Customer Support on Twitter

By : Tawaah Alhaddad

INTRODUCTION

In this project, the study will focus on modern customer support practices on one of the most popular social media platforms 'Twitter' for Over 3 million tweets and replies from the biggest brands and companies its impact. This will give a wide view to enhance my job as customer service representative in a mall which customer support on twitter is new filed to my company.

Original Dataset

```
full_df = pd.read_csv("twcs.csv", nrows=10000)
df = full_df[["text"]]
df["text"] = df["text"].astype(str)
full_df.head()
```

```
[nltk_data] Downloading package stopwords to /root/nltk_data...
[nltk_data]   Package stopwords is already up-to-date!
Requirement already satisfied: pyspellchecker in /usr/local/lib/python3.7/dist-packages (0.6.2)
```

	tweet_id	author_id	inbound	created_at	text	response_tweet_id	in_response_to_tweet_id
0	1	sprintcare	False	Tue Oct 31 22:10:47 +0000 2017	@115712 I understand. I would like to assist y...	2	3.0
1	2	115712	True	Tue Oct 31 22:11:45 +0000 2017	@sprintcare and how do you propose we do that	NaN	1.0
2	3	115712	True	Tue Oct 31 22:08:27 +0000 2017	@sprintcare I have sent several private messag...	1	4.0
3	4	sprintcare	False	Tue Oct 31 21:54:49 +0000 2017	@115712 Please send us a Private Message so th...	3	5.0
4	5	115712	True	Tue Oct 31 21:49:35 +0000 2017	@sprintcare I did.	4	6.0

DATA PREPARING

Some of the common text preprocessing / cleaning steps are:

- Lower casing
- Removal of Punctuations
- Removal of Stopwords
- Removal of Frequent words
- Removal of Rare words
- Conversion of emoticons to words
- Conversion of emojis to words
- Removal of URLs
- Chat words conversion
- Spelling correction

DATASET LINK

https://www.kaggle.com/thoughtvector/customer-support-on-twitter/code?datasetId=4133&sortBy=voteCount

Data after processing

```
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full_df.head()
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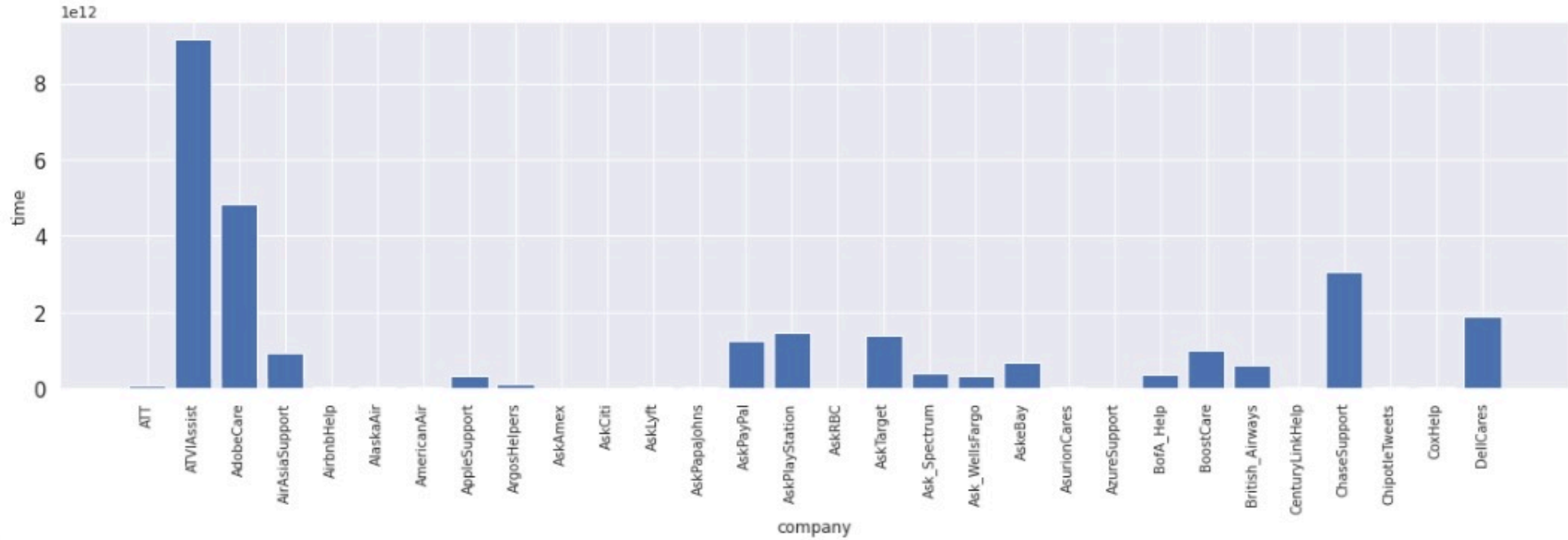
Answering

EDA Questions

01 The max time of delay for each company



EDA Questions

02 The time difference between the customer tweet and the company respond.

```
query_date = pd.to_datetime(Q_inrespond['created_at_x'])
respond_date = pd.to_datetime(Q_inrespond['created_at_y'])


Q_inrespond['DifferenceofTime']= pd.to_timedelta(respond_date - query_date)/ 60

Q_inrespond['DifferenceofTime']
```

```
0       0 days 00:00:01.233333333
1          0 days 00:00:03.200000
2          0 days 00:00:06.600000
3       0 days 00:00:04.033333333
4          0 days 00:00:05.250000
                    ...
2795       0 days 00:00:04.100000
2796       0 days 00:04:43.500000
2797    0 days 00:00:09.066666666
2799       0 days 00:08:25.200000
2800    0 days 00:01:10.266666666
Name: DifferenceofTime, Length: 2327, dtype: timedelta64[ns]
```

Answering

EDA Questions

03 Finding the subjectivity and polarity analysis for tweets.

	author_id_x	created_at_x	text_x	author_id_y	created_at_y	text_y	Sujectivity	Polarity	Sentiment	Analysis
0	115712	Tue Oct 31 21:45:10 +0000 2017	sprintcare worst customer service	sprintcare	Tue Oct 31 21:46:24 +0000 2017	send private message gain details account	1.000000	-1.000000	0	Negative
1	115713	Tue Oct 31 19:56:01 +0000 2017	y'all lie "great" connection bars lte still wo...	sprintcare	Tue Oct 31 19:59:13 +0000 2017	h wed definitely like work long experiencing i...	0.750000	0.800000	1	Positive
2	115715	Tue Oct 31 22:03:34 +0000 2017	whenever contact customer support tell shortco...	sprintcare	Tue Oct 31 22:10:10 +0000 2017	send private message send link access account fr	0.000000	0.000000	1	Natural
3	115716	Tue Oct 31 22:01:35 +0000 2017	actually thats broken link sent incorrect info...	Ask_Spectrum	Tue Oct 31 22:05:37 +0000 2017	information pertaining account assumption corr...	0.250000	-0.200000	0	Negative
4	115717	Tue Oct 31 22:06:54 +0000 2017	yo askspectrum customer service reps super nic...	Ask_Spectrum	Tue Oct 31 22:12:09 +0000 2017	hello apologies frustrations inconvenience i'd...	0.666667	0.333333	1	Positive
...	...	...	...	...	...	...	...	...	...	...
1329	117287	Wed Nov 22 08:12:16 +0000 2017	lagos nigeria week tmobile data work nigeria a...	TMobileHelp	Wed Nov 22 11:13:26 +0000 2017	knowing kind coverage expect traveling key wan...	0.566667	-0.066667	0	Negative
1330	117288	Wed Nov 22 06:59:32 +0000 2017	heres experience customer years amp bought pix...	TMobileHelp	Wed Nov 22 11:06:58 +0000 2017	limited time offer ended highlighted specifies...	0.527273	0.418182	1	Positive
1331	117289	Mon Oct 30 02:15:59 +0000 2017	dear new update sucks it's insanely hard navig...	hulu_support	Tue Oct 31 23:43:06 +0000 2017	isnt way roll back working making changes navi...	0.324053	-0.113826	0	Negative
1332	117290	Mon Oct 30 02:13:57 +0000 2017	guys maybe stuff longest time captions lasts o...	hulu_support	Tue Oct 31 23:41:54 +0000 2017	uh oh captions stay device happening specific ...	0.000000	0.000000	1	Natural
1333	117291	Mon Oct 30 01:57:36 +0000 2017	platform available specifically argentina	hulu_support	Tue Oct 31 23:40:03 +0000 2017	hulu available right well sure share interest ...	0.400000	0.400000	1	Positive

1104 rows x 10 columns

Imbalanced classes

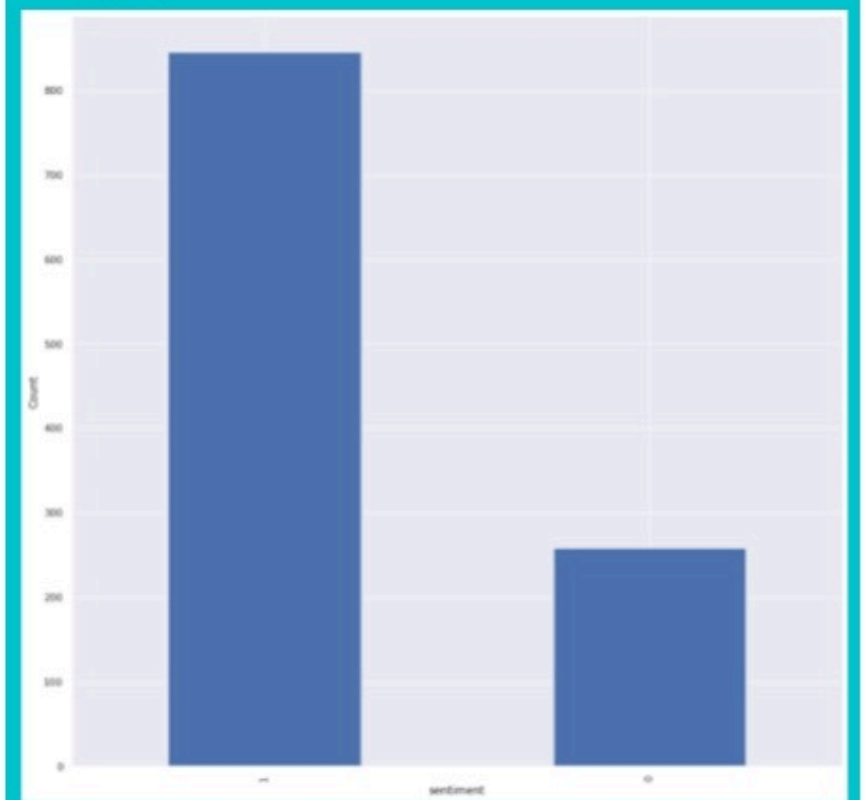
Discovering imbalance in dataset will be dealt with in two ways

#1

```
[34] #discovering imbalance in dataset
     Q_inrespond['Sentiment'].value_counts()

     1    846
     0    258
     Name: Sentiment, dtype: int64
```

#2



Algorithms

- Due the huge size of the dataset over 3M and the limited resources, I had to reduce the size of observation to 5000 and restricted the features to 1200.
- I have used only the tweets and sentiment columns.
- I have used logistic regression and Naive Bayes.
- I have used CountVectorizer and TF-IDF as word embedding and Create a logistic regression model to compare their performances. And run the experiment on imbalanced and balanced classes using SMOTE classes.

Result

I chose Logistic Regression with TFIDF balanced

	LR_CV	LR1-TFIDF	LRCV-balanced_class_smote	LRTFIDF-balanced_class_smote	Bayes_balanced_smote
Accuracy	0.810	0.760	0.679	0.819	0.756
Precision	0.805	0.761	0.829	0.843	0.838
Recall	0.988	0.994	0.725	0.934	0.838
F1 Score	0.887	0.862	0.774	0.886	0.838

THANK YOU!

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