

# TrumpTweetDataAnalysis

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## 0.1 Trump Twitter Analysis

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Analyzing the realDonaldTrump\_in\_office.csv from <https://github.com/MarkHershey/CompleteTrumpTweetsArchives>

## 2 Summary

Here we are analyzing Tweets published by Donald Trump during his first presidency, specifically how the time of day or season affect the frequency of the tweets. Additionally, we did sentiment analysis using a VADER for classification to determine the frequency of positive, negative and neutral tweets. Finally, using a combination of CountVectorizer and Logistic Regression, we used WordCloud visualization to determine the most frequent positive and negative words.

### 2.1 Introduction

Twitter (also known as X) is one of the world's most popular social media platforms, where users can share short messages (texts, videos, photos) known as tweets. In April 2025, the Pew Research Center did a study and found that on average active users published 157 tweets per month, which is around 5 tweets per day. At the beginning of his first presidency, Donald Trump followed the average, posting about 5.7 times per day. However towards the second half of 2020, his posting rate grew to around 34.8 times per day. On June 5 2020, he went as far as tweeting or retweeting 200 messages in a single day. With so much data, we thought it would be interesting to consider what could affect his frequency of posting. The president uses the platform mostly to disparage those he perceives as threats (people, companies, countries...), with more than half of his tweets between January 2017 and October 2019 being used to attack something or someone. Another interesting question to consider would be to determine the frequency of positive and negative tweets throughout his presidency. In this report, we will start by considering different the factors (time of day or season) that might have an impact on the frequency of the tweets, then we will classify the tweets into positive, negative or neutral to determine the most frequent sentiment expressed in his posts.

### 2.2 Data

The dataset we are using contains all tweets published (includes deleted tweets) published by Donald Trump during his first presidency between 20 Jan 2017 and 08 Jan 2021. It contains 5 columns (ID, Time, Tweet URL, Tweet Text) and each row represents a tweet. For the initial EDA

and data processing we ended up having to drop around 1/2 of the rows to stop unconventional characters at the end of the tweet string from tripping up pandas. After a visual review we noticed that these problem rows were quite evenly distributed (every 2-3 rows) and that this wouldn't be too much of an issue to get started.

## 2.3 Analysis

### 2.3.1 Part 1: Does the time of day/period of the year affect the frequency of the tweets?

With the president posting 34.8 times per day it is interesting to consider whether the time of day or even the period of the year affects the frequency of his tweets. Before our analysis, we believed that the frequency of tweets would be highest during the daytime and night-time. These assumptions were proven wrong as the numbers show that the most frequent time of day for tweets was the overnight period.

```
[1]: import pandas as pd
import altair as alt

url = "https://raw.githubusercontent.com/MarkHershey/CompleteTrumpTweetsArchive/
↪refs/heads/master/data/realDonaldTrump_in_office.csv"

tweets = pd.read_csv(
    url,
    encoding="utf-8-sig", # removes a BOM "Byte Order
↪Mark" at the beginning of the file (ChatGPT assist)
    on_bad_lines="skip" # skip the lines ending
↪in weird characters and tripping up pandas
)
tweets.columns = tweets.columns.str.strip() # strip
↪white-space from before column names
#print(tweets.columns)
tweets["Date & Time"] = pd.to_datetime(tweets["Time"], errors="coerce") #
↪set Time column to index and rename
tweets = tweets.drop(columns=["ID", "Tweet URL", "Time"])
tweets = tweets.set_index("Date & Time")
tweets.head(10)
```

```
[1]:
```

Date & Time	Tweet Text
2017-01-20 06:31:00	"It all begins today! I will see you at 11:00...
2017-01-20 11:54:00	"We will bring back our jobs. We will bring b...
2017-01-20 11:55:00	"We will follow two simple rules: BUY AMERICA...
2017-01-20 11:58:00	"It is time to remember that...https://www.fa...
2017-01-20 12:13:00	"TO ALL AMERICANS https://www.facebook.com/Do...
2017-01-21 05:53:00	"A fantastic day and evening in Washington D...
2017-01-22 06:47:00	"Watched protests yesterday but was under the...

```

2017-01-23 05:38:00    "Busy week planned with a heavy focus on jobs...
2017-01-24 05:11:00    "Will be meeting at 9:00 with top automobile ...
2017-01-24 10:58:00    "A photo delivered yesterday that will be dis...

```

- The initial data filtering by time of day visualized in the bar chart shows that the highest frequency of tweets occurs during the overnight period between 12:01am and 8:00am (as mentioned above) with a total of 3706 analyzed tweets. The second most frequent tweet period occurred during the nighttime period between 4:01pm-12:00am with a total of 3653 analyzed tweets, with the time of day resulting in the least frequent amount of tweets actually being the daytime period between 8:01am-4:00pm with a total of 3325 analyzed tweets. Perhaps this is because Trump is most busy during the day (golfing?) and cannot tend to tweets.

```

[2]: daytime = tweets.between_time("08:01", "16:00")      # 8:01 am - 4:00 pm
     evening = tweets.between_time("16:01", "00:00")      # 4:01 pm - 12:00 am
     overnight = tweets.between_time("00:01", "08:00")    # 12:01 am - 8:00 am

print(f"The number of tweets in the 'Daytime' category is: {len(daytime)}")
print(f"The number of tweets in the 'Evening' category is: {len(evening)}")
print(f"The number of tweets in the 'Overnight' category is: {len(overnight)}")

print("Just by the distribution of tweets it is surprisingly evenly spread;␣
↪with the most tweets happening overnight.")

```

The number of tweets in the 'Daytime' category is: 3325

The number of tweets in the 'Evening' category is: 3653

The number of tweets in the 'Overnight' category is: 3706

Just by the distribution of tweets it is surprisingly evenly spread; with the most tweets happening overnight.

```

[3]: tweet_time = pd.DataFrame({
      "Time": ["daytime", "evening", "overnight"],
      "Count": [len(daytime), len(evening), len(overnight)]
    })

tweet_time

```

```

[3]:      Time  Count
0    daytime   3325
1    evening   3653
2  overnight   3706

```

Figure 1: Number of tweets published by time of day (daytime: 8:01 am - 4:00 pm, evening: 4:01 pm - 12:00 am, overnight: 12:01 am - 8:00 am )

- The seasonal filtering of the tweets returned the results of the most frequent amount of tweets being in the summer with 3148 analyzed tweets, with the autumn being the second busiest season for tweets resulting in 3067 analysed tweets, followed by the spring recording 2520 analyzed tweets, and lastly the winter being the least busy season for tweets recording a number of 1949 tweets. This falls inline with intuitive assumptions about mood and activity

as the summer is usually the busiest with longer days (daylight) and nicer weather, then the fall slowly tapers off into the winter season being the shortest days for daylight and the most restricting weather.

```
[4]: tw = pd.Series(tweets.index.strftime('%m-%d'), index=tweets.index)      #  
      ↪ ChatGPT assistance to troubleshoot filtering datetimes in index  
  
      spring = tweets.loc[tw.between('04-01', '06-30')]                    # April  
      ↪ 1st - June 30th  
      summer = tweets.loc[tw.between('07-01', '09-30')]                    # July 1st  
      ↪ - September 30th  
      autumn = tweets.loc[tw.between('10-01', '12-31')]                    # October  
      ↪ 1st - December 31st  
      winter = tweets.loc[tw.between('01-01', '03-31')]                    # January 1st  
      ↪ - March 31st  
  
      print(f"The number of tweets in the 'Spring' category is: {len(spring)}")  
      print(f"The number of tweets in the 'Summer' category is: {len(summer)}")  
      print(f"The number of tweets in the 'Autumn' category is: {len(autumn)}")  
      print(f"The number of tweets in the 'Winter' category is: {len(winter)}")  
      print("")  
      print("Judging by the distribution of tweets throughout the seasons, the  
      ↪ frequency decays in the winter and spring and peaks in the summer")
```

```
The number of tweets in the 'Spring' category is: 2520  
The number of tweets in the 'Summer' category is: 3148  
The number of tweets in the 'Autumn' category is: 3067  
The number of tweets in the 'Winter' category is: 1949
```

Judging by the distribution of tweets throughout the seasons, the frequency decays in the winter and spring and peaks in the summer

```
[5]: tweet_season = pd.DataFrame({  
      "Season": ["Spring", "Summer", "Autumn", "Winter"],  
      "Count": [len(spring), len(summer), len(autumn), len(winter)]  
    })  
  
      tweet_season
```

```
[5]:   Season  Count  
0  Spring   2520  
1  Summer   3148  
2  Autumn   3067  
3  Winter   1949
```

Figure 2: Number of tweets published by season (Spring: April 1st - June 30th, Summer: July 1st - September 30th, Autumn: October 1st - December 31st, Winter: January 1st - March 31st)

Creating the time of day frequency charts:

```
[6]: timeBars = alt.Chart(tweet_time).mark_bar(color="#f00808").encode(
    y = "Time:N",
    x = "Count:Q",
).properties(
    title="Trump's Tweet Frequency by Time of Day",
    width=500,
    height=350)

#timeBars
```

```
[7]: label_df = pd.DataFrame({
    "Time": ["daytime", "evening", "overnight"],
    "range": ["8:01am-4:00pm", "4:01pm-12:00am", "12:01am-8:00am"],
    "Count": tweet_time["Count"].values
})
```

```
[8]: range_text = (
    alt.Chart(label_df)
    .mark_text(
        align="center",
        baseline="middle",
        color="white",
        fontSize=16,
        dx=-80
    )
    .encode(
        y="Time:N",
        x="Count:Q",
        text="range:N"
    )
)

#timeBars + range_text
```

```
[9]: count_text = alt.Chart(label_df).mark_text(
    align="left",
    baseline="middle",
    dx=5,
    color="black",
    fontSize=14
).encode(
    y="Time:N",
    x="Count:Q",
    text="Count:Q"
)

tweet_times = timeBars + range_text + count_text
```

```
#tweet_times
```

```
[10]: final_time_of_day_chart = (timeBars + range_text + count_text).  
      ↪properties(padding={"right": 50, "top":15, "bottom":15, "left":10}) # <=□  
      ↪add some white-space to balance appearance  
      final_time_of_day_chart
```

```
[10]: alt.LayerChart(...)
```

Figure 3: Trump's Tweet Frequency by Time of Day

Creating the seasonal frequency charts:

```
[11]: seasonBars = alt.Chart(tweet_season).mark_bar(color="#f00808").encode(  
      x="Count:Q",  
      y=alt.Y("Season:N",sort=["Spring", "Summer", "Autumn", "Winter"])  
    ).properties(  
      title="Trump's Tweet Frequency by Season",  
      width=500,  
      height=350)
```

```
#season_bars
```

```
[12]: season_label_df = pd.DataFrame({  
      "Season": ["Spring", "Summer", "Autumn", "Winter"],  
      "range": ["April 1st - June 30th", "July 1st - Sept 30th", "Oct 1st - Dec  
      ↪31st", "Jan 1st - March 31st"],  
      "Count": tweet_season["Count"].values  
    })
```

```
#season_label_df
```

```
[13]: season_range_text = alt.Chart(season_label_df).mark_text(  
      align="center",  
      baseline="middle",  
      color="white",  
      fontSize=16,  
      dx=-90  
    ).encode(  
      y=alt.Y("Season:N",sort=["Spring", "Summer", "Autumn", "Winter"]),  
      x="Count:Q",  
      text="range:N"  
    )
```

```
#season_bars + season_range_text
```

```
[14]: season_count_text = alt.Chart(season_label_df).mark_text(  
      align="left",  
      baseline="middle",
```

```

        dx=5,
        color="black",
        fontSize=14
    ).encode(
        y=alt.Y("Season:N",sort=["Spring", "Summer", "Autumn", "Winter"]),
        x="Count:Q",
        text="Count:Q"
    )

tweet_seasons = season_bars + season_range_text + season_count_text
#tweet_seasons

```

```

[15]: final_season_chart = (season_bars + season_range_text + season_count_text).
      ↪properties(padding={"right": 50, "top":15, "bottom":15, "left":10}) #
      ↪aesthetic padding

      final_season_chart

```

```
[15]: alt.LayerChart(...)
```

Figure 4: Trump's Tweet Frequency by Season

Visualizing our results we see that there is no major difference in posting frequency given the time of day, but there is a difference for different seasons.

```

[16]: tweet_charts = (tweet_seasons | tweet_times).properties(padding={"right": 50,
      ↪    ↪"top":25, "bottom":25, "left":25})
      tweet_charts

```

```
[16]: alt.HConcatChart(...)
```

Figure 5: Trump's Tweet Frequency by Time of Day and Season

### 2.3.2 Part 2: How many tweets are positive vs negative? (2 classification methods)

When we think of the tweets posted by the president, we tend to think mostly of those where he critics or attacks others. However, is this a real representation of the sentiments of his tweets? In this part we will use two different sentiment analysis models to determine the frequency of positive, negative and neutral tweets.

Method 1:

We use a simple sentiment analysis model (VADER) to classify each tweet as positive, negative, or neutral, and then compare the counts, this methodological inspiration is from ChatGPT.

```

[17]: #import nltk
      from vaderSentiment.vaderSentiment import SentimentIntensityAnalyzer
      sia = SentimentIntensityAnalyzer()

```

```
[18]: tweets_q2 = tweets.copy()
tweets_q2["Tweet Text"] = tweets_q2["Tweet Text"].fillna("").astype(str)

tweets_q2["sentiment_score"] = tweets_q2["Tweet Text"].apply(
    lambda t: sia.polarity_scores(t)["compound"]
)

def score_to_label(score, pos_threshold=0.05, neg_threshold=-0.05):
    if score >= pos_threshold:
        return "positive"
    elif score <= neg_threshold:
        return "negative"
    else:
        return "neutral"

tweets_q2["sentiment_label"] = tweets_q2["sentiment_score"].
    ↪ apply(score_to_label)

tweets_q2[["Tweet Text", "sentiment_score", "sentiment_label"]].head(10)
```

```
[18]:
```

Date & Time	Tweet Text \	sentiment_score	sentiment_label
2017-01-20 06:31:00	"It all begins today! I will see you at 11:00...	0.0000	neutral
2017-01-20 11:54:00	"We will bring back our jobs. We will bring b...	0.7345	positive
2017-01-20 11:55:00	"We will follow two simple rules: BUY AMERICA...	0.0000	neutral
2017-01-20 11:58:00	"It is time to remember that...https://www.fa...	0.0000	neutral
2017-01-20 12:13:00	"TO ALL AMERICANS https://www.facebook.com/Do...	0.0000	neutral
2017-01-21 05:53:00	"A fantastic day and evening in Washington D...	0.8666	positive
2017-01-22 06:47:00	"Watched protests yesterday but was under the...	-0.8459	negative
2017-01-23 05:38:00	"Busy week planned with a heavy focus on jobs...	0.4939	positive
2017-01-24 05:11:00	"Will be meeting at 9:00 with top automobile ...	0.3382	positive
2017-01-24 10:58:00	"A photo delivered yesterday that will be dis...	0.4199	positive



```
[19]: sentiment_counts = (
    tweets_q2
    .groupby("sentiment_label")
    .size()
    .reset_index(name="Count")
    .rename(columns={"sentiment_label": "Sentiment"})
)

sentiment_counts
```

```
[19]:   Sentiment  Count
0  negative   2415
1   neutral   3433
2  positive   4836
```

Figure 6: Number of tweets per sentiment (negative, neutral, positive)

Using the VADER sentiment analyzer the tweets were classified as either positive, neutral, or negative. At first, we believed that the tweets were likely more negative than positive, but in fact the tweets were classified as far more positive than negative, almost doubling the negatively classified tweets. The tweets classified as 'neutral' fall almost directly in between the tweets classified as positive and negative. The actual context and literal meaning of the tweets was not analyzed, nor the accuracy of the classification at this point, so there is certainly going to be a margin of error and some 'false positives' etc as the positivity is quite often a self directed compliment of sorts.

```
[20]: sentiment_chart = (
    alt.Chart(sentiment_counts)
    .mark_bar()
    .encode(
        x=alt.X("Sentiment:N", sort=["positive", "neutral", "negative"]),
        y=alt.Y("Count:Q"),
        tooltip=["Sentiment", "Count"]
    )
    .properties(
        title="Number of Positive, Neutral, and Negative Tweets"
    )
)

sentiment_chart
```

```
[20]: alt.Chart(...)
```

Figure 7: Chart Comparing the Number of Positive, Neutral, and Negative Tweets

Method 2:

Using a CountVectorizer and Logistic Regression, combining with a Wordcloud visualization to determine the most frequent words in the positive and negative tweets. Syntax and bug fixing credited to ChatGPT 5.1

```

[21]: import re
from collections import Counter
from wordcloud import WordCloud
import matplotlib.pyplot as plt
from sklearn.feature_extraction.text import CountVectorizer
from sklearn.linear_model import LogisticRegression
from sklearn.model_selection import train_test_split

positive_words = set("""good great amazing fantastic tremendous strong win_
    ↪winning beautiful success successful
happy proud respect love best positive incredible honored grateful huge strong_
    ↪strongest great big""".split())

negative_words = set("""bad terrible horrible weak fail failure disaster sad_
    ↪angry corrupt
worst negative unfair hate disgrace stupid dishonest democrat biden obama_
    ↪democrats sleepy joe illegal""".split()) # democrat, biden, obama usually_
    ↪associated negatively when Trump speaks

stopwords = set("""the a an and of to in is it this that for on with be as by_
    ↪are was were will from at have has but not or if so
you your my our their they we i he she his her him them rt s all t just now amp_
    ↪more very about do what who people word should m realdonaldtrump u""".
    ↪split())

# -----
# 1. Helper functions
# -----

def simple_tokenize(text: str):
    """Lowercase everything, remove URLs and non letters, then split."""
    text = text.lower()
    text = re.sub(r"http\S+", "", text) # remove URLs
    text = re.sub(r"[^a-z\s]", " ", text) # keep letters and spaces
    return text.split()

def weak_label(text: str):
    """Use positive and negative lexicons to create weak labels for training."""
    if not isinstance(text, str):
        return None
    tokens = simple_tokenize(text)
    pos_hits = sum(1 for w in tokens if w in positive_words)
    neg_hits = sum(1 for w in tokens if w in negative_words)
    if pos_hits > neg_hits:
        return "positive"
    elif neg_hits > pos_hits:
        return "negative"

```

```

else:
    return None # ambiguous, skip from training

# -----
# 2. Create weak labels for a subset of tweets
# -----

tweets["weak_label"] = tweets["Tweet Text"].apply(weak_label)
train_df = tweets.dropna(subset=["weak_label"]).copy()

print("Number of weak labeled tweets:", len(train_df))
print(train_df["weak_label"].value_counts())

# -----
# 3. Train a simple ML model using CountVectorizer
# -----

X_train, X_test, y_train, y_test = train_test_split(
    train_df["Tweet Text"],
    train_df["weak_label"],
    test_size=0.2,
    random_state=42,
    stratify=train_df["weak_label"]
)

vectorizer = CountVectorizer(stop_words=list(stopwords), min_df=3)
X_train_vec = vectorizer.fit_transform(X_train.fillna(""))
X_test_vec = vectorizer.transform(X_test.fillna(""))

clf = LogisticRegression(max_iter=2000)
clf.fit(X_train_vec, y_train)

print("Validation accuracy (weak labels):", clf.score(X_test_vec, y_test))

# -----
# 4. Predict sentiment for all tweets (positive vs negative)
# -----

all_X = vectorizer.transform(tweets["Tweet Text"].fillna(""))
tweets["Sentiment"] = clf.predict(all_X)

print(tweets["Sentiment"].value_counts())

# -----
# 5. Answer the question "What are the most frequent words in the positive and
    ↪ negative tweets?"
# -----

```

```

pos_text = " ".join(tweets[tweets["Sentiment"] == "positive"]["Tweet Text"].
↳dropna())
neg_text = " ".join(tweets[tweets["Sentiment"] == "negative"]["Tweet Text"].
↳dropna())

pos_tokens = [w for w in simple_tokenize(pos_text) if w not in stopwords]
neg_tokens = [w for w in simple_tokenize(neg_text) if w not in stopwords]

top_pos = Counter(pos_tokens).most_common(20)
top_neg = Counter(neg_tokens).most_common(20)

top_pos_df = pd.DataFrame(top_pos, columns=["word", "count"])
top_neg_df = pd.DataFrame(top_neg, columns=["word", "count"])

print("\nMost frequent words in positive tweets:")
print(top_pos_df)

print("\nMost frequent words in negative tweets:")
print(top_neg_df)

# -----
# 6. Wordcloud
# -----
pos_wc = WordCloud(
    width=900,
    height=500,
    background_color="white"
).generate(" ".join(pos_tokens))

plt.figure(figsize=(10, 5))
plt.imshow(pos_wc, interpolation="bilinear")
plt.axis("off")
plt.title("Positive Tweets Word Cloud")
plt.show()

neg_wc = WordCloud(
    width=900,
    height=500,
    background_color="white"
).generate(" ".join(neg_tokens))

plt.figure(figsize=(10, 5))
plt.imshow(neg_wc, interpolation="bilinear")
plt.axis("off")
plt.title("Negative Tweets Word Cloud")
plt.show()

```

Number of weak labeled tweets: 3527

weak\_label

positive 2137

negative 1390

Name: count, dtype: int64

Validation accuracy (weak labels): 0.9985835694050992

Sentiment

positive 7817

negative 2867

Name: count, dtype: int64

Most frequent words in positive tweets:

	word	count
0	great	1216
1	thank	836
2	president	760
3	trump	547
4	america	392
5	whitehouse	371
6	big	325
7	news	309
8	today	297
9	american	264
10	country	234
11	new	227
12	maga	212
13	up	211
14	good	200
15	make	199
16	get	199
17	house	195
18	foxnews	180
19	day	179

Most frequent words in negative tweets:

	word	count
0	democrats	530
1	trump	468
2	biden	375
3	president	370
4	no	309
5	joe	228
6	out	203
7	media	201
8	impeachment	198
9	obama	182
10	there	177
11	election	175



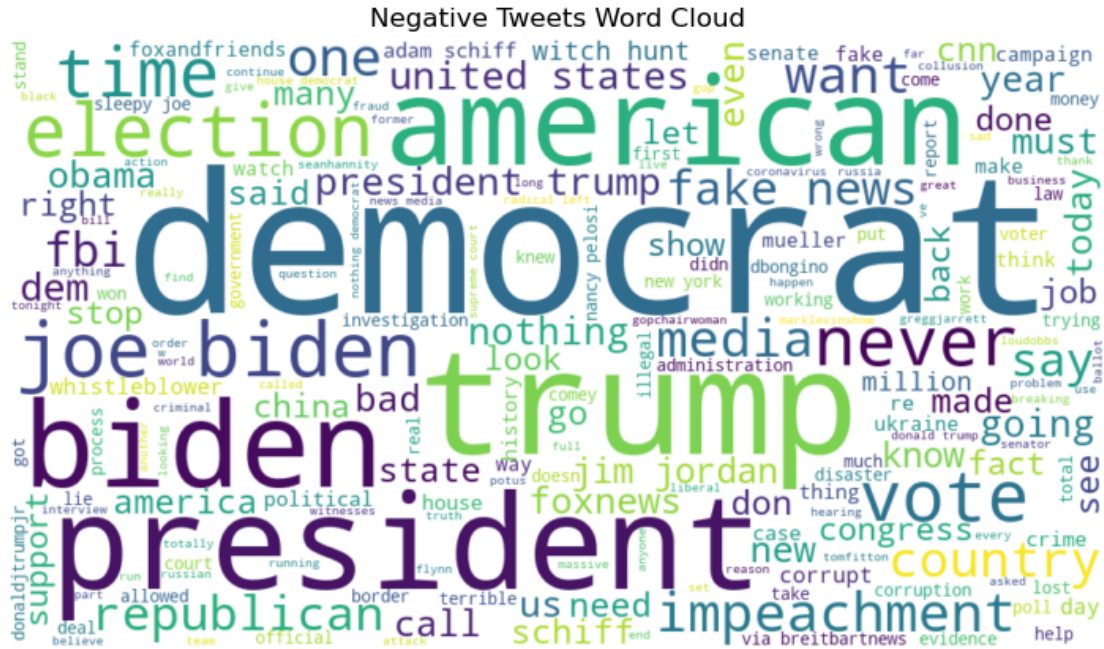


Figure 8a: Table with the number of weak labeled tweets Figure 8b: Table with the number of tweets per sentiment (positive or negative) Figure 8c: Table of the most frequent words used in positive tweets Figure 8d: Word cloud of the positive tweets Figure 8e: Word cloud of the negative tweets

The second classifier method used to analyze the tweets was utilizing the `CountVectorizer()` to classify sets as positive words, negative words and some stop words unique to this dataset. The overall positive VS negative tweet counts are skewed in the opposite direction as the ‘neutral’ category here is somewhat added to the positively classified category. The results of the most frequent words are not very surprising to anyone who has followed American news at all in the last 10 years with the positive tweets containing words of praise and common phrases used by Trump, as well as his own name. The most frequent words appearing in the negative tweets could also be somewhat assumed as they contain words of the opposing political parties and leaders as well as other common phrases and words that one would hear often in a news report of Trump lashing out over twitter or a speech. A somewhat interesting note is that the word ‘Trump’ appears frequently in both positive and negative classifications, but could be rationalized by the fact that Trump often speaks about himself in the third person. A great visual indicator of these word frequencies is the word clouds for the respective most frequent positive and negatively classified words.

## 2.4 Results

Within this report we considered multiple aspects of the tweets. Firstly we determined that Donald Trump’s most productive time and season for posting was overnight during the summer. Then we determined that, contrary to what we originally believed, most of his tweets are actually positively connotated. Now, as mentioned above, our sentiment classification methods might not be a faithful representation of the sentiment of the tweets, as the models do not consider intricacies (sarcasm, neutral tweets added to positive class) that can change the sentiment of the message.

## 2.5 References

Gottfried, J., Park, E., & Nolan, H. (n.d.). Americans' Social Media Use 2025 Growing shares of U.S. adults say they are using Instagram, TikTok, WhatsApp and Reddit, but YouTube still rises to the top FOR MEDIA OR OTHER INQUIRIES. Retrieved November 21, 2025, from [https://www.pewresearch.org/wp-content/uploads/sites/20/2025/11/PI\\_2025.11.20\\_Social-Media-Use\\_REPORT.pdf](https://www.pewresearch.org/wp-content/uploads/sites/20/2025/11/PI_2025.11.20_Social-Media-Use_REPORT.pdf)

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