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In [1]: # Let's read in our document-term matrix
import pandas as pd
import pickle

# To show all the columns
pd.set_option('display.max_columns', 200)
pd.set_option('display.max_colwidth', 200)

# Import textblob
from textblob import TextBlob

sentiment_df = pd.read_pickle('tweetwidthsent_df.pkl')
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in [2]: sentiment_df = pd.read_pickle('brand_with_part_of_year.pkl')
        sentiment_df.head()
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id	Rating	review	year	car_name	model	date	review_year	month	day
0	4	Outstanding large family van With the expected arrival of our 6th child, our Toyota Sienna minivan was going to be too small for our needs. The thought of diving a huge 12-passenger van did not ap...	2013	Nissan	NV	2013-03-07	2013	3	7
1	3	Back as suck Rear ac blow to slow that my kid do not want to be in the back seat.	2015	Nissan	NV	2018-07-06	2018	7	6
2	5	we love ours! This is not a small astro van type.You will need to navigate certain parking lots,spaces and drive fast food drive thrus. This is why we bought it because it is extra roomy!	2015	Nissan	NV	2018-03-26	2018	3	26
3	5	My 2014 Nissan NV SLP review I am very satisfied with my 2014 Nissan NV SL. I use this van for my business deliveries and personal use. Camping, road trips, etc. We dont have any children so I st...	2015	Nissan	NV	2016-05-14		5	14
4	3	Not for a family I went from a Honda Odyssey to this van since our family grew and we needed more room. we have all the kids in boosters or car seats. Here are the pros: smooth drive*comfortable ...	2015	Nissan	NV	2015-10-21	2015	10	21

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[3]: # Creating a list of lambda functions to calculate the polarity and subjectivity of each review
#I used a lambda functions create the polarity and subjectivity of each review

#Polarity: How positive or negative a word is. -1 is very negative. +1 is very positive.
#Subjectivity: How subjective, or opinionated a word is. 0 is fact. +1 is very much an opinion.

rev_polarity = []
rev_subjectivity = []

def review_polarity_subjectivity(x):
    review_analysis = TextBlob(x)
    rev_polarity.append(round(review_analysis.polarity, 2))
    rev_subjectivity.append(round(review_analysis.subjectivity, 2))

_ = sentiment_df.review.apply(lambda x: review_polarity_subjectivity(x))
del _

# Creating
sentiment_df['review_polarity'] = rev_polarity
sentiment_df['review_subjectivity'] = rev_subjectivity

In [4]: # Just testing out the TextBlob
TextBlob(" IT'S A LEMON! I bought this car new in 2012. Four years later the engine died, and the dealership wanted to charge me $6,100 to essentially replace
```

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Out[4]: Sentiment(polarity=0.06808/12121212121, subjectivity=0.4151515151515151)
```

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In [5]: sentiment_df.head()
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	id	rating	review	year	car_name	model	date	review_year	month	day	review_polarity	review_subjectivity
	0	4	Outstanding large family van With the expected arrival of our 6th child, our Toyota Sienna minivan was going to be too small for our needs. The thought of diving a huge 12-passenger van did not ap...	2013	Nissan	NV	2013-03-07	2013	3	7	0.24	0.58
	1	3	Back ac suck Rear ac blow to slow that my kid do not want to be in the back seat.	2015	Nissan	NV	2018-07-06	2018	7	6	-0.10	0.13
	2	5	we love ours! This is not a small astro van type.You will need to navigate certain parking lots.spaces and drive fast food drive thrus. This is why we bought it because it is extra roomy!	2015	Nissan	NV	2018-03-26	2018	3	26	0.23	0.45
	3	5	My 2014 Nissan NVP SL review I am very satisfied with my 2014 Nissan NV SL. I use this van for my business deliveries and personal use. Camping, road trips, etc. We dont have any children so I st...	2015	Nissan	NV	2016-05-14	2016	5	14	0.23	0.60
	4	3	Not for a family I went from a Honda Odyssey to this van since our family grew and we needed more room. we have all the kids in boosters or car seats. Here are the pros.* smooth drive*comfortable ...	2015	Nissan	NV	2015-10-21	2015	10	21	0.04	0.49

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In [6]: # Neutral/Positive/ Negative
def polarity_status(x):
    if x == 0:
        return 'Neutral'

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        elif x > 0.00:
            return 'Positive'
        elif x < 0.00:
            return 'Negative'

# Very Objective / Objective / Subjective/ Very Subjective
def subjectivity_status(x):
    if x == 0:
        return 'Very Objective'
    elif x > 0.00 and x < 0.40:
        return 'Objective'
    elif x >= 0.40 and x < 0.70:
        return 'Subjective'
    elif x >= 0.70:
        return 'Very Subjective'

# Putting the polarity & Subjectivity status in the DataFrame
sentiment_df['polarity_status'] = sentiment_df.review_polarity.apply(lambda x: polarity_status(x))
sentiment_df['subjectivity_status'] = sentiment_df.subjectivity.apply(lambda x: subjectivity_status(x))

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In [7]: # Checkin the Datafram with the polarity and subjectivity status
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		sentiment_df.head()													
Out[7]:		Rating		review	year	car_name	model	date	review_year	month	day	review_polarity	review_subjectivity	polarity_status	subjectivity_status
0	4			Outstanding large family van With the expected arrival of our 6th child, our Toyota Sienna minivan was going to be too small for our needs. The thought of diving a huge 12-passenger van did not ap...	2013	Nissan	NV	2013-03-07	2013	3	7	0.24	0.58	Positive	Subjective
1	3			Back ac suck Rear ac blow to slow that my kid do not want to be in the back seat.	2015	Nissan	NV	2018-07-06	2018	7	6	-0.10	0.13	Negative	Objective
2	5			we love ours! This is not a small astro van type.You will need to navigate certain parking lots,spaces and drive fast food drive thrus. This is why we bought it because it is extra roomy!	2015	Nissan	NV	2018-03-26	2018	3	26	0.23	0.45	Positive	Subjective
3	5			My 2014 Nissan NVP SL review I am very satisfied with my 2014 Nissan NV SL. I use this van for my business deliveries and personal use. Camping, road trips, etc. We dont have any children so I st...	2015	Nissan	NV	2016-05-14	2016	5	14	0.23	0.60	Positive	Subjective
4	3			Not for a family I went from a Honda Odyssey to this van since our family grew and we needed more room. we have all the kids in boosters or car seats. Here are the pros:* smooth drive*comfortable ...	2015	Nissan	NV	2015-10-21	2015	10	21	0.04	0.49	Positive	Subjective

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In [8]: sentiment_df.loc[(sentiment_df.polarity_status == 'Negative')]
```

[illegible]

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In [9]: # change the polarity and subjectivity status to numerical values
        neutral_list = []
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```
positive_list = []
negative_list = []

def polarity_status(x):
    if x == 0.00:
        neutral_list.append(1)
        positive_list.append(0)
        negative_list.append(0)
    elif x > 0.00:
        positive_list.append(1)
        neutral_list.append(0)
        negative_list.append(0)
    elif x < 0.00:
        positive_list.append(0)
        neutral_list.append(0)
        negative_list.append(1)

_ = sentiment_df.review_polarity.apply(lambda x: polarity_status(x))
del _

sentiment_df['neutral_review'] = neutral_list
sentiment_df['positive_review'] = positive_list
sentiment_df['negative_review'] = negative_list
```

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In [10]: sentiment_df.head()
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	Rating	review	year	car_name	model	date	review_year	month	day	review_polarity	review_subjectivity	polarity_status	subjectivity_status	neutral_review	positive_review	negative_re
0	4	Outstanding large family van With the expected arrival of our 6th child, our Toyota Sienna minivan was going to be too small for our needs. The thought of diving a huge 12-passenger van did not ap...	2013	Nissan	NV	2013-03-07	2013	3	7	0.24	0.58	Positive	Subjective	0	1	
1	3	Back ac suck Rear ac blow to slow that my kid do not want to be in the back seat.	2015	Nissan	NV	2018-07-06	2018	7	6	-0.10	0.13	Negative	Objective	0	0	
2	5	we love ourst! This is not a small astro van type.You will need to navigate certain parking lots,spaces and drive fast food drive thrus. This is why we bought it because it is extra roomey!	2015	Nissan	NV	2018-03-26	2018	3	26	0.23	0.45	Positive	Subjective	0	1	
3	5	My 2014 Nissan NVP SL review I am very satisfied with my 2014 Nissan NV SL. I use this van for my business deliveries and personal use. Camping, road trips, etc. We dont have any children so I st...	2015	Nissan	NV	2016-05-14	2016	5	14	0.23	0.60	Positive	Subjective	0	1	
4	3	Not for a family I went from a Honda Odyssey to this van since our family grew and we needed more room. we have all the kids in boosters or car seats. Here are the pros: smooth drive*comfortable ...	2015	Nissan	NV	2015-10-21	2015	10	21	0.04	0.49	Positive	Subjective	0	1	

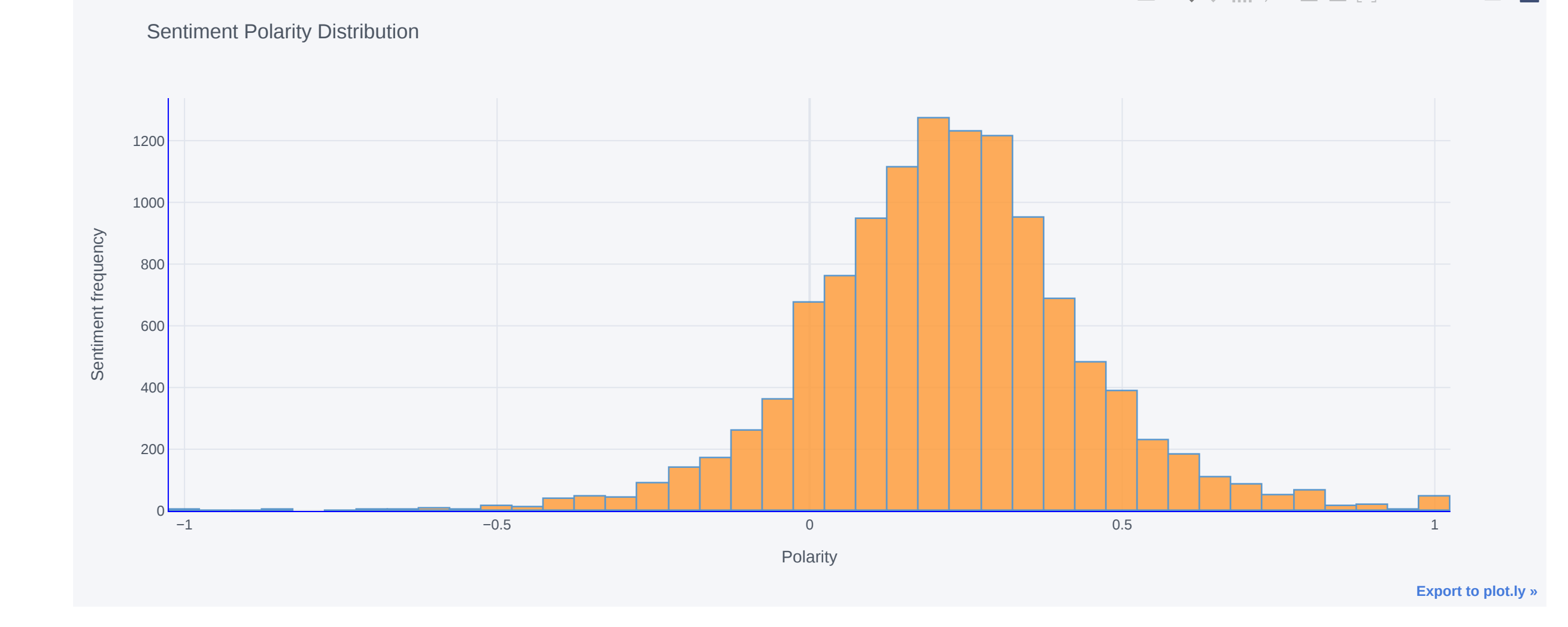
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n [11]: # We imported cufflinks to visualize the sentiment polarity
import cufflinks as cf
cf.go_offline()
fig = cf.polarity(review, word_readable=True)

```

```
cf.set_coming_file(coming_file=False, world_readable=True)
```

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[12]: # plotting the Sentiment distribution of the review
sentiment_df['review_polarity'].plot(
    kind='hist',
    bins=50,
    xTitle='Polarity',
    linecolor='blue',
    yTitle='Sentiment frequency',
    title='Sentiment Polarity Distribution')
```



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In [13]: sentiment_make_review = sentiment_df[['model', 'review', 'Rating', 'positive_review', 'negative_review', 'neutral_review', 'subjectivity_status']]
          sentiment_make_review.head()
```

	model	review	Rating	positive_review	negative_review	neutral_review	subjectivity_status
out[13]:	0	NV Outstanding large family van With the expected arrival of our 6th child, our Toyota Sienna minivan was going to be too small for our needs. The thought of diving a huge 12-passenger van did not ap...	4	1	0	0	Subjective
	1	NV Back ac suck Rear ac blow to slow that my kid do not want to be in the back seat.	3	0	1	0	Objective
	2	NV we love ours! This is not a small astro van type.You will need to navigate certain parking lots,spaces and drive fast food drive thrus. This is why we bought it because it is extra roomey!	5	1	0	0	Subjective
	3	NV My 2014 Nissan NVP SL review I am very satisfied with my 2014 Nissan NV SL. I use this van for my business deliveries and personal use. Camping, road trips, etc. We dont have any children so I st...	5	1	0	0	Subjective
	4	NV Not for a family I went from a Honda Odyssey to this van since our family grew and we needed more room. we have all the kids in boosters or car seats. Here are the pros:" smooth drive"comfortable ...	3	1	0	0	Subjective

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[14]: # Aggregate polarity of the brands
sentiment_model = sentiment_df.groupby(['model']).agg({'positive_review': 'sum',
                                                    'negative_review': 'sum', 'neutral_review': 'sum'
                                                    }).reset_index()

# Seperate dataframe
sentiment_Altimea_df = sentiment_model[sentiment_model.model == 'Altimea'].drop('model', axis = 1).copy()
# Getting the percentage polarity

sentiment_model['pct_pol_positive'] = (sentiment_model['positive_review'] /
                                       (sentiment_model['positive_review'] + sentiment_model['negative_review'] +
                                        sentiment_model['neutral_review']))*100

sentiment_model['pct_pol_negative'] = (sentiment_model['negative_review'] /
                                       (sentiment_model['positive_review'] + sentiment_model['negative_review'] +
                                        sentiment_model['neutral_review']))*100

sentiment_model['pct_pol_neutral'] = (sentiment_model['neutral_review'] /
                                       (sentiment_model['positive_review'] + sentiment_model['negative_review'] +
                                        sentiment_model['neutral_review']))*100

# Adding the column to the DataFrame
sentiment_model['pct_pol_positive'] = sentiment_model['pct_pol_positive'].apply(lambda x: round(x, 2))
sentiment_model['pct_pol_negative'] = sentiment_model['pct_pol_negative'].apply(lambda x: round(x, 2))
sentiment_model['pct_pol_neutral'] = sentiment_model['pct_pol_neutral'].apply(lambda x: round(x, 2))

# dropping some columns
sentiment_model.drop(['positive_review', 'negative_review', 'neutral_review'], axis=1, inplace=True)

n [15]: sentiment_model

ut [15]:      model  pct_pol_positive  pct_pol_negative  pct_pol_neutral
```

0	Altima	84.77	13.35	1.89
1	Armada	82.82	9.44	2.82

1	Armada	88.83	9.14	2.03
2	Cube	87.20	8.80	4.00
3	Frontier	88.55	9.63	1.82
4	GTR	94.59	2.70	2.70
5	Juke	89.35	8.28	2.37
6	Kicks	66.67	0.00	33.33
7	Leaf	90.08	6.87	3.05
8	Maxima	85.58	12.97	1.45
9	Murano	90.00	5.00	5.00
10	NV	86.67	13.33	0.00
11	NV200	60.87	34.78	4.35
12	Pathfinder	84.42	13.11	2.47
13	Quest	84.59	13.87	1.54
14	Rogue	78.54	18.23	3.23
15	SX200	89.80	8.16	2.04
16	SX240	93.33	6.67	0.00
17	Sentra	83.45	14.44	2.11
18	Titan	91.13	7.26	1.61

19	Truck	89.36	4.26	6.38
20	Versa	83.76	14.31	1.94