

**Introduction**

**Methodology**

**Results**

**Conclusions**

**Future Work**

**Appendix**

**Business Need:** Improving services and customers satisfy for **Bacchanal Buffet.**

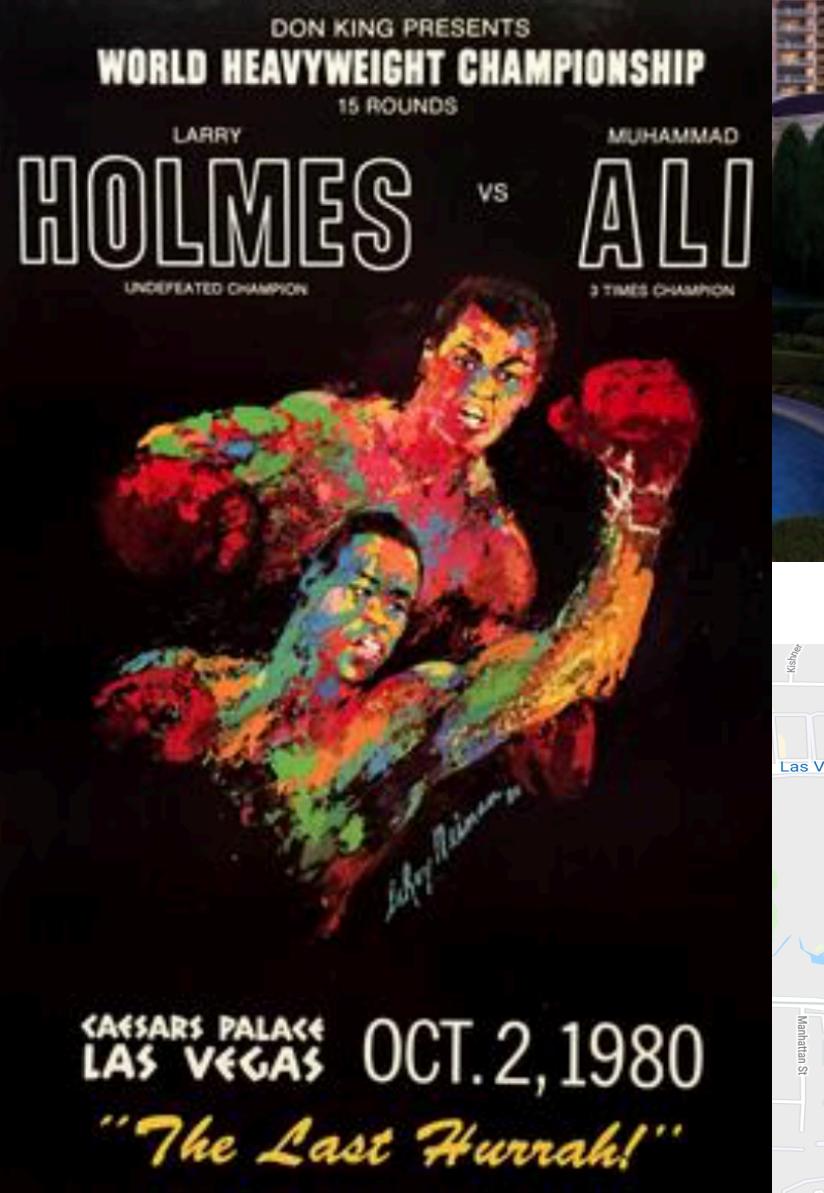
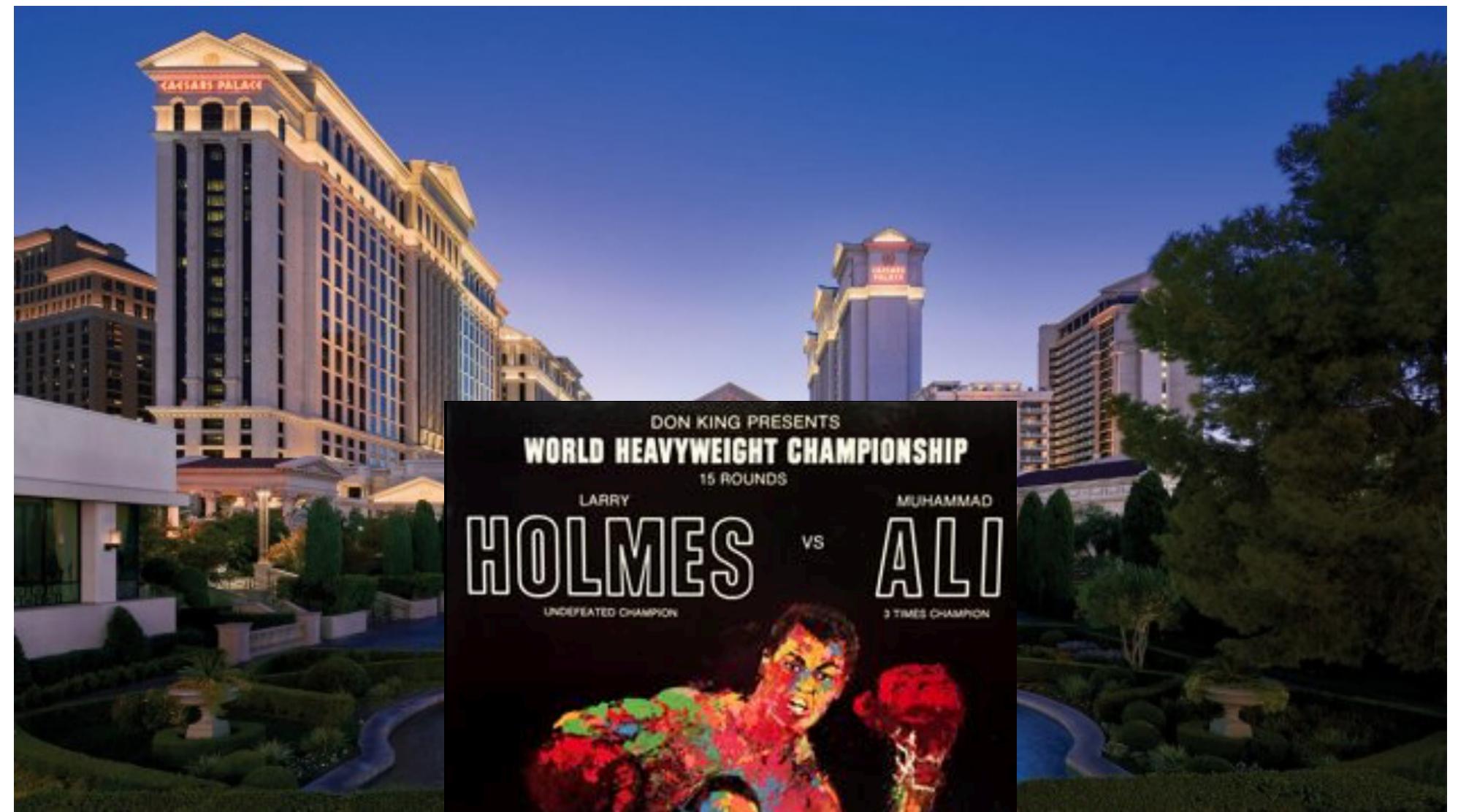
**Solution:**

Using **Yelp**, **Foursquare** and **Twitter** data, Analyse Reviews, Customer's Sentiment and provide suggestions.

**Objectives:**

- **NLP Supervised Classification** on Yelp Dataset
- **Sentiment Analysis on** Yelp Dataset
- **Scraping Foursquare** Dataset and Building **Sentiment Analysis**
- **Getting Tweets** about business and Building **Sentiment Analysis.**
- **Compare** Results

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### Bacchanal Buffet Claimed

6,112 reviews | #57 of 545 Quick Bites in Las Vegas | \$\$ - \$\$\$, Quick Bites, Italian, American



#### Bacchanal Buffet

Web sitesi Yol tarifi Kaydet

4,2 ★★★★☆ 6.084 Google yorumu  
££££ • Büfe

### Bacchanal Buffet

10674 reviews Details

\$\$\$ • Buffets Edit

Closed ⏱ Hours updated 1 month ago

caesarspalace Follow ...

1,594 posts 295k followers 111 following

4.5

258 Reviews

Las Vegas, Nevada [caesarspalace.com](http://caesarspalace.com)

42K Following 291.5K Followers

8.1 /10 1,812 ratings



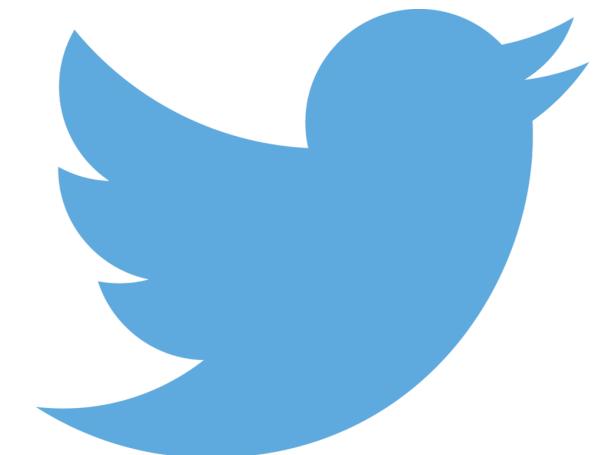
## Data Sources



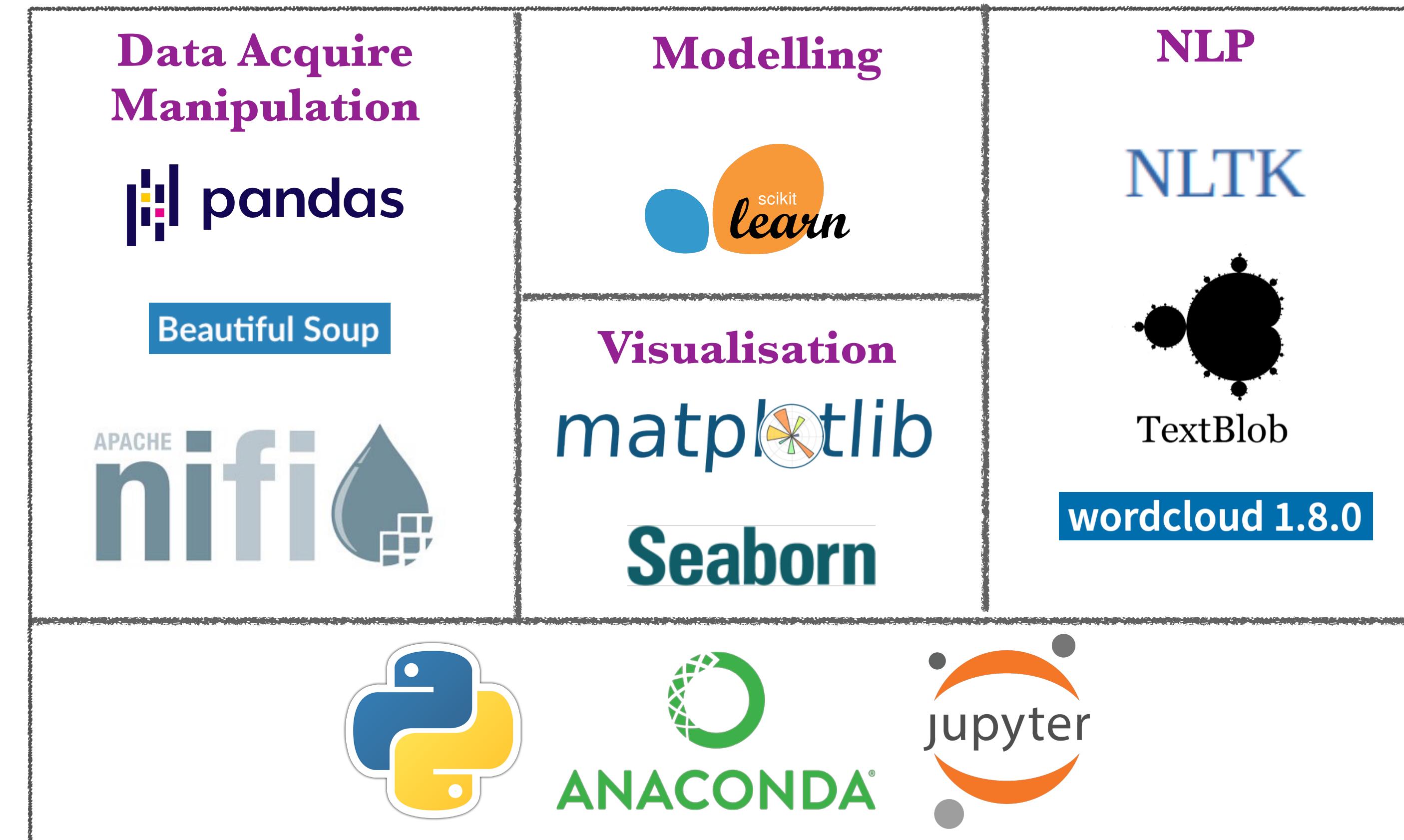
- Json
- 209.393 business
- 1.968.703 users
- 8.021.122 reviews - **10.674**



- Web Scraping
- 409 reviews



- Nifi Get Twitter



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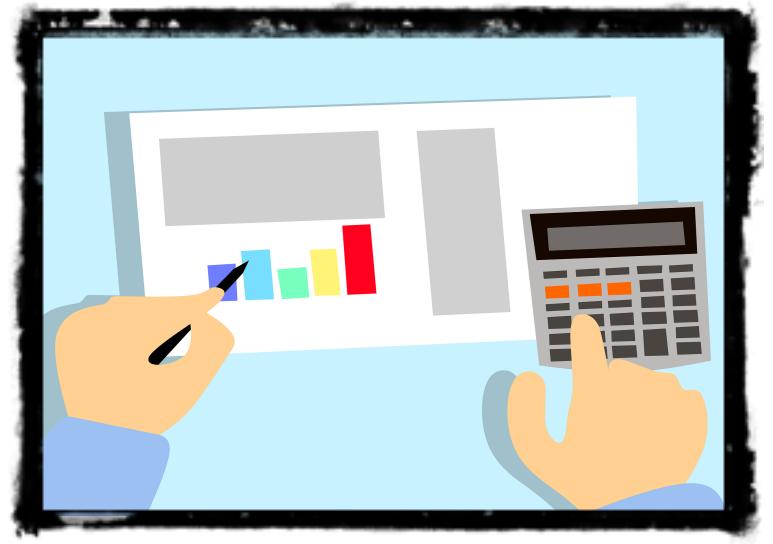
**Data Acquire**



**Exploratory  
Data Analysis**



**Text Processing**



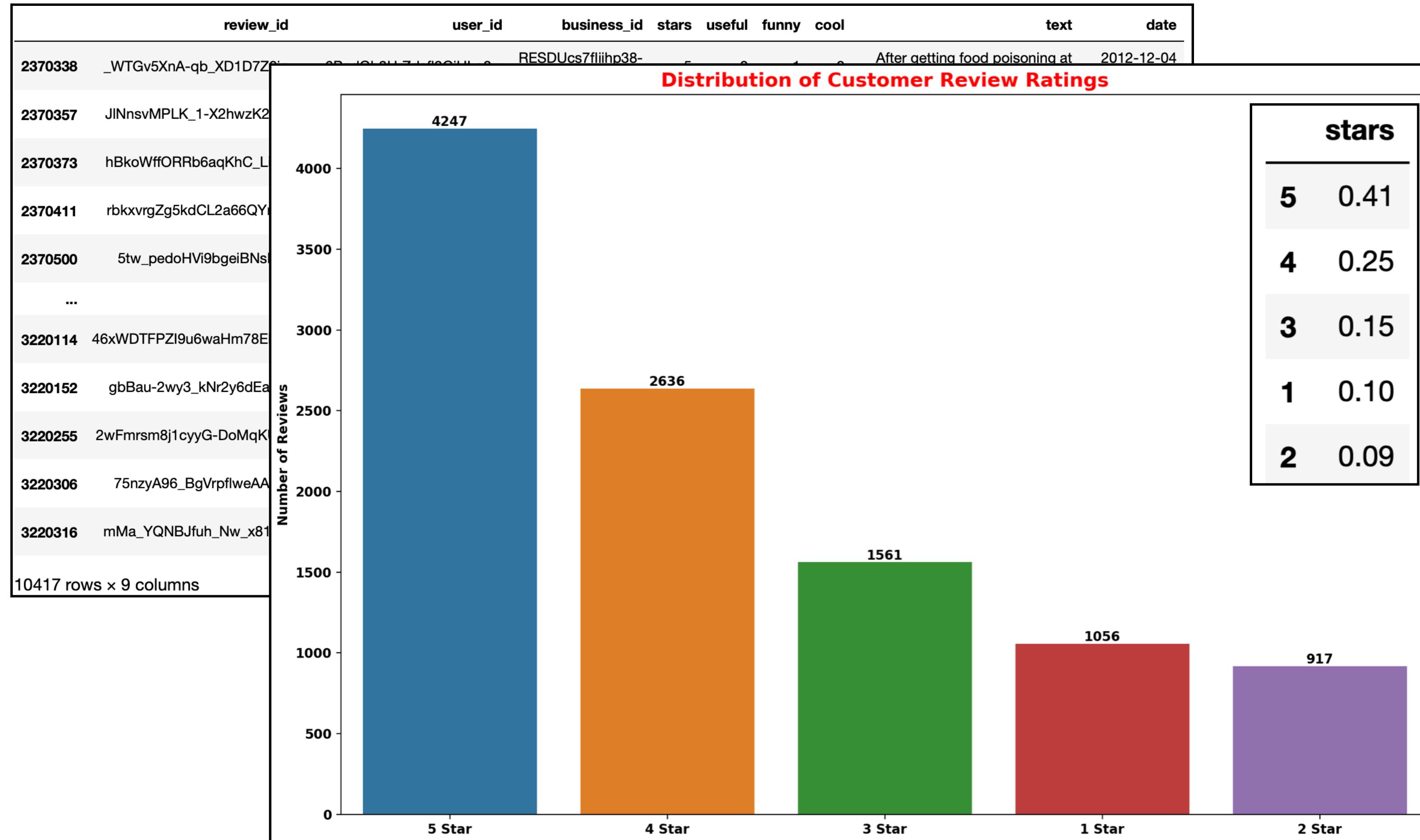
**Modelling**



**Evaluation**



Date of First Review: 2012-09-10 20:03:19  
 Date of Last Review : 2019-12-13 07:33:11



	Total	Percentage
2019	1685	16.18
2017	1588	
2015	1419	
2018	1407	
2016	1372	
2014	1319	
2013	1200	
2012	427	
	Total	Percentage
12	995	9.55
11	961	9.23
9	960	9.22
7	945	9.07
10	926	8.89
8	908	8.72
6	882	8.47
1	854	8.20
4	811	7.79
3	780	7.49
2	713	6.84
5	682	6.55

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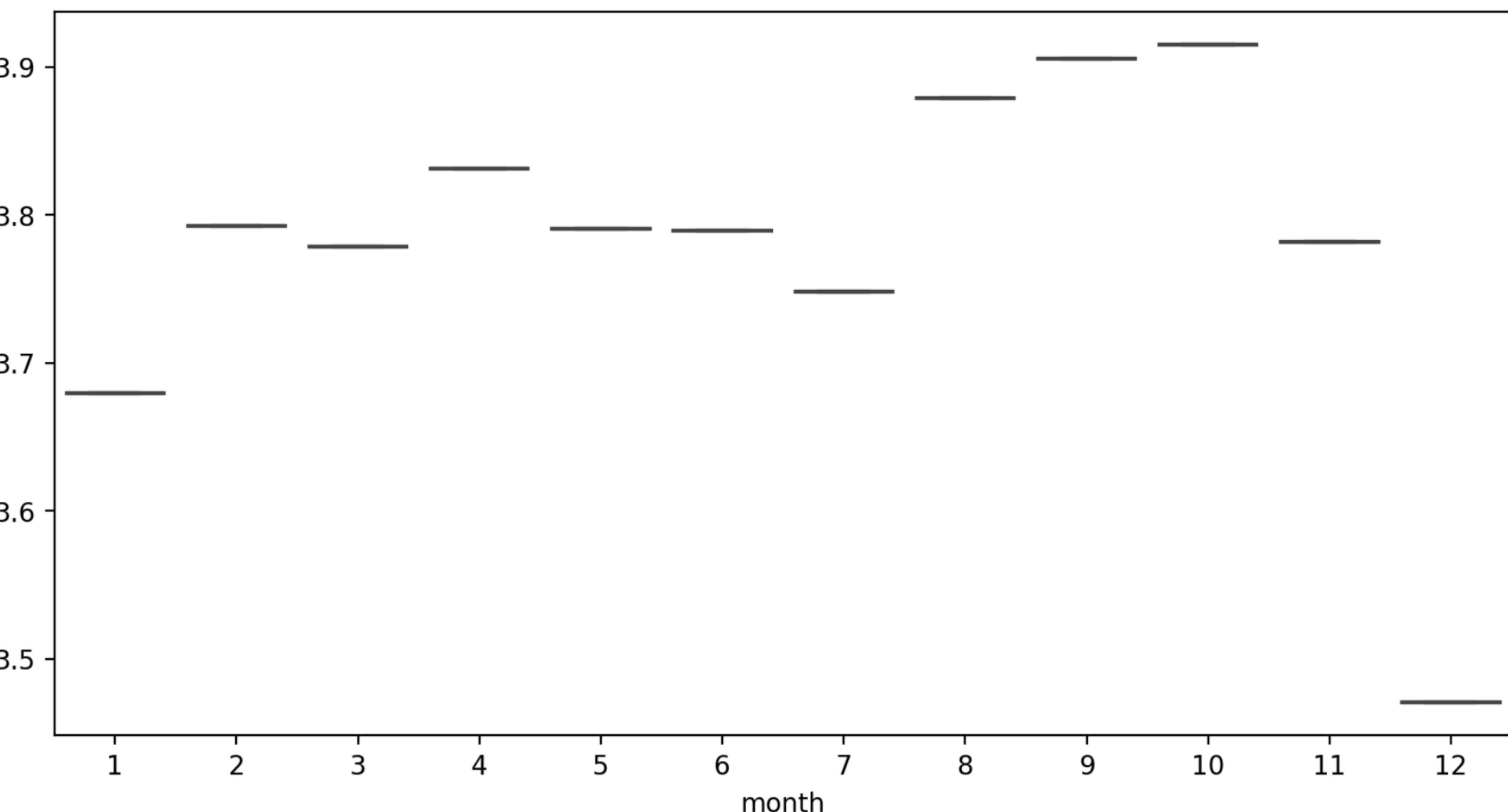
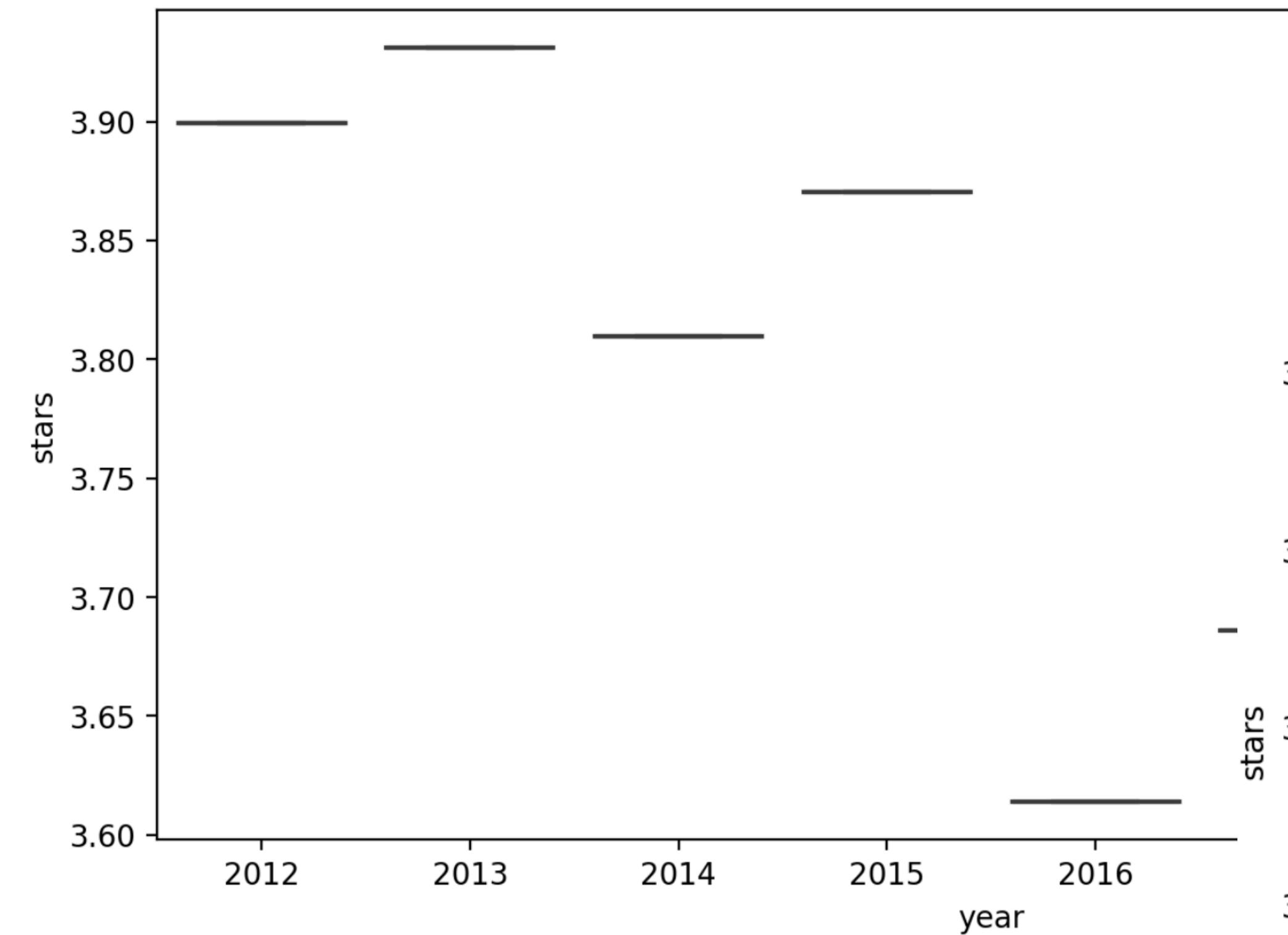
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# Text Processing

## • Adding Sentiment Features

- 1,2 → Negative
- 3 → Neutral
- 4,5 → Positive

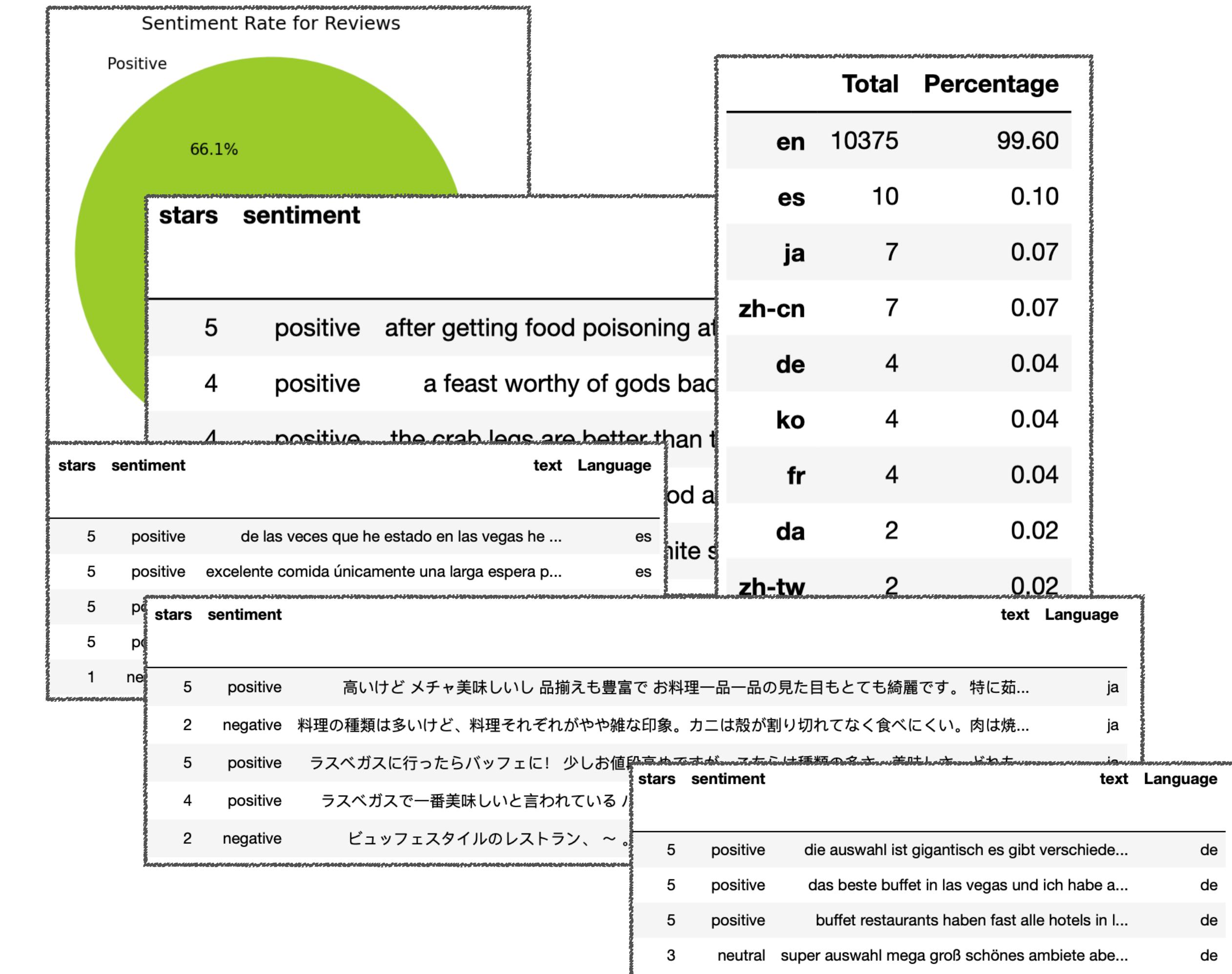
## • Removing Characters

- numbers (1-9)
- punctuation ()
- new line (\n)
- Convert Lower Case

## • Detecting Language

- Removing non English (42 reviews)

## • Applying Stemming & Lemmatisation





# Modelling

- **Split dataset into X (feature) and y (target)**
- **Split dataset into training and test sets**
- **Methods**
  - Count Vectorizer, 10374 rows x 15082 features
  - Count Vectorizer, Ngram, 10374 rows x 244175 features
  - TF-IDF
  - TF-IDF, Ngram
- **Classifier**
  - LogisticRegression(),
  - KNeighborsClassifier(),
  - DecisionTreeClassifier(),
  - RandomForestClassifier(),
  - AdaBoostClassifier(),
  - GradientBoostingClassifier(),
  - MultinomialNB(),
  - BernoulliNB()

Total records: 10374  
 Train records: 7261  
 Test records : 3113

	text															sentiment		
	after getting food poisoning at the palms hote...															positive		
	a feast worthy of gods baccarnal buffet in ...															positive		
	the crab legs are better than the ones at wick...															positive		
	aa	aaa	aaaaah	aaaahhh	aaaawesome	aaahhh	aaamazinnng	aaammmaazzinggg	aah	aahs	aalty	aawwsm				0	0	0
4396	0	0	0	0	0	0	0	0	0	0	0	0			0	0	0	0
3769	0	0																
1866	0	0	aa	aa	aa	aa	aaahhh	aaaahhh	aaaahhh	aaaahhh	aaaahhh	aaaahhh	aaaahhh	aaaahhh	aaaahhh	aaaahhh	aaaahhh	aaaahhh
740	0	0	decent	dessert	aaa	aaaah	sooo	sooo	line	line	line							
7248	0	0																
5504	0	0																
3424	0	0																
368	0	0																
6120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3294	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 rows × 15082 columns			2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			5 rows × 244175 columns															

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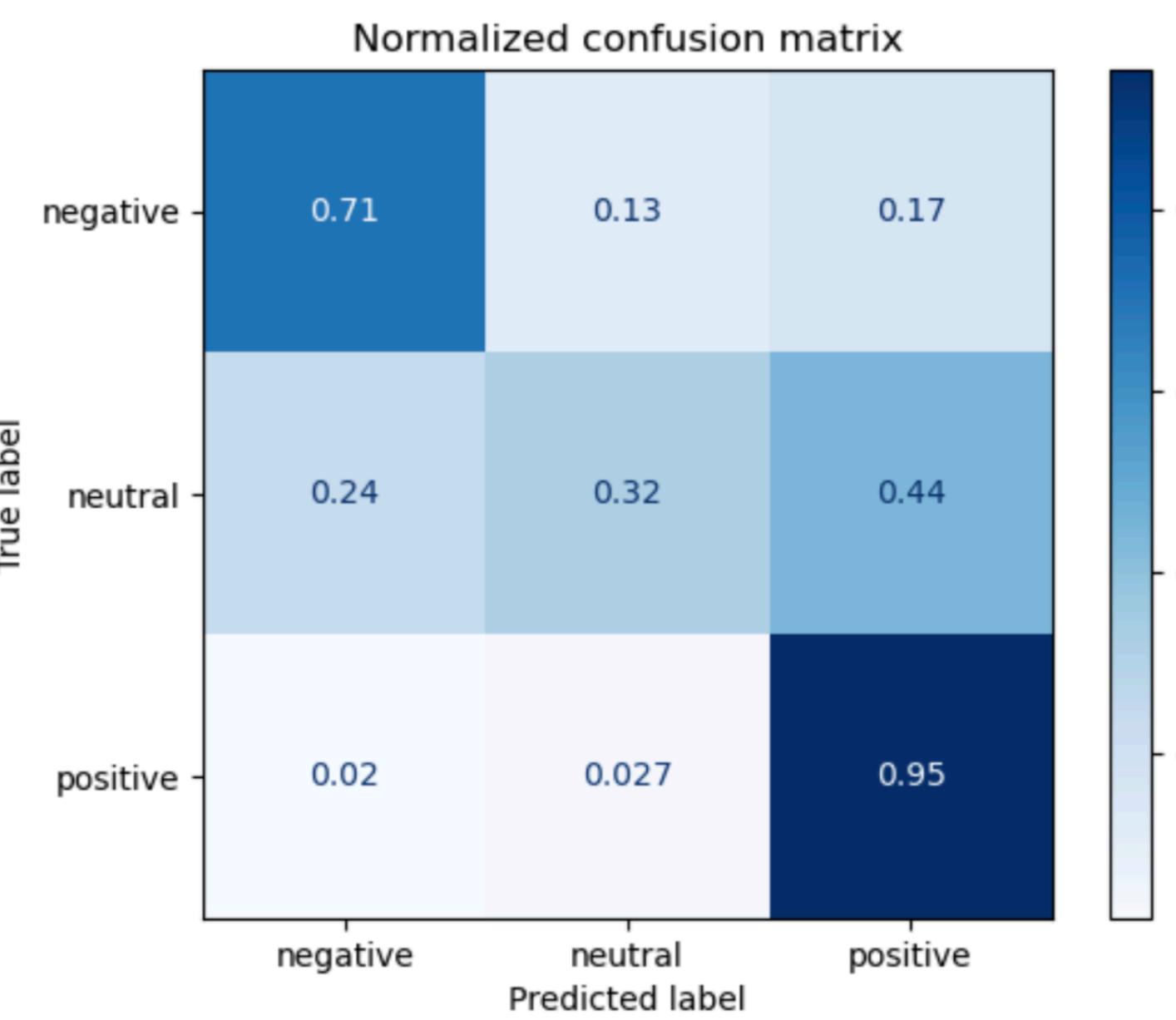
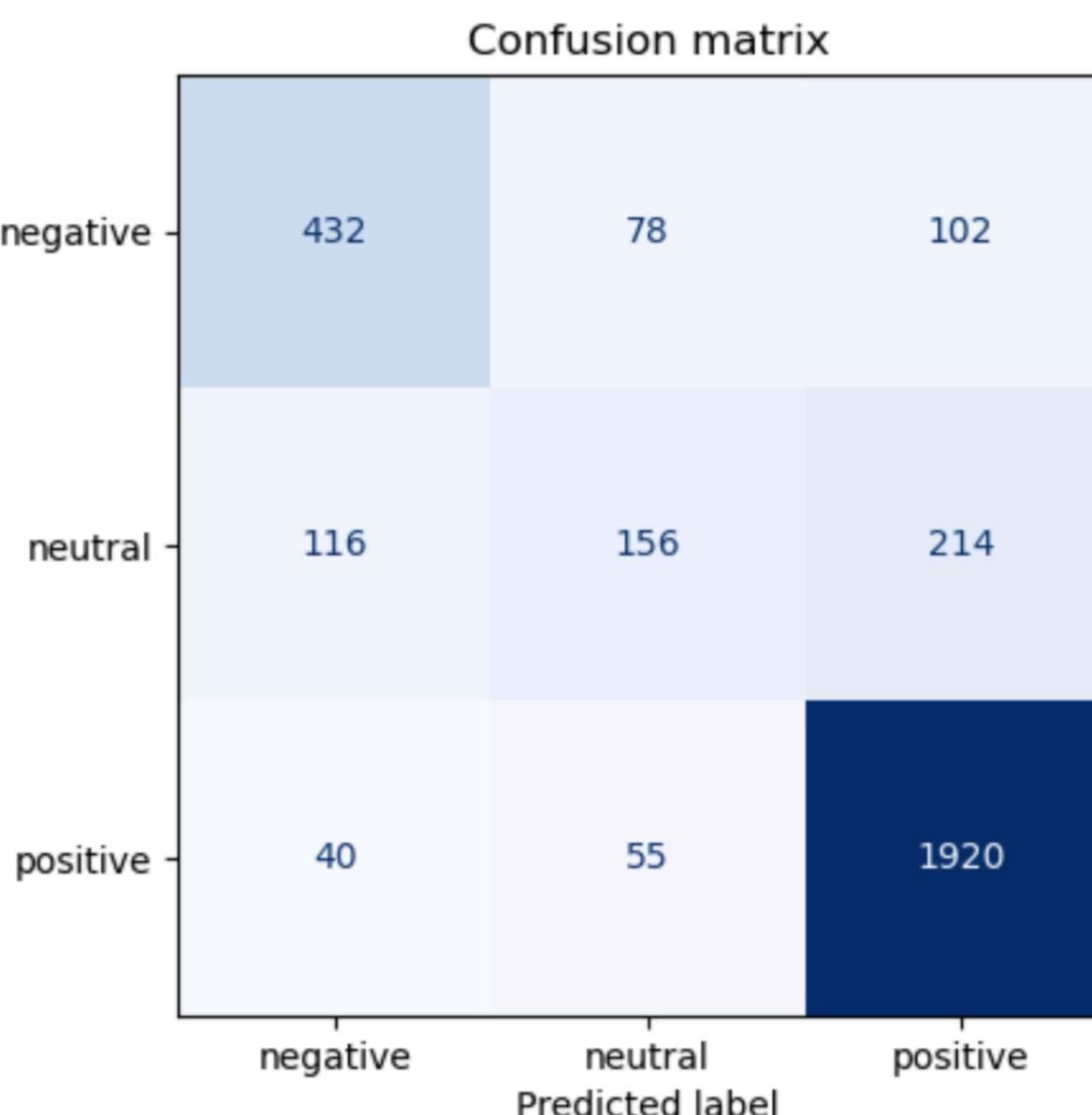
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Classifier	Methods	Accuracy	Precision	Recall	F1Score
LogisticRegression	CountVectorizer	78.541600	77.227423	78.541600	77.763924
KNeighborsClassifier	CountVectorizer	65.563765	58.065421	65.563765	59.195044
DecisionTreeClassifier	CountVectorizer	66.431095	64.793632	66.431095	65.521361
RandomForestClassifier	CountVectorizer	71.924189	67.052038	71.924189	64.055920
AdaBoostClassifier	CountVectorizer	74.590427	71.486140	74.590427	71.920428

Classifier	Methods	Accuracy	Precision	Recall	F1Score
LogisticRegression	N-grams	80.565371	78.451793	80.565371	78.910301
LogisticRegression	CountVectorizer	78.541600	77.227423	78.541600	77.763924
LogisticRegression	TF-IDF	80.083521	77.644710	80.083521	77.470489
MultinomialNB	CountVectorizer	77.642146	74.489197	77.642146	75.015267
LogisticRegression	TF-IDF, N-grams	77.802763	75.575087	77.802763	73.182093

GradientBoostingClassifier	N-grams	75.104401	72.800258	75.104401	70.707994
MultinomialNB	N-grams	68.936717	65.658364	68.936717	59.287891
BernoulliNB	N-grams	65.210408	64.561192	65.210408	51.998540
LogisticRegression	TF-IDF	80.083521	77.644710	80.083521	77.470489
KNeighborsClassifier	TF-IDF	69.322197	64.921525	69.322197	65.968503
DecisionTreeClassifier	TF-IDF	66.270479	64.928890	66.270479	65.542997
RandomForestClassifier	TF-IDF	71.635079	73.440651	71.635079	63.629069
AdaBoostClassifier	TF-IDF	75.008031	71.945767	75.008031	72.394351
GradientBoostingClassifier	TF-IDF	74.622551	71.518254	74.622551	70.512934
MultinomialNB	TF-IDF	65.531642	61.154101	65.531642	52.668915
BernoulliNB	TF-IDF	70.831995	69.111719	70.831995	68.581890
LogisticRegression	TF-IDF, N-grams	77.802763	75.575087	77.802763	73.182093
KNeighborsClassifier	TF-IDF, N-grams	71.024735	64.908096	71.024735	66.157427
DecisionTreeClassifier	TF-IDF, N-grams	65.081915	64.040486	65.081915	64.502236
RandomForestClassifier	TF-IDF, N-grams	69.225827	66.605293	69.225827	59.733296
AdaBoostClassifier	TF-IDF, N-grams	74.494057	71.660734	74.494057	72.203495
GradientBoostingClassifier	TF-IDF, N-grams	76.100225	73.697104	76.100225	72.492968
MultinomialNB	TF-IDF, N-grams	64.728558	41.897862	64.728558	50.868972
BernoulliNB	TF-IDF, N-grams	65.210408	64.561192	65.210408	51.998540





# Sentiment Analysis - Text Processing

- **Removing Characters**
  - numbers (1-9)
  - punctuation ()
  - new line (\n)
  - Convert Lower Case

- **Calculating Polarity, Subjectivity**
  - TextBlob(text).sentiment

- **Calculating Pos, Neg, Neu, Compound**
  - SentimentIntensityAnalyzer().polarity\_scores()

	text	stars	Language	polarity	subjectivity						
	after getting food poisoning at the palms hote...	5	en	0.367452	0.605702						
	a feast worth					polarity					
	the crab legs ar					subjectivity					
	not worth it to					stars					
	i would give										
1	-0.001825	0.521494									
2	0.090957	0.517530									
3	0.169395	0.516492									
4	0.248443	0.531899									
	text	stars	Language	polarity	subjectivity	sentiment	neg	neu	pos	compound	
	after getting food poisoning at the palms hote...	5	en	0.367452	0.605702	positive	0.092	0.657	0.251	0.9902	
	a feast worthy of gods baccarnal buffet in ...	4	en	0.217299	0.532126	positive	0.094	0.749	0.157	0.9970	
	the crab legs are better than the ones at wick...	4	en	-0.134722	0.731944	positive	0.110	0.770	0.120	0.1027	
	text										
	amazing selections good for a sea food					motherfriggin food poisoned you unsanitary ...					
	that was the best buffet experience eve					awful flavor texture poor selection of asia...					
	best food best best service best francesid					food was ok but got food poisoning and ruined ...					
	great buffet with a huge selection and de					worse service ever never got out drinks and...					
	best buffet i ve been to and such beauti					average food pa for thanksgiving dinner ...					





# WordCloud (5 Star)

# 4226 reviews



# WordCloud (1 Star)

1051 reviews







## Positive 2 words & 3 words

```
[('crab legs', 3379),
('best buffet', 1618),
('prime rib', 1595),
('buffet vegas', 1037),
('las vegas', 925),
('bacchanal buffet', 819),
('dim sum', 772),
('wicked spoon', 765),
('king crab', 698),
('ice cream', 672),
('quality food', 577),
('pretty good', 546),
('really good', 482),
('wait line', 475),
('carving station', 471),
('dessert bar', 469),
('food good', 465),
('vegas buffet', 413),
('snow crab', 396),
('wait time', 395)]
```

```
[('best buffet vegas', 538),
('king crab legs', 429),
('buffet las vegas', 296),
('best buffet ve', 226),
('snow crab legs', 224),
('best buffet las', 165),
('steamed crab legs', 152),
('mochi ice cream', 146),
('crab legs oysters', 134),
('hot crab legs', 124),
('chocolate covered strawberries', 120),
('hands best buffet', 113),
('favorite buffet vegas', 111),
('crab legs shrimp', 104),
('red velvet pancakes', 103),
('far best buffet', 101),
('cold crab legs', 98),
('buffets las vegas', 92),
('best buffet strip', 89),
('oysters crab legs', 86)]
```

## Negative 2 words & 3 words

```
[('crab legs', 247),
('wicked spoon', 137),
('king crab', 111),
('prime rib', 99),
('wait line', 78),
('bacchanal buffet', 70),
('wait time', 69),
('customer service', 66),
('quality food', 64),
('buffet vegas', 59),
('food good', 57),
('las vegas', 57),
('snow crab', 54),
('food poisoning', 52),
('hour wait', 49),
('best buffet', 48),
('worth price', 44),
('long line', 38),
('long wait', 35),
('waste money', 34)]
```

```
[('king crab legs', 37),
('snow crab legs', 24),
('best buffet vegas', 22),
('don waste money', 14),
('wicked spoon better', 14),
('don waste time', 13),
('buffet las vegas', 13),
('got food poisoning', 13),
('waste time money', 12),
('crab legs salty', 12),
('really looking forward', 11),
('king crab leg', 11),
('steamed crab legs', 10),
('stone crab claws', 9),
('alaskan king crab', 9),
('wait line hour', 9),
('buffets las vegas', 9),
('wicked spoon cosmo', 8),
('wait line pay', 8),
('buffet buffets pass', 8)]
```



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Tips 409 | Photos 2,102

SORT: POPULAR RECENT

**Michael Madamba** January 14, 2014  
Walk the entire buffet to see what they have. Get small portions to be able to try everything. Make sure to leave room for desserts.  
↑ Upvote ↓ Downvote

**Hunter Graham** December 7, 2014  
The multi million dollar buffet cannot be beat. Every item was fresh, hot and oh so tasty. Challenge yourself to eat all the meats.  
↑ Upvote 3 ↓ Downvote

**Natalie S.** January 17, 2013  
There is a whole other room of food in the back. Save room for dessert. They have a variety of Japanese mochi that is delicious!  
↑ Upvote ↓ Downvote

**SayNoMore :::** February 27  
Asian food is good. All meats. Peruvian ceviche is also there. Desserts are awesome. Good service. Nice environment.  
↑ Upvote ↓ Downvote

**Brett R.** January 24, 2016  
Best buffet ever! Crab legs, large grill stations, lots of sushi and other Asian dishes, and an enormous dessert selection.  
↑ Upvote ↓ Downvote

**Nikolai A. Taylor** March 23, 2013  
Best buffer ever! The desserts are to DIE for. Try the Malaysian one with tapioca, coconut & plum sugar (forget the name!)  
↑ Upvote 3 ↓ Downvote

**Melanie P** January 31, 2013  
The food here is AMAZING! the food is worth the wait. I'm a local&of all the places I've eaten this buffet is the best hands down!  
↑ Upvote 1 ↓ Downvote

**Edward Barcik** October 2, 2016  
very large buffet with a huge variety of different foods and you cannot go wrong



	text	polarity	subjectivity	sentiment	neg	neu	pos	compound
	best buffet	1.0	0.300	positive	0.0	0.192	0.808	0.6369
	absolutely amazing	0.6	0.900	positive	0.0	0.196	0.804	0.6240
	excellent buffet	1.0	1.000	positive	0.0	0.213	0.787	0.5719
	excellent à faire	1.0	1.000	positive	0.0	0.213	0.787	0.5719
	this place is top notch love love love	0.5	0.575	positive	0.0	0.217	0.783	0.9371

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	Total	Percentage
positive	262	85.06
negative	46	14.94

	text	polarity	subjectivity	sentiment	neg	neu	pos	compound
	best buffet	1.0	0.300	positive	0.0	0.192	0.808	0.6369
	absolutely amazing	0.6	0.900	positive	0.0	0.196	0.804	0.6240
	excellent buffet	1.0	1.000	positive	0.0	0.213	0.787	0.5719
	excellent à faire	1.0	1.000	positive	0.0	0.213	0.787	0.5719
this place is top notch love love love		0.5	0.575	positive	0.0	0.217	0.783	0.9371

	text	polarity	subjectivity	sentiment	neg	neu	pos	compound
	don t go disappointing	-0.600000	0.700000	negative	0.615	0.385	0.000	-0.4939
	a little overrated it s ok no more no less	0.036458	0.391667	negative	0.388	0.441	0.171	-0.3535
	over rated crazy unorganized experience very...	0.033333	0.566667	negative	0.364	0.486	0.150	-0.5468
	died and went to buffet heaven	0.000000	0.000000	negative	0.330	0.367	0.303	-0.0772
	como si no hubiera un mañana	0.000000	0.000000	negative	0.306	0.694	0.000	-0.2960



	text_word_count
<b>sentiment</b>	
<b>negative</b>	21.33
<b>positive</b>	16.90



## WordCloud (Positive)

262 reviews



## WordCloud (Negative)

46 reviews





## Positive 2 words & 3 words

```
[('best buffet', 34),
('buffet vegas', 12),
('crab legs', 11),
('make sure', 8),
('buffet ve', 8),
('ice cream', 8),
('come hungry', 7),
('las vegas', 6),
('worth penny', 6),
('great food', 6),
('food great', 6),
('wicked spoon', 6),
('buffet las', 5),
('buffet strip', 5),
('room dessert', 5),
('worth wait', 5),
('amazing food', 5),
('worth price', 5),
('asian food', 4),
('hands best', 4)]
```

```
[('best buffet vegas', 10),
('best buffet ve', 7),
('buffet las vegas', 5),
('best buffet las', 3),
('best buffet strip', 3),
('make sure leave', 3),
('sure leave room', 3),
('buffet ve vegas', 3),
('save room dessert', 3),
('steamed crab legs', 3),
('leave room desert', 2),
('weekday breakfast buffet', 2),
('crab prime rib', 2),
('definitely best buffet', 2),
('try ice cream', 2),
('food save room', 2),
('best buffet town', 2),
('hands best buffet', 2),
('food great dessert', 2),
('amazing want italian', 1)]
```

```
[('las vegas', 4),
('los más', 2),
('en el', 2),
('una hora', 2),
('el mejor', 2),
('wicked spoon', 2),
('crab legs', 2),
('come hours', 2),
('avoid long', 2),
('long wait', 2),
('come hungry', 2),
('hungry don', 2),
('long lines', 2),
('asian food', 2),
('hour wait', 2),
('quality food', 2),
('es los', 1),
('más baratos', 1),
('baratos pero', 1),
('pero sí', 1)]
```

```
[('come hungry don', 2),
('es los más', 1),
('los más baratos', 1),
('más baratos pero', 1),
('baratos pero sí', 1),
('pero sí los', 1),
('sí los más', 1),
('los más buenos', 1),
('más buenos dejes', 1),
('buenos dejes escapar', 1),
('dejes escapar las', 1),
('escapar las ostras', 1),
('las ostras ni', 1),
('ostras ni pedir', 1),
('ni pedir mimosas', 1),
('pedir mimosas incluidas', 1),
('mimosas incluidas en', 1),
('incluidas en el', 1),
('en el precio', 1),
('el precio bebidas', 1)]
```



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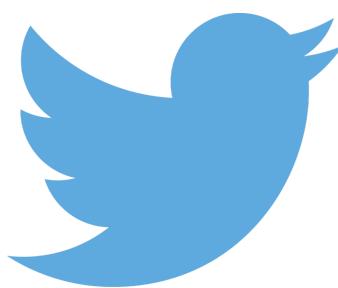
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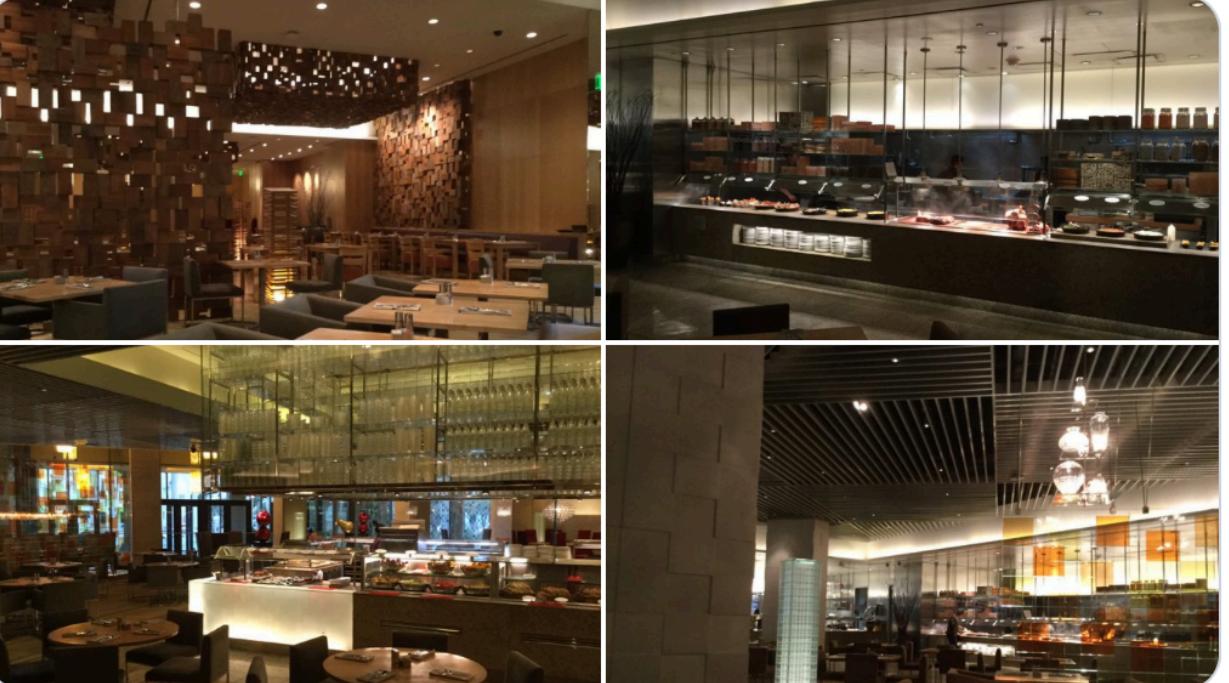


← Q bacchanal buffet ⚙

Top Latest People Photos Videos

RJ @lamARRJAY · Jul 1  
Got damn, I miss the **Bacchanal Buffet** 😢

Alastair @bluestorm2000 · Dec 12, 2018  
Man cannot eat by Happy Hour alone, so for the first time in ages I'm at the **Bacchanal Buffet** at Caesars. It's nearly 8.30 and the place is deserted, which is great, no fighting to get to the food stations 😊



Jonet @jonettywap · Apr 24  
I'm really craving the bottled guava juice from **Bacchanal Buffet** in Vegas 🍹

CNBC's The Profit ✅ @TheProfitCNBC · Jan 5, 2019  
Sorry, you can't jump through the screen. 😞 This delicious spread is just a taste of the cuisine **Bacchanal Buffet** serves each day.  
#TheProfitHighStakes #TheProfit

Watch The Profit: High Stakes premieres Tuesday, January 8th at 10P!



text	Language	polarity	subjectivity	sentiment	neg	neu	pos	compound
owner in talks to buy	NaN	0.000000	0.000	neutral	0.000	1.000	0.000	0.0000
Larry Holmes defeated Muhammad Ali outdoors a...	en	0.000000	0.000	negative	0.297	0.703	0.000	-0.7650
William Hill Caesars Palace owner in advan...	NaN	0.400000	0.600	positive	0.000	0.833	0.167	0.2500
10 00am Caesars Palace 100 NL Holdem Tourname...	NaN	0.000000	0.000	neutral	0.000	1.000	0.000	0.0000
CZR makes 3 70 Billion offer for William...	NaN	0.000000	1.000	neutral	0.000	1.000	0.000	0.0000
CZR makes 3 70 Billion offer for Wil...	NaN	0.000000	0.000	neutral	0.000	1.000	0.000	0.0000
THE BIG FIGHT LIVE FROM CAESARS PALACE LAS ...	en	0.034091	0.275	negative	0.188	0.661	0.152	0.0173

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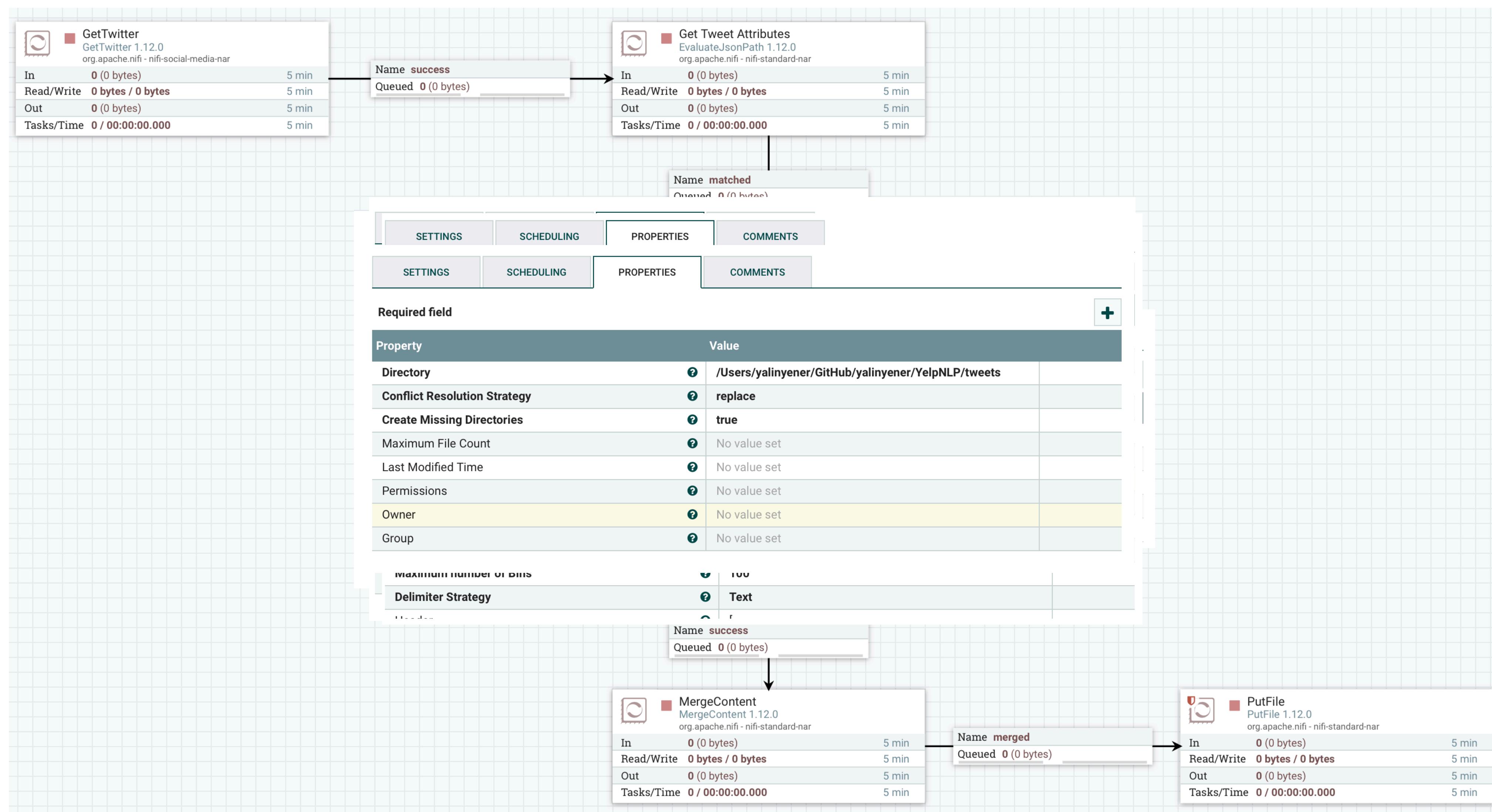
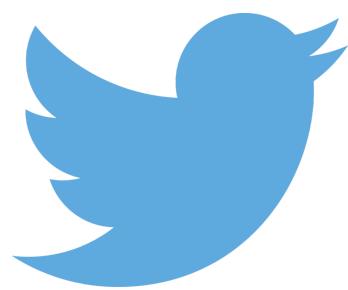
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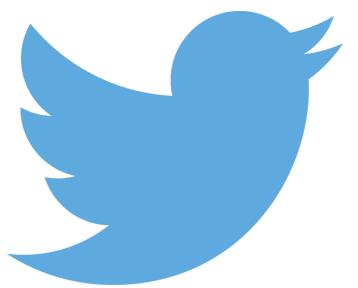
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## Appendix



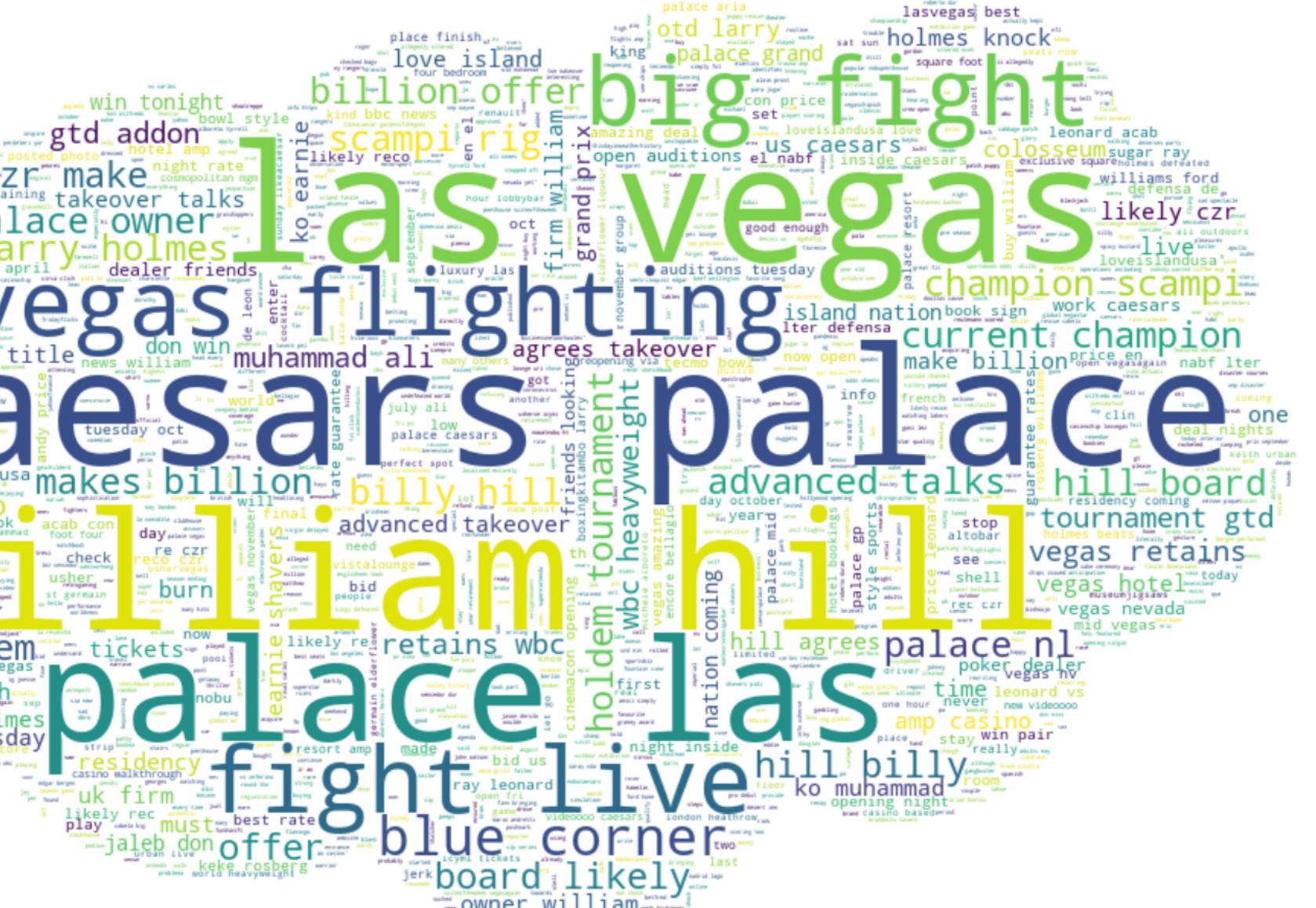
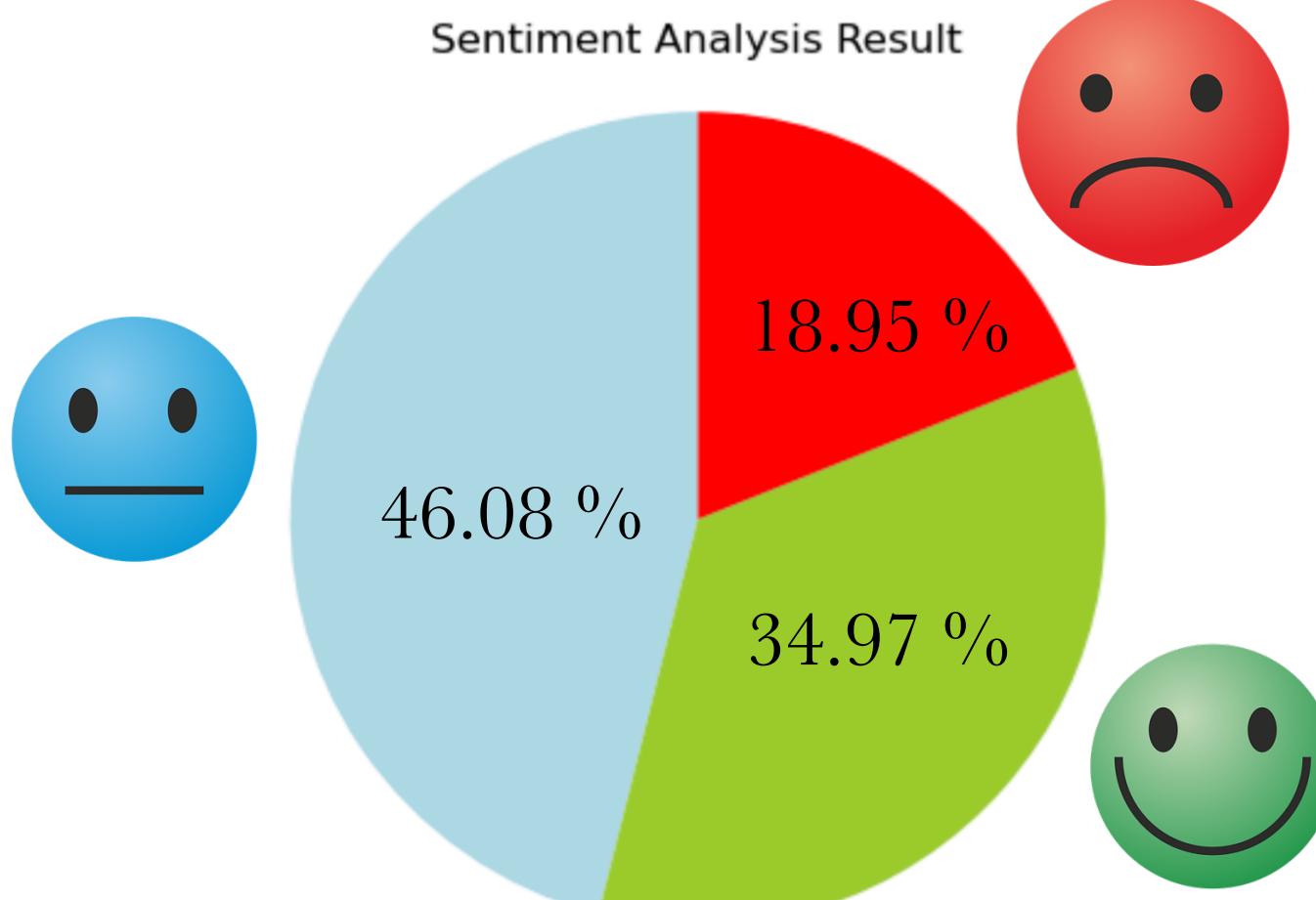
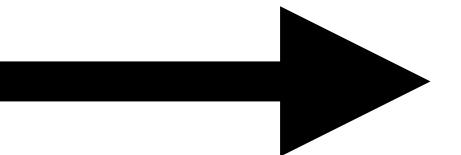
Screenshot of a Twitter search results page for "bacchanal buffet". The search bar at the top shows the query. Below it, there are tabs for "Top", "Latest", "People", "Photos", and "Videos". The "Top" tab is selected.

The first tweet is from RJ (@lamARRJAY) on July 1, 2018, saying "Got damn, I miss the Bacchanal Buffet 😢". It has 2 retweets and 4 likes.

The second tweet is from Alastair (@bluestorm2000) on December 12, 2018, saying "Man cannot eat by Happy Hour alone, so for the first time in ages I'm at the **Bacchanal Buffet** at Caesars. It's nearly 8.30 and the place is deserted, which is great, no fighting to get to the food stations 😊". It includes four images of the restaurant interior. It has 1 retweet and 14 likes.

The third tweet is from Jonet (@jonettywap) on April 24, 2018, saying "I'm really craving the bottled guava juice from **Bacchanal Buffet** in Vegas 🍹". It has 4 retweets and 5 likes.

The fourth tweet is from CNBC's The Profit (@TheProfitCNBC) on January 5, 2019, saying "Sorry, you can't jump through the screen. 😞 This delicious spread is just a taste of the cuisine **Bacchanal Buffet** serves each day. #TheProfitHighStakes #TheProfit". It includes a small image of the buffet spread. The text ends with "Watch The Profit: High Stakes premieres Tuesday, January 8th at 10P!"



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	<b>Yelp Supervised Cls</b>	<b>Yelp Sentiment</b>	<b>Foursquare Sentiment.</b>	<b>Twitter Sentiment</b>
<b>Positive Rate</b>	66.06	88.37	85.06	79.62
<b>Negative Rate</b>	18.93	11.25	14.94	16.28
<b>Neutral Rate</b>	15.01	0.39	-	4.1

- Waiting Long Time
- Expensive
- Salty
- Rude Waiter
- Restroom
- Customer services
- Food Poisoning



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