

Text Mining Project

Sentiment Analysis of Tweets About the Tesla Cybertruck

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12/8/2019

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Dataset Description

The dataset consists of 28,756 tweets that contain the 'cybertruck' keyword. The tweets were gathered from Twitter by the authors using the rtweet library on December 2, 2019. All of the tweets are in English and geocoded to the United States of America. Retweets are excluded. The timeline of the tweets extend from approximately 4:11 PM EST on November 23, 2019 until 6:45 PM EST on December 2, 2019.

Problem Description

Tesla debuted their initial entry into the pickup truck market on November 21, 2019. Tesla CEO Elon Musk unveiled the Cybertruck to a live audience in Los Angeles and broadcast via the internet to the rest of the world at 8:00 PM PST.

The Cybertruck design is unlike any other pickup truck currently or previously offered by a manufacturer. It's futuristic, angular design was met with mixed reviews. In an interview with CNN¹, Matt DeLorenzo, Senior Executive Editor at Kelley Blue Book said, "It will be a niche product at best and poses no threat in the pickup market as we know it today." In the same CNN interview, Chelsea Sexton, an analyst who covers the electric vehicle market, said "From a specification standpoint, I believe that's probably what they're aiming for, but no question that body style, that is not a high-volume product."

The US pickup truck market in 2018 represented over \$72B in revenue, according to Forbes². Tesla will have competition soon from new and existing car manufacturers. According to Reuters³, Ford aims to sell its electric pickup in Fall 2020, and GM will build a family of premium electric pickups the following year. Rivian, a start up electric vehicle manufacturer backed by Ford, also plans its own electric pickup next Fall. Tesla plans to deliver the first Cybertrucks in late 2021.

Tesla and its competitors will be interested to gauge the sentiments of the public as they finalize their initial electric pickup truck models. It will be helpful to these manufacturers to determine if there is a market for such a non-traditional vehicle design like the Tesla Cybertruck. An interesting aspect is how is sentiment changing over time in the days after the Cybertruck unveiling? Is positive sentiment increasing or decreasing over time as the public gets past the initial shock of the vehicle design?

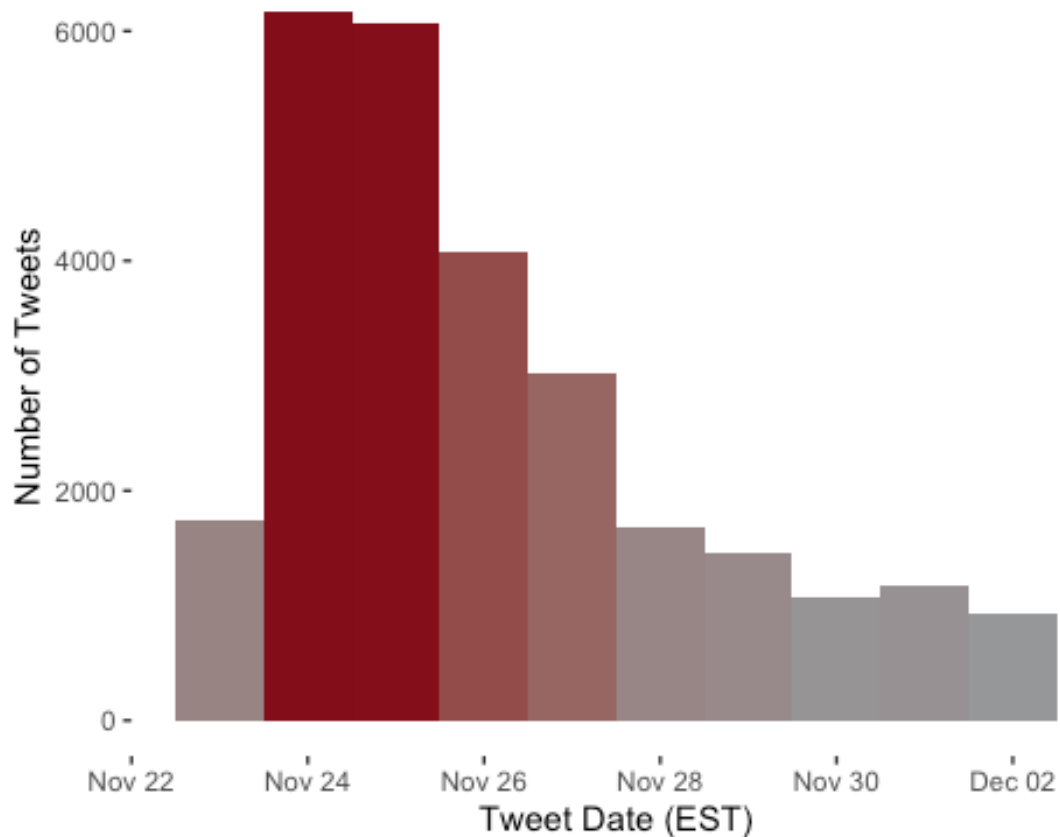
Vehicle manufacturers may also be interested to know the sentiment for verified accounts vs. non-verified accounts. Twitter describes⁴ a verified account as, "An account may be verified if it is determined to be an account of public interest. Typically this includes accounts maintained by users in music, acting, fashion, government, politics, religion, journalism, media, sports, business, and other key interest areas." Given that verified accounts are related to news outlets, celebrities, and others with social influence, manufacturers may be interested in targeting those sources if there is a significantly more negative sentiment from verified accounts compared to non-verified accounts.

Data Visualization



Cybertruck Tweet Locations

The above figure shows where the tweets in our dataset are coming from. A stronger color opacity represents more tweets coming from that location. We can see that unsurprisingly many tweets are coming from major metropolitan areas. Of the 28,756 observations in the data, only 1,670 (5.81%) had latitude and longitude data available.



Tweet Distributions

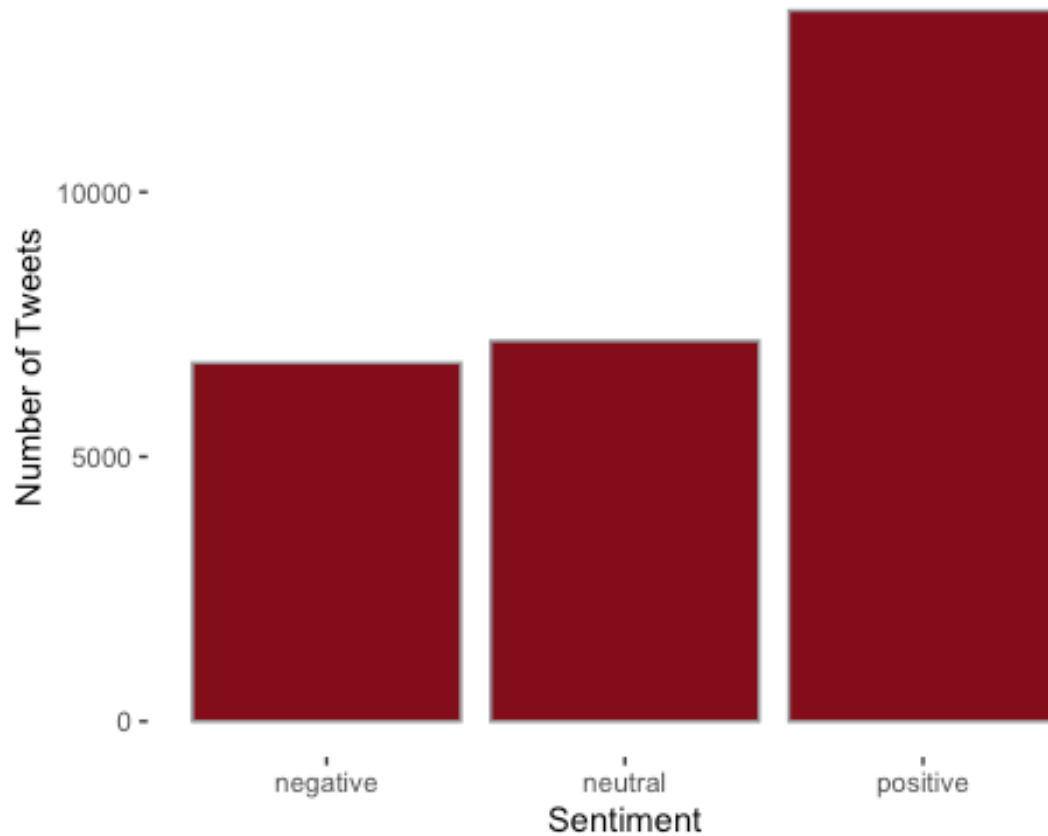
The figure above shows the number of tweets by day. A more maroon color is related to a relatively high number of tweets for the day as compared to a lower number of tweets represented by the color gray. Keep in mind that tweets on November 23 and December 2 (earliest and latest dates in the dataset, respectively) do not represent a full 24 hours of data. The number of tweets steadily declines after the first two days of full data until stabilizing around the fifth day of full data.

1. Converted the tweet time stamps from Coordinated Universal Time (UTC) to Eastern Time, America/New York.
2. Performed cleaning of the Tweet text by removing names, html links, twitter handles, punctuation, white space, digits, and line breaks.
3. Converted the text to lower case.
4. Removed any observations where text cleanup removed all of the Tweet text.
5. Calculated the sentiment of each remaining Tweet.
6. Added ratings for each Tweet based on the sentiment score.
 - Score > 0 = positive.
 - Score < 0 = negative.
 - Score = 0 = neutral.

To produce the word cloud, we:

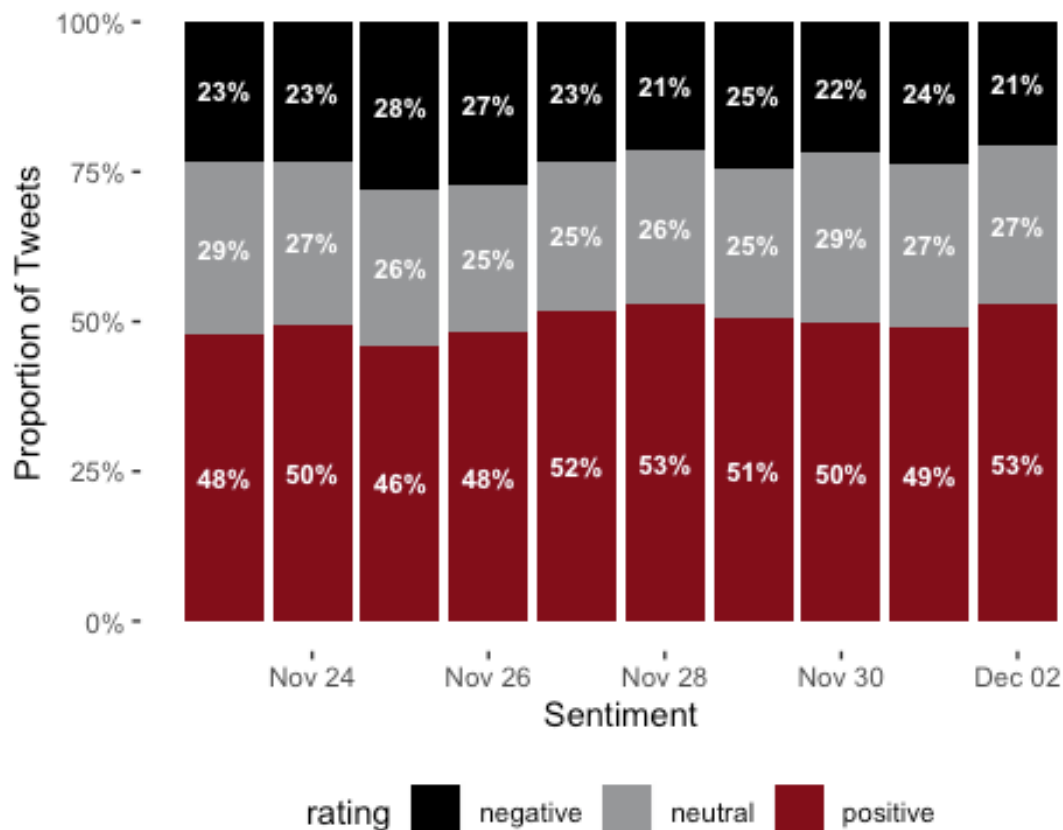
1. Created a corpus of the tweet text.
2. Removed stop words and white space.
3. Created a term document matrix.
4. Counted the frequency of each word.
5. Generated the word cloud.

Findings and Discussion



Cybertruck Tweet Sentiment Totals

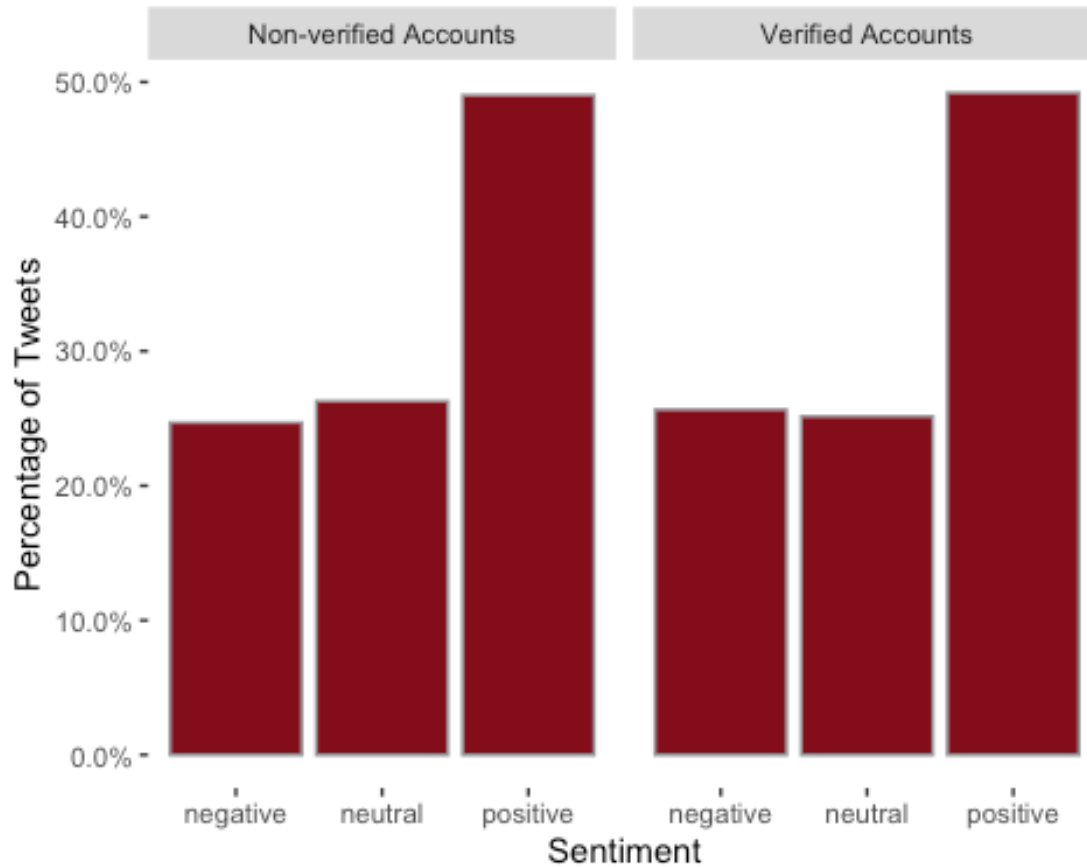
The figure above shows that overall the tweets in the days following the unveiling of the Tesla Cybertruck, more tweets were positive than negative or neutral. This is good news for Tesla given the unusual design of the vehicle and the issues with the glass strength demonstration.



Cybertruck Tweet Sentiments by Day

The figure above shows that positive sentiment has fluctuated slightly but remained within a seven percentage point range (46% - 53%). Neutral sentiment has remained even more steady within a four percentage point range (25% - 29%). Negative sentiment was also within a seven percentage point range (21% - 28%).

Again we would classify this result as positive for Tesla given the unusual, futuristic design of the vehicle and failed glass strength demonstration during the unveiling event.

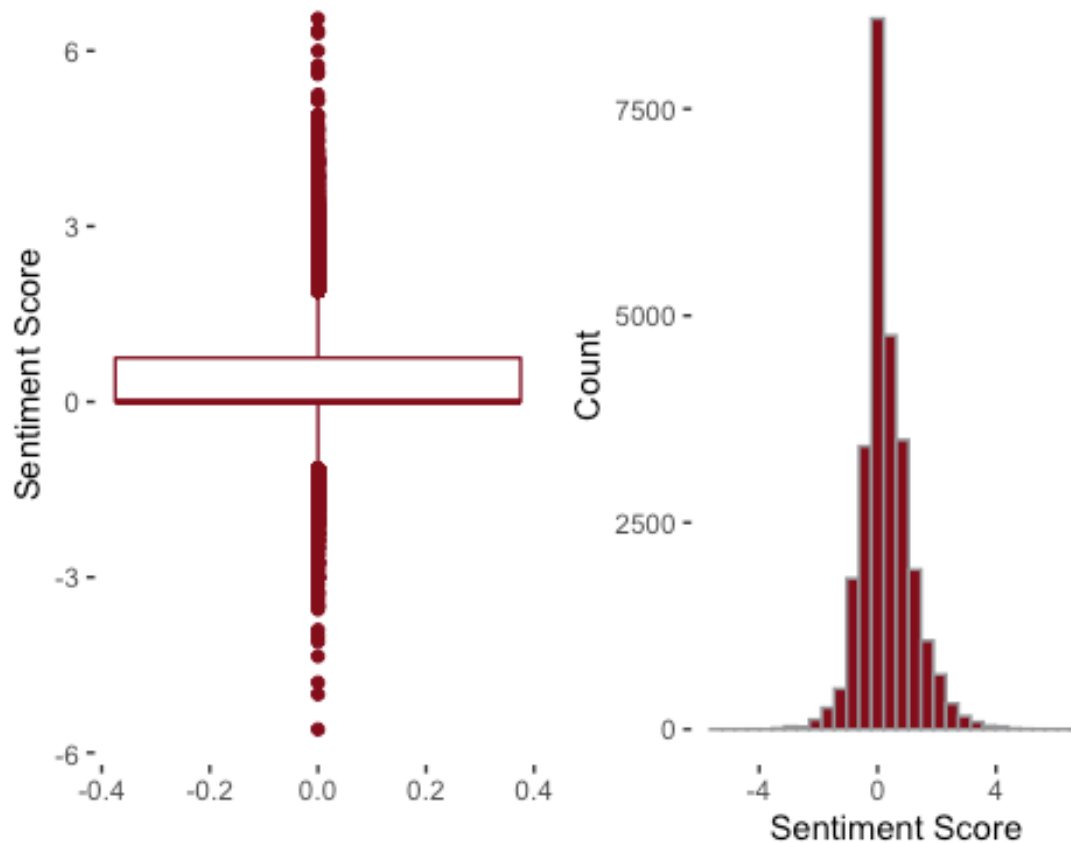


Cybertruck Tweet Sentiments by Twitter Verification Status

The figure above shows that sentiment between verified and non-verified Twitter accounts is nearly identical. Both types of accounts are even at roughly 50% for positive sentiment. Verified accounts have just slightly more negative sentiment than non-verified accounts. This shows that there may be an opportunity to target verified accounts to increase their positive sentiment with the intent that will influence non-verified accounts to have more positive sentiment.

Relevant R Outputs

Sentiment Score Distribution



Cybertruck Tweet Sentiment Score Distribution

The figures above show that the sentiment scores appear to be mildly skewed to the right toward the positive sentiment. The scores range from a maximum of 6.55 on the positive side to -5.6 on the negative side. The mean sentiment score is 0.2977981, showing some bias toward positive sentiment. The sentiment score standard deviation is 0.864586.

Below we can see a sampling of ten tweets from each of the sentiment categories. From these examples we are able to see some of the limitations of sentiment analysis. In the positive tweets there is a one calling the Cybertruck a “joke” but praising the Model X, Tesla’s full-sized SUV. The last example of negative tweets the user is saying they really want a Cybertruck will not be able to afford it. Many of the sampled neutral tweets could reasonably be classified as positive. In general the sentiment analysis seems to be relatively accurate.

Top 10 Positive Tweets

mr may please help settle a friendly bet friend says no way you are hot on the cybertruck as a fellow astute creative i postulated that you would be into a the sheer specs being alarmingly good and b the design choice lowering cost amp improving efficiency

thanks we ordered one hoping to get one on or before just in time for my daughters th birthday its a surprise birthday gift i will feel safe knowing she is driving cybertruck our family looks up to you thank you for all you do godspeed amp cheers

happy thanksgiving currently evacuated from my home after the cave fire in santa barbara ca but glad to be safe grateful for people like you who are dedicated to making a difference i love the cybertruck tesla spacex and theboringcompany thank you elon for your work

tesla came up during my thanksgiving dinner general consensus cybertruck is a joke laughs over the bullet proof windows and the tug of war with the ford was not legit my sisterinlaw loves the model x though her friend who has one is the coolest mom at school tslaq

im a tesla fanboy and one of your patreon supporters my model is amazing and i love it more than any material object ive ever owned i think youve been fair to tesla challenging tesla to do better benefits us all so keep it up but have to say cybertruck is beautiful

excellent content change started a current silverado owner friend of mine ordered the trimotor cybertruck buyers know what they want and what it would cost this buddy of mine is a current model owner used to be a ford focus owner buyers are super smart

happy thanksgiving i am thankful for individuals like you who are pushing the envelope on sustainable transport and keep thinking outside the box no pond intended with the cybertruck loves the specs the design keeps growing on me

cybertruck is an evolution of the utopian futurism of tesla which posited that affordable renewable tech would be a part of star treklike vision of crossclass prosperity cybertruck concedes dystopian futurism where protection of the prosperous from the poor is most important

i love teslamodelx the teslamodels and the teslamodel if that cybertruck sells well i am glad and hope everyone who orders them is pleased with their purchase it is not for me if it pours money into tesla than good

cybertruckelonmusk cybertruck aliens joeditzel comedian humor happy fun laugh photo funnyphoto funnypicture motivation smile comedy funnypic losangeles la author humorist writer

Top 10 Negative Tweets

the redesign is just burst discs instead of valves due to corrosion from the fuel the engines has fired multiple times before the stress failure i fail to see the problem the cybertruck window breaking was because the sledgehammer to the side weakened it significantly

want to keep the economy from sliding into another debilitating recession cancel student debt then maybe ill buy a stupid cybertruck but i probably still wont

i havent decided whats friging dumber yet the name cybertruck or how it looks terribleall teslas are goddamn ugly but this this is crude arrogance distilled down to butt friging ugly

also i dont think the cybertruck has crumple zones so it will explode your worse itd damage the battery and friging explode the whole damn car

i cannot fathom how aggressively stupid this statement is not only does the cybertruck have a front maximized for the killing of pedestrians but without a crumple zone it is also maximized for death of person inside

if you know me you know how heavy i frig with ozzy it sucks to watch him barley able to walk amp getting trotted out to these post malone poops he should be at least rolling around on some satanic chariot looking death sled meets cybertruck type of poop

i keep seeing these physicist explains cybertruck glbutt breaking articles and they are all wrong its a load case it proofed to before as elon tweeted in a video of behind the scenes its not a constraint difference probably fatigue damage

the cybertruck is ridiculous readawful but this isnt a valid complaint that door panels dont dent with a mild sledgehammer blow doesnt mean the truck wont crumple in a crash how flexible do you think a gas engine block is

i know its a dead horse but cybertruck is a friging dogpoop butt name its not cyber and its barely a truck frig this

i want that friging cybertruck so friging bad and there is gonna be a matte black version kill me now i will never be able to get that poop

Sample of 10 Neutral Tweets

the cybertruck is way cooler than a jacked up half ton every day of the week

i think im getting the cybertruck

wheres that cybertruck merch at

can i get a pink cybertruck

can u stick magnetic business signs on the cybertruck

cybertruck vs make it happen

whoever did this cybertruck redesign needs to get hired

watch watch elon musk announce the tesla cybertruck in minutes on youtube

you should get the cybertruck haha

so many models

References

- 1: Valdes-Dapena, P. (2019). Tesla reveals Cybertruck, but breaks its 'unbreakable' windows during unveiling. [online] CNN. Available at: <https://www.cnn.com/2019/11/22/cars/tesla-cybertruck-electric-pickup-truck/index.html> [Accessed 5 Dec. 2019].
- 2: Forbes.com. (2019). Cybertruck Could Bring In Over \$4.5 Billion In Revenue For Tesla By 2025. [online] Available at: <https://www.forbes.com/sites/greatspeculations/2019/11/28/cybertruck-could-bring-in-over-45-billion-in-revenue-for-tesla-by-2025/#72894b67e560> [Accessed 5 Dec. 2019].
- 3: Klayman, B. (2019). Tesla picks a fight with Detroit by going after the pickup market. [online] Reuters. Available at: <https://www.reuters.com/article/us-tesla-pickup/tesla-picks-a-fight-with-detroit-by-going-after-the-pickup-market-idUSKBN1XV1CN> [Accessed 5 Dec. 2019].
- 4: Help.twitter.com. (2019). About verified accounts. [online] Available at: <https://help.twitter.com/en/managing-your-account/about-twitter-verified-accounts> [Accessed 5 Dec. 2019].