and mutate certain tweets, that can further be compared to our positive, negative, and neutral words.

We also will be applying more recent topics, such as RShiny, that allows interactivity with user input. Our RShiny app allows for the user to view our original data set, along with the ability for the user to extract twitter data using their own api access tokens.}

2 Related Work

Noel Bambrick extracted 2.2 million tweets from super 51 and ran sentiment analysis.. It is a very similar idea to ours as it monitors tweets focusing on the volume, sentiment, and team specific fan reactions. The difference with our idea is that we are only analysing the tweets for one team. In this study, he wanted to find out who twitter thought was going to win the game based off of real time tweets throughout the game but in our study we are just focused on the Fighting Illini fans opinions of the team and Lovie Smith on Twitter. He used the AYLIEN Text Analysis API which you have to pay for. Our access from the standard free Twitter API is 250 tweets per query. Our We are using ggplot2 to visualize our data and Noel used Tableau.

We also looked at a sentiment analysis project wherein tweets regarding the Colorado Floods were analyzed. We used this as a baseline for how a good sentiment analysis project should look. In accordance with that, we looked at multiple articles describing the general process of collecting tweets through R and Twitter's API.

We also used information from the "Text Mining with R" book in which different general-purpose lexicons categorized words under different sentiments, giving us more precise data than if we created our own lexicon.

3 Methods

In order to run sentiment analysis, we will first need to collect the data set. To do this, we need to use the 'searchTwitter' function using the 'twitteR' (Gentry 2015) package. Using this function allows us to to search through tweets with keywords that we feel Fighting Illini fans would include within their 140 character limit tweet. The key query terms we searched for were 'lovie smith', 'illini football', 'loviesmith', 'illinifootball'. The search function when you include a space, makes sure that both words are included in the tweet. By removing the space between the keywords, it allows us to be able to search for that extract phrase which means we pulled tweets with that extract phrase and those with the hash tags associated with the phrase (i.e. #loviesmith, #illinifootball).

Our way to approach the word summary was to split each tweet into individual words. In order to clean the data we had to use the stringr (Wickham 2018) package's function of str.split in order to clean up the data by removing unneccesary special characters, and links by various regex patterns. The sentiment analysis is based on all works appeared in all tweet. This was accomplished by the tidytext::unnest_tokens function (Silge and Robinson 2016). Then the words are merged with the selected sentiment lecixons in the sentiments dataset supplied by the tidytext (Silge and Robinson 2016). To run this process smoothly, we used dyplr (Wickham et al. 2018) package's function of inner_join with the associated selected sentiment lecixons on the RShiny app interace. The top positive and negative words that were captured using the Bing sentiment lexicon are displayed in the Bing Words section of the graphs.

In order to add interactivy to the RShiny app, we display the data captured within the 'AFINN' sentiment lexicon. This allows for Users to change the positive and negative values (-5,5) for words they may feel have more weight than what the lexicon states. For example, the data we collected stated that both good and great appeared 38 times, while both scores in the lexicons contribute 3 units. If the user believes great should hold more weight than good, a user can click on new score column, and change great to the value of 4 units. This is shown respectively at the Score Distribution section and the User Score Distribution updates as a user changes score values.

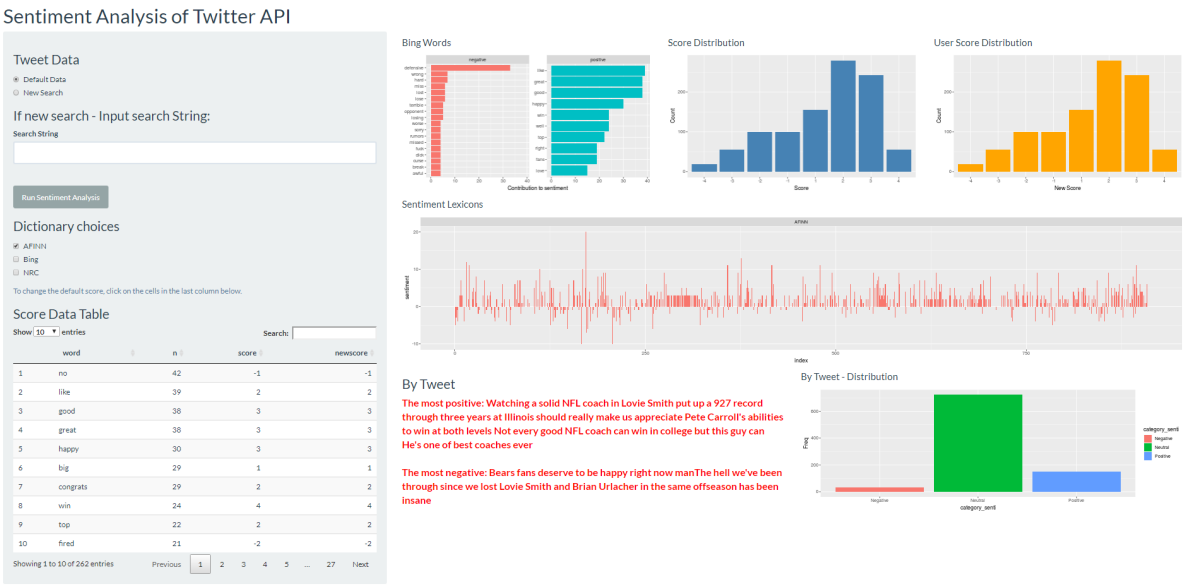
As the user clicks on sentiment lexicon dictionary choices, the rshiny updates with the Sentiment Lexicons graph of each selected choice(s). The graph shows the total amount of scores per tweet.

In the “By Tweet” section it displayed the most positive and negative tweets. A score is calculated for each tweet. We must first call the NRC sentiment dictionary to calculate the presenece of eight different emotions and their corresponding valence, “anger”, “antipication”, “digust”, “fear”, “joy”, “sadness”, “surprise”, “trust”, “negative”, and “positive”. The sentiment values are then assigned with the relevant functions of syuzhet::get_nrc_sentiment, and syuzhet::gent_sentiment (Jockers 2015). Once the sentiment values are determined, we then get a measure of the overall emoitonal valence in the tweet.

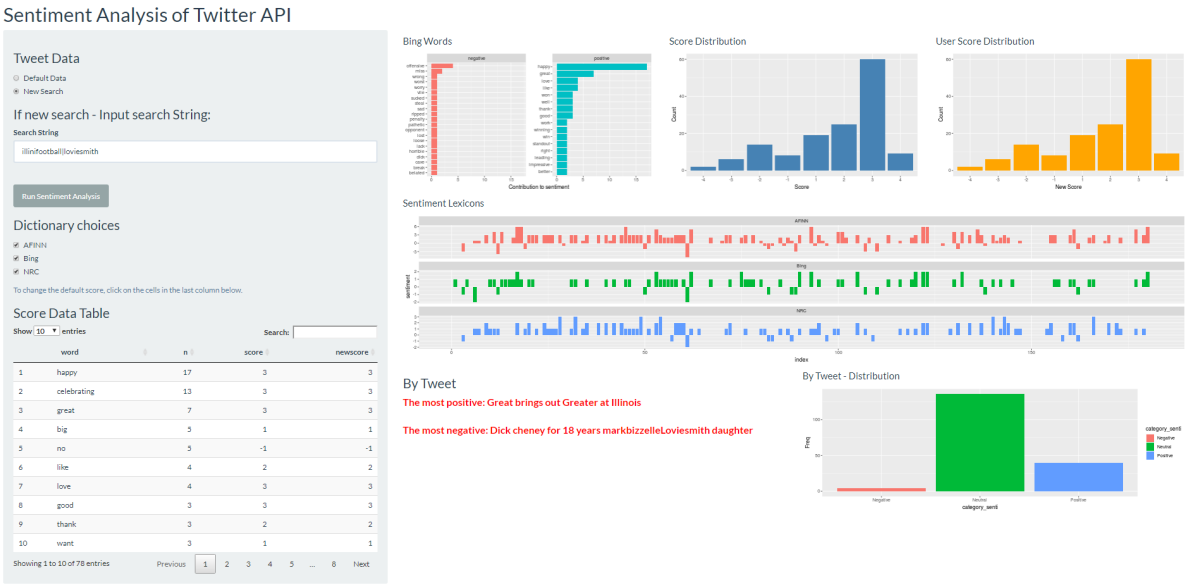
All our plots were created using the ggplot2 packages (Wickham 2016)

4 Results

4.1 Dynamic Default Data Using 908 Tweets



4.2 Static Data Using “illinifootball” and “loviesmith”



5 Discussion

After running the sentiment analysis on our default data set we can see that fans are still remaining relatively positive in regards to Lovie and the Fighting Illini football team as a whole. From the “By Tweet - Distribution” plot we can see that the vast majority of tweets were neutral but the positives outweighed the negatives by a lot. Aside from the quantity of tweets, the “Score Distribution” plot using our default scores is left - skewed in favor of the positives. This shows that fans were using more impactful positive words in each tweet than they were negative. A similar conslusion can be made from the “Bing Words” plot that shows the positive words having a much larger contribution to the overall sentiment than the negatives, with the exception of “defensive”. All of these plots show that fans aren’t quite ready to get rid of Lovie even after the embarassing blowout loss to Iowa and contract extension given to him for another two years. In his three years at Illinois the team has a record of 9-27 but it turns out that’s not enough to get the Champaign faithful to turn on him. As students and fans we were definitely thinking negatively about the team and expected the fans on Twitter to have the same concerns, but they don’t. Maybe we are just too critical of fans and need to have more faith in the team, either way we are in the minority. Even though the positives do outweigh the negatives it should be noted that the overwhelming majority of the tweets were neutral so it could just be that fans are bullish about speaking out negatively on social media about the team, or they just don’t really know what to think at this point. It will be interesting to continue to monitor this as the team starts training camp and progresses into the new season. We will see how tight of a leash fans will give Lovie next year especially after the new contract extension and higher expectations.

6 Conclusion

This project was inspired by our pride and desire to win as students and fans as we have been here for some brutal years in terms of success on the football field. After the third consecutive losing season by the Fighting Illini led by Lovie Smith, we became impatient with the team and started to question both Lovie's ability as a college coach and the team as a whole. Since we aren't the one's who get to make the decisions we wanted to see if other Fighting Illini fans were with us. Instead of taking a poll we decided to collect tweets off of Twitter using keywords related to the team and run sentimental analysis to see what the fanbase was thinking. Based off of the results there really aren't too many other fans who think the same we do. It turns out that the majority of fans still can't make up their minds and remain neutral on the topic. We expected there to be plenty of neutrality as nobody want to talk bad about their own team and choose to remain optimistic but we didn't expect there to be a greater positive feeling than negative. But that is just the case as we see from the results that there are more positive fans on Twitter than critical one's like us. That just speaks to the culture of this University as fans are still remaining positive after so many poor seasons in a row.

If we were to do this project again, we would change a few things. First, we believe we would have to more narrow our search query keywords. Since Lovie Smith was previously a Chicago Bears Coach, when running the tweet extractor, we grabbed a some tweets that were more related to the Bears. This is shown on the most negative tweet in the Default Data. By making the keywords more specific, we think we can get more reliable tweets that are strictly about the Fighting Illini. We also ran into issues with the standard twitter search API. The twitter standard API only allows for limited amount of sample tweets. This means that we were not able to extract more tweets to make the results more reliable. In efforts to try to combat this, we were able to get the free premium standard twitter API later in the project but currently no R package works with the premium API. Using the python package 'python-twitter' would have allowed us to grab 2 million tweets in a month time frame. Which would have made the results much more reliable.

One last potential change, would be to only extract tweets during a certain timeframe. Doing this, for example on gameday until a day after, would allow us to reduce the amount of tweets not about the Fighting Illini or Lovie Smith (his time at Illini). This is because when we search "Lovie Smith" tweets during that time frame, the tweets containing 'Lovie Smith' will more likely about the illini game than his time coaching for the Bears.

7 Appendix

see 'DefaultDataExtractor.R' for how we extracted the default data set

default data set had 89 variables but we only used twitter_data$text

twitter_data$text - is a string of text that was displayed in the tweet

app.R file contains our RShiny app and how we conducted sentiment analysis

References

Gentry, Jeff. 2015. *TwitteR: R Based Twitter Client*. http://lists.hexdump.org/listinfo.cgi/twitter-users-hexdump.org.

"Illinois Extends Contract of Football Coach Lovie Smith." n.d. *RSS*. https://fightingillini.com/news/2018/11/25/illinois-extends-contract-of-football-coach-lovie-smith.aspx.

Jockers, Matthew L. 2015. *Syuzhet: Extract Sentiment and Plot Arcs from Text*. https://github.com/mjockers/syuzhet.

Silge, Julia, and David Robinson. 2016. "Tidytext: Text Mining and Analysis Using Tidy Data Principles in R." *JOSS* 1 (3). The Open Journal. https://doi.org/10.21105/joss.00037.

Wickham, Hadley. 2016. *Ggplot2: Elegant Graphics for Data Analysis*. Springer-Verlag New York. http://ggplot2.org.

———. 2018. *Stringr: Simple, Consistent Wrappers for Common String Operations*.

Wickham, Hadley, Romain François, Lionel Henry, and Kirill Müller. 2018. *Dplyr: A Grammar of Data Manipulation*.