

Public Sentiment Toward the NFL

Can it predict weekly Fantasy Football outcomes?

- Ryan Timbrook
- Diego Vales
- David Madsen

Data Science to help you win...

PYTHON R

Using Data Science to Help Win Fantasy Football Games



BY GORDON YUN
NOVEMBER 6, 2018

COMMENTS 8



Social media and the rise of fantasy sports



How Top Fantasy Draft Companies Use Social Media

Fantasy draft sites emerged with the rise in fantasy sports popularity—particularly, the popularity of fantasy on social media.

Fantasy Insights with Watson

Use AI to make better decisions in Fantasy Football

How it works

ESPN Fantasy Insights draws upon the latest in machine learning techniques to turn unstructured data into valuable insights. Nearly 10 million players rely on the combined resources of Watson Discovery and Watson OpenScale running on the IBM Cloud to give them a competitive edge.

+100 MILLION
DOCUMENTS



1,900+
PLAYERS



32 TEAMS



[Get the latest updates on](#)
[Twitter @IBMSports](#)

10 Tips & Tricks to Win Your Fantasy Football League in 2019

BY THE FANTASY FOOTBALLERS // AUGUST 16, 2019

Fantasy Football Industry

Fantasy Football is an \$18.6 BILLION Market.



Fantasy Football is back in full swing — and business has never been bigger.

Average Time Spent
Consuming Sports



18 hours per week

Average Time Spent
Consuming Fantasy Sports



9 hours per week

Number of Fantasy Sports Players in US and Canada:

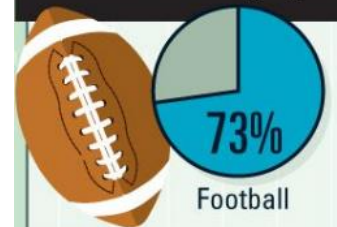


That's
\$6 billion more



than the current
estimated NFL
revenue...

Favorite Fantasy Sport



Of the 56.8 million
players, more than
40 million play
fantasy football.

brought to you by

sportsmanagementdegreehub.com

... Mapping Public Opinion To Weekly NFL Schedule ...

PRESEASON				SEPTEMBER				OCTOBER		OCTOBER	NOVEMBER				DECEMBER		
AT	VS	AT	VS	WK 1 - AT	WK 2 - VS	WK 3 - AT	WK 4 - VS	WK 5 - VS	WK 6 - AT	WK 7 - AT	WK 8 - VS	WK 9 - AT	WK 11 - AT	WK 12 - VS	WK 13 - VS	WK 14 - VS	WK 15 - AT
THURSDAY AUG 8 7:00 PM ABC 13	SATURDAY AUG 17 7:00 PM ABC 13	SATURDAY AUG 24 6:00 PM ABC 13	THURSDAY AUG 29 7:00 PM ABC 13	MONDAY SEPT 9 6:10 PM ESPN	SUNDAY SEPT 15 12:00 PM CBS	SUNDAY SEPT 22 3:25 PM CBS	SUNDAY SEPT 29 12:00 PM FOX	SUNDAY OCT 6 12:00 PM FOX	SUNDAY OCT 13 12:00 PM CBS	SUNDAY OCT 20 12:00 PM CBS	SUNDAY OCT 27 12:00 PM CBS	SUNDAY NOV 3 8:30 AM NFLN - LONDON	SUNDAY NOV 17 12:00 PM CBS	THURSDAY NOV 21 7:20 PM FOX/NFLN/AMAZON	SUNDAY DEC 1 7:20 PM NBC	SUNDAY DEC 8 12:00 PM CBS	SUNDAY DEC 15 12:00 PM CBS
													BYE WEEK 10				TBD DEC 21/22 TBD
																	SUNDAY DEC 29 12:00 PM CBS

Houston Texans
1st in AFC South



NFL Weekly Schedule - Public Opinion



Team: **Houston Texans**

Coach: **Bill O'Brien**

Player: **Deshaun Watson**



VEDAR

1. positive sentiment: `compound score >= 0.05`
2. neutral sentiment: `(compound score > -0.05) and (compound score < 0.05)`
3. negative sentiment: `compound score <= -0.05`

compound score metric

✗	✓	✓	✗	✓	✓	✗	✓	✓	✗	✓	✓
28:30	12:13	27:20	16:10	32:53	31:24	23:30	24:27	26:3	7:41	17:20	22:28

1: Obtaining Twitter Data

Three Approaches Taken:

- Steaming API
 - Limited to 7 days data
- Full Archive Historical Search
 - Weekly search starting from NFL schedule week 1 to week 13
 - 10,000+ Tweets (Team, Coach, Player)
- Public Twitter Data Sets Pre-labeled
 - Twitter US Airline Sentiment Analyze how travelers in February 2015
 - First GOP Debate Twitter Sentiment Analyze tweets on the first 2016 GOP Presidential Debate

Usage numbers are updated at regular intervals but are not updated instantaneously. Graphs and data points should be accurate and updated to reflect actual product usage within one minute. All times are in UTC.

Current Month ▾

Search Tweets: 30-Days / Sandbox ...

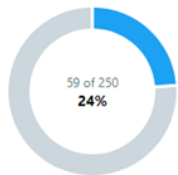
Requests this month
59 of 250

Projected requests
72

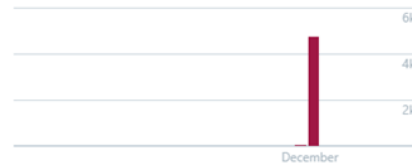
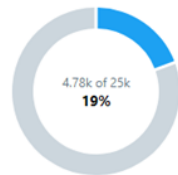
Tweets this month
4.78k of 25k

Projected tweets
5.8k

REQUESTS USAGE



TWEETS USAGE



Search Tweets: Full Archive / Premium ...

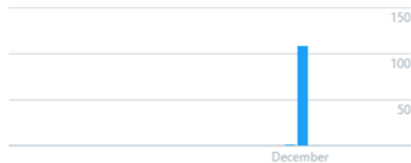
Requests this month
109 of 100

Projected requests
133

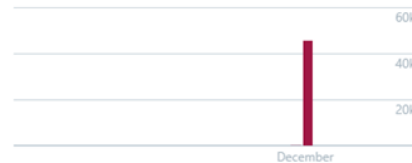
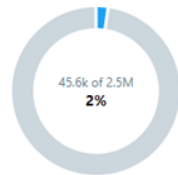
Tweets this month
45.6k of 2.5M

Projected tweets
55.4k

REQUESTS USAGE



TWEETS USAGE



Lesions Learnt

Request Usage Burn...

API Pagination Lesions Learned...

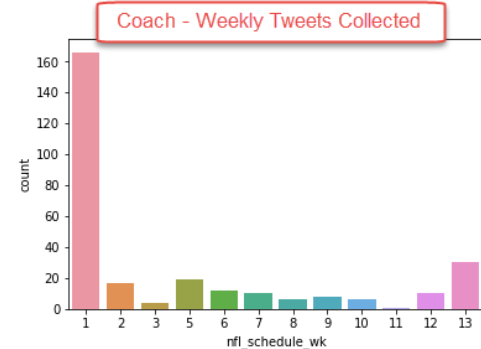
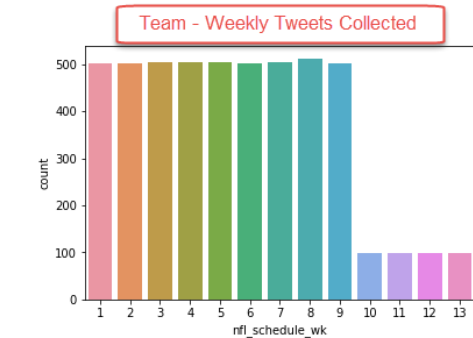
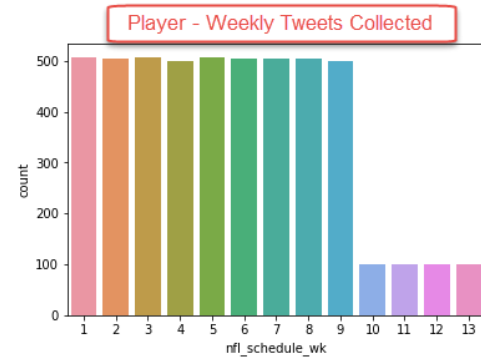
Need for Search Operational Parameter Tuning

Use case for saving raw data to file – ran out of requests before report was written

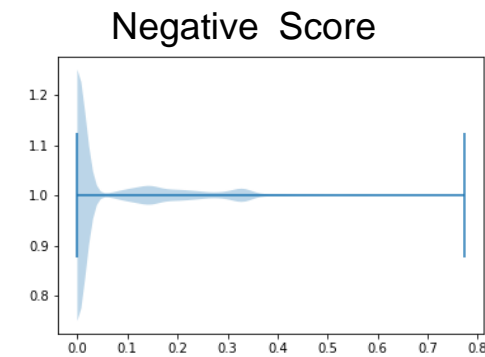
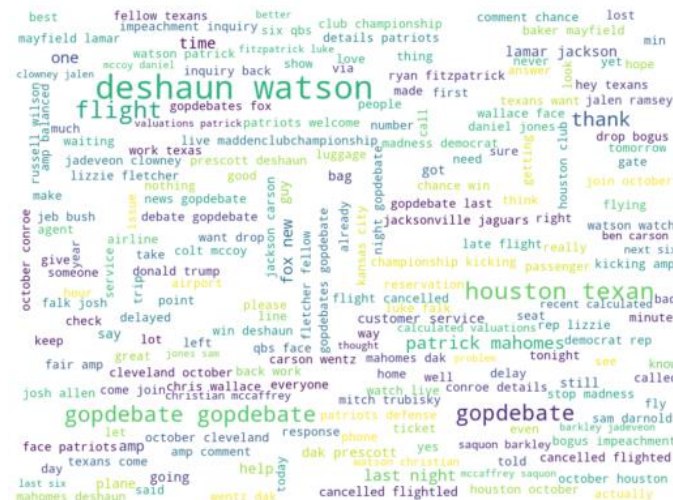
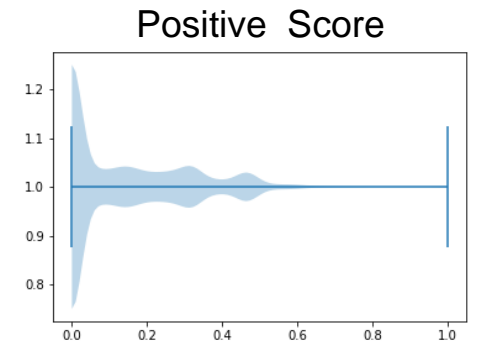
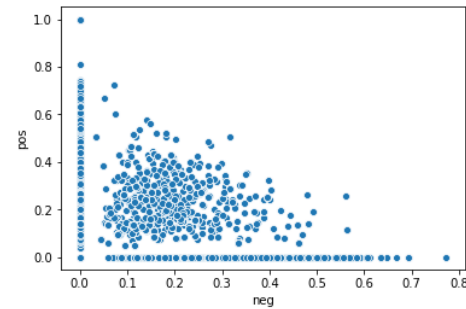
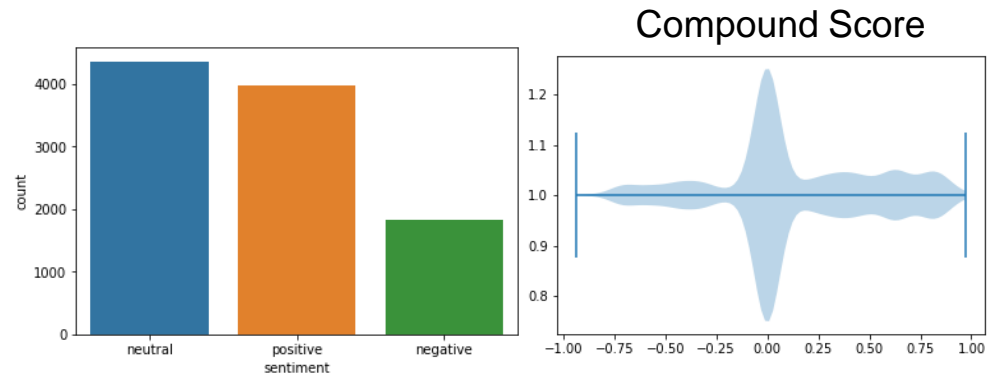
Twitter API Wrappers...
-- Twython – doesn't have documentation on how to use premium vs. standard free

3: Twitter Data Sentiment Classification

VEDAR Classification on NFL Twitter Data



Polarity Scoring

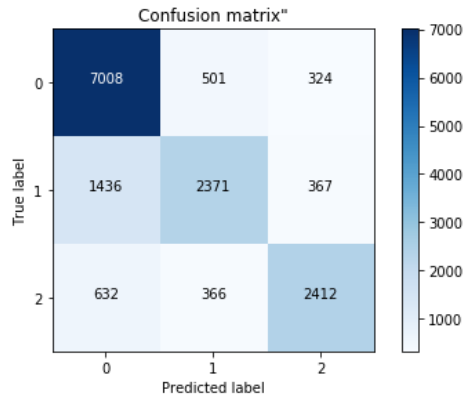


4: Sentiment Classification Model Results

****50,000 Labeled Tweets****

Best Fit Model: **77% Accuracy**

- Classification Type: **LinearSVM**
- Vectorizer: **TfidfVectorizer**
- N-Gram: **Bigram**
- Binary: **True**



	precision	recall	f1-score	support
negative	0.77	0.89	0.83	7833
neutral	0.73	0.57	0.64	4174
positive	0.78	0.71	0.74	3410
micro avg	0.76	0.76	0.76	15417
macro avg	0.76	0.72	0.74	15417
weighted avg	0.76	0.76	0.76	15417

Classification Trials



Model_Type	Vectorizer	N_Gram	Cross_Fold	Prediction_Accuracy	Total_Prediction_Points	Test_Recall_Score_Avg	Test_Precision_Score_Avg	Train_Recall_Score_Avg	Train_Precision_Score_Avg	Total_Build_Time	Total_Predict_Time	Confusion_Matrix
LinearSVM	tfidf	bigram	10	76.48	15417	0.7223	0.7599	0.87	0.9029	21.5007	0.0028	[[7008 501 324] [1436 2371 367] [632 366 2412]]
LinearSVM	count	unigram	10	76.45	3855	0.7393	0.7481	0.8745	0.8889	34.694	0.0018	[[1611 206 116] [260 717 93] [128 105 619]]
LinearSVM	count	bigram	10	75.77	3855	0.7383	0.7426	0.941	0.9457	62.9269	0.0011	[[1585 258 100] [255 701 81] [132 108 635]]
LinearSVM	tfidf	unigram	10	75.57	15417	0.7152	0.7556	0.8259	0.8682	11.2072	0.002	[[6905 510 343] [1496 2349 390] [692 335 2397]]
LinearSVM	count	bigram	10	74.53	15417	0.7243	0.7268	0.9643	0.9656	50.5876	0.0044	[[6305 1045 461] [1034 2671 424] [535 428 2514]]
LinearSVM	count	unigram	10	74.44	15417	0.7142	0.7177	0.9141	0.922	38.1779	0.0023	[[6316 977 470] [1123 2698 384] [544 442 2463]]
LinearSVM	count	unigram	10	74.31	15417	0.7168	0.7191	0.9143	0.9212	31.2185	0.0045	[[6304 985 532] [1050 2660 410] [566 418 2492]]
Multinomial_Naive_Bayes	count	bigram	10	72.89	15417	0.6698	0.7502	0.746	0.8294	0.4043	0.006	[[7299 283 193] [1889 1936 305] [1154 355 2003]]
Multinomial_Naive_Bayes	count	unigram	10	71.51	15417	0.6531	0.7245	0.7147	0.7924	0.2743	0.0036	[[7102 343 304] [1893 1893 443] [1070 340 2029]]
Multinomial_Naive_Bayes	count	unigram	10	71.51	15417	0.6468	0.7238	0.7078	0.7903	0.2601	0.003	[[7133 320 292] [1923 1870 415] [1139 304 2021]]

Predicting Player Outcomes from Tweets

Case: Deshaun Watson

Thousands of Tweets

Fantasy Points



97%

Fantasy Points



99%

DATA SCIENCE AT THE iSCHOOL AT SYRACUSE UNIVERSITY

ARCHITECTURE

ACQUISITION

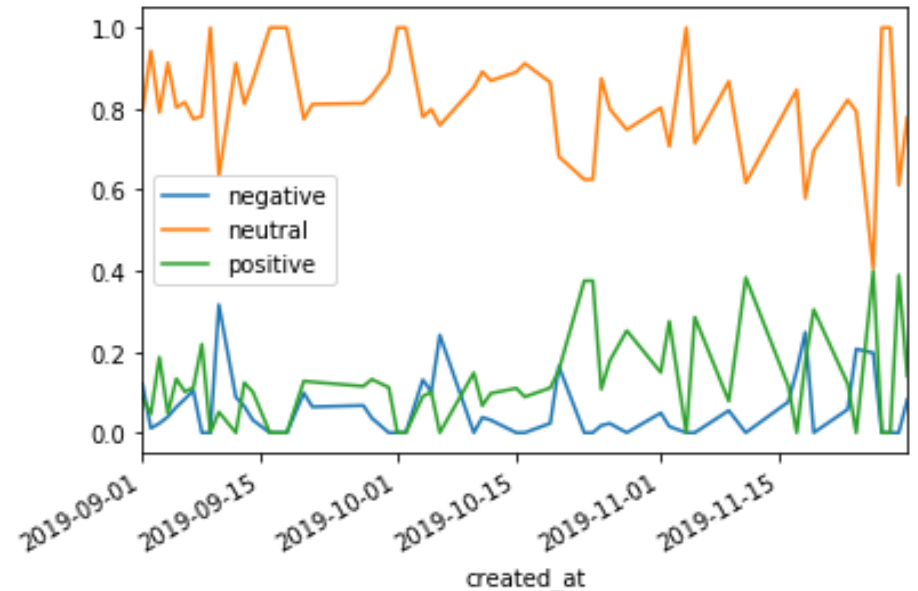
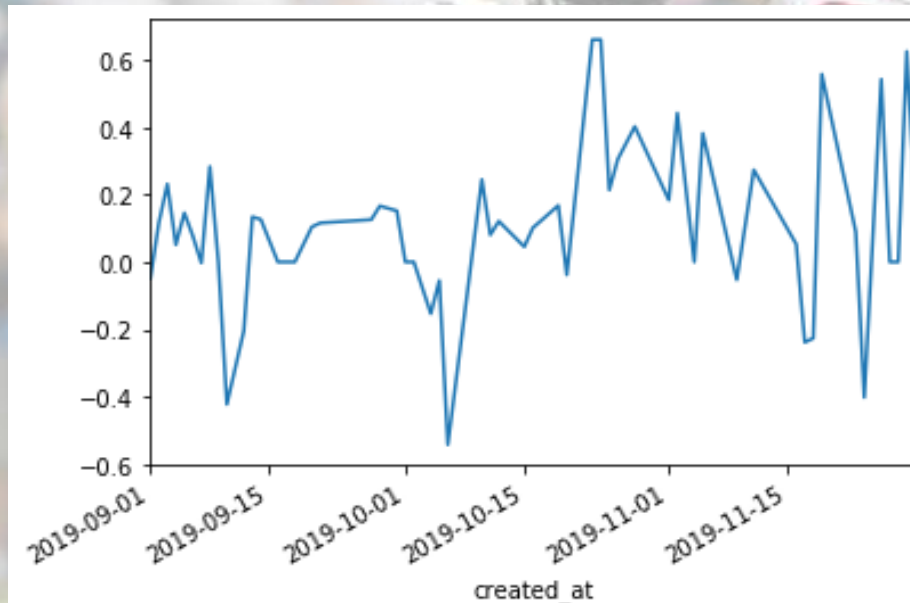
ANALYTICS

ARCHIVE

Get the full lifecycle view.

[iSCHOOL.SYR.EDU/BIGDATA](https://ischool.syr.edu/bigdata)

Tweet Sentiment Over Time



DATA SCIENCE AT THE iSCHOOL AT SYRACUSE UNIVERSITY

ARCHITECTURE

ACQUISITION

ANALYTICS

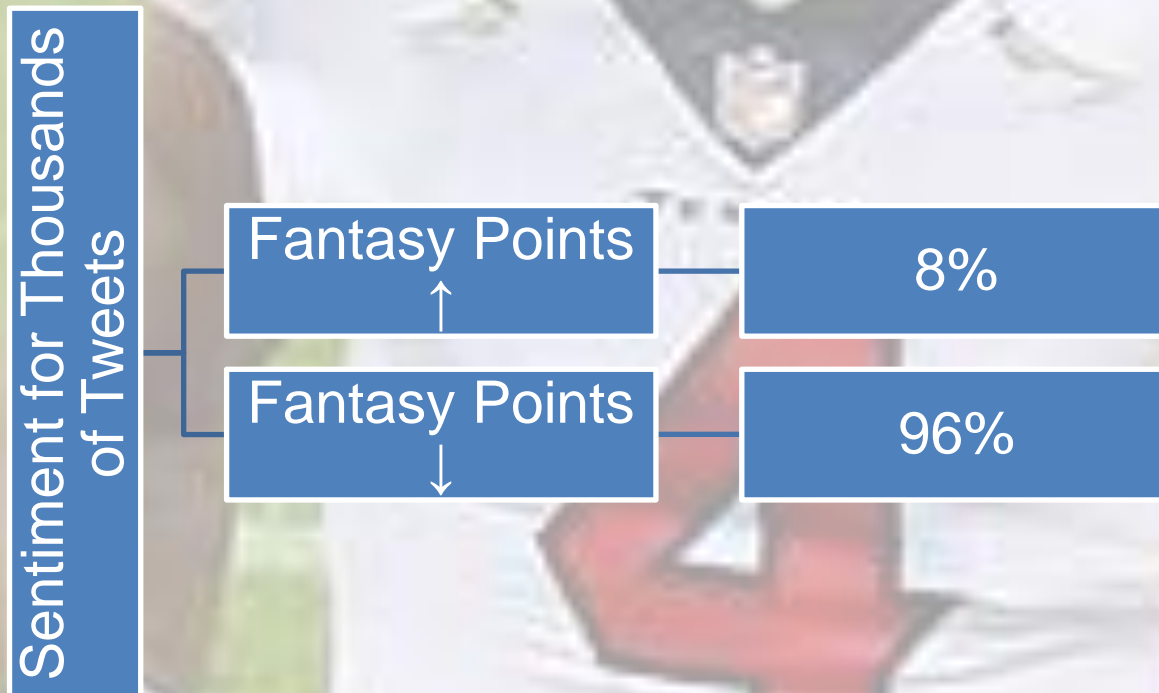
ARCHIVE

Get the full lifecycle view.

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Predicting Player Outcomes from Tweet Sentiment

Case: Deshaun Watson Revisited



DATA SCIENCE AT THE iSCHOOL AT SYRACUSE UNIVERSITY

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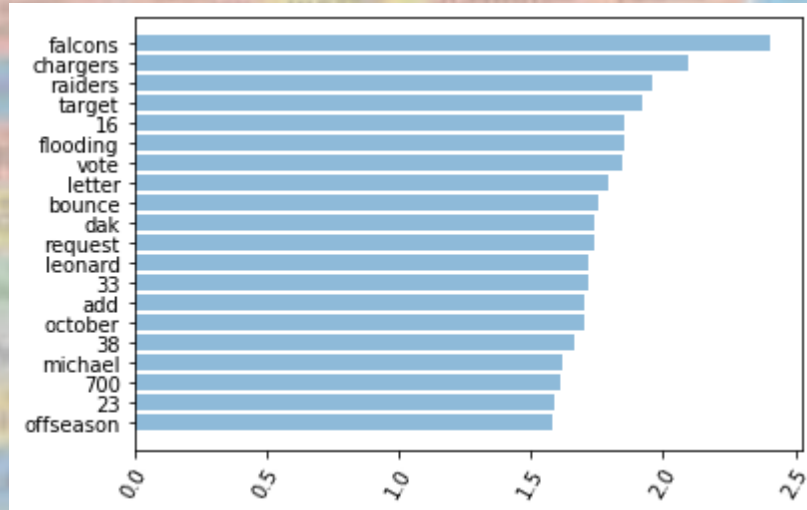
ARCHIVE

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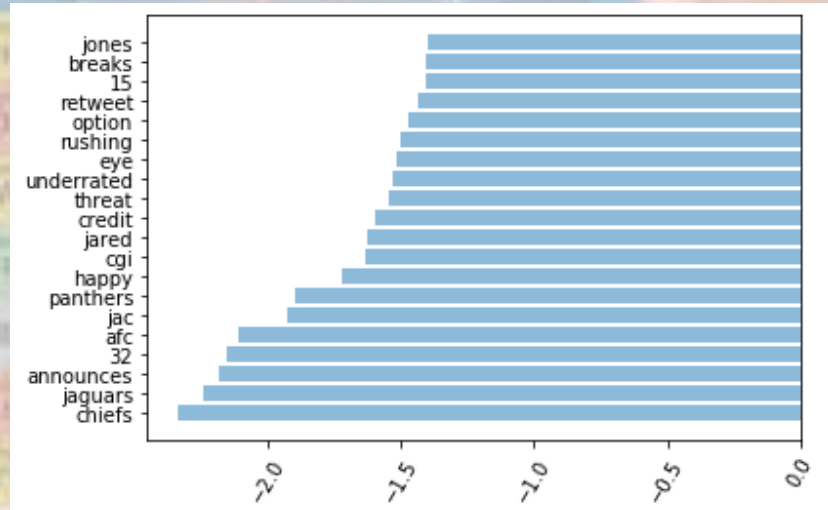
[iSCHOOL.SYR.EDU/BIGDATA](https://ischool.syr.edu/bigdata)

Feature Importance

Top Features



Bottom Features

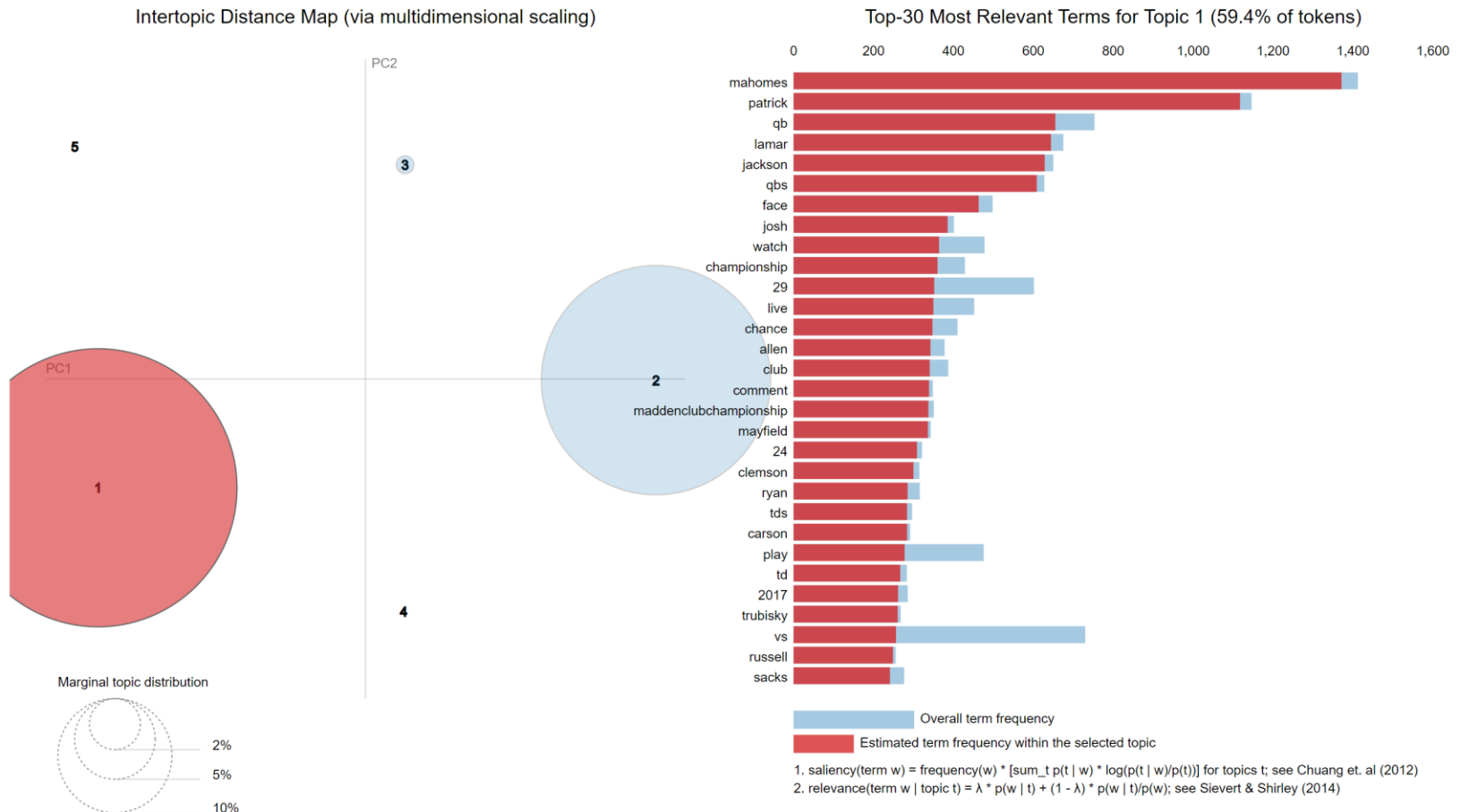


Topic Modeling

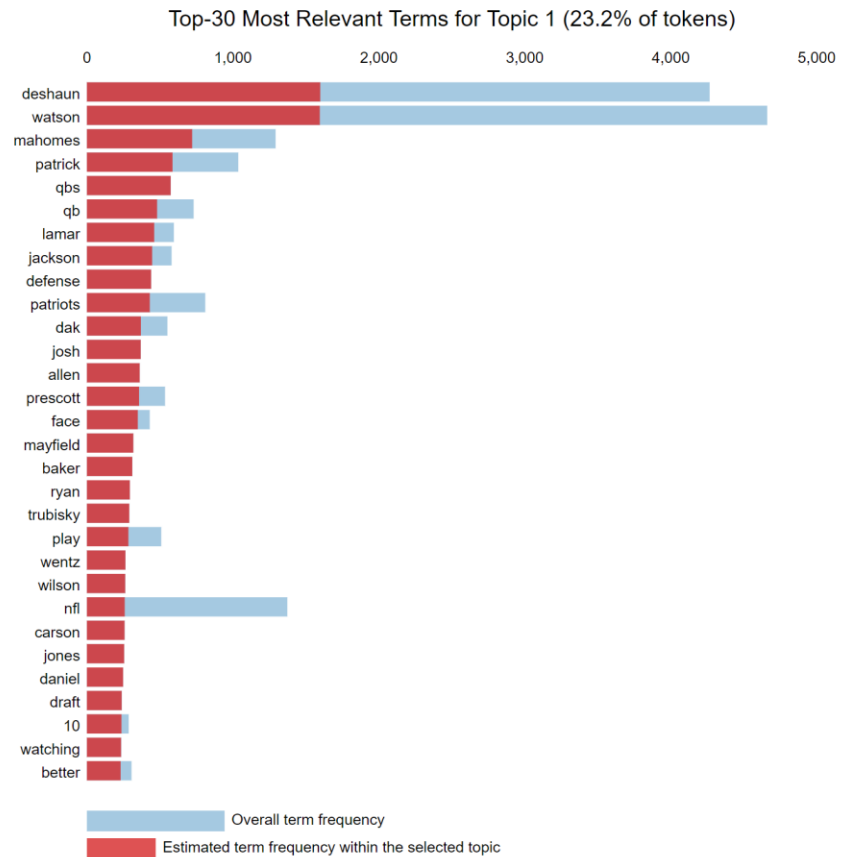
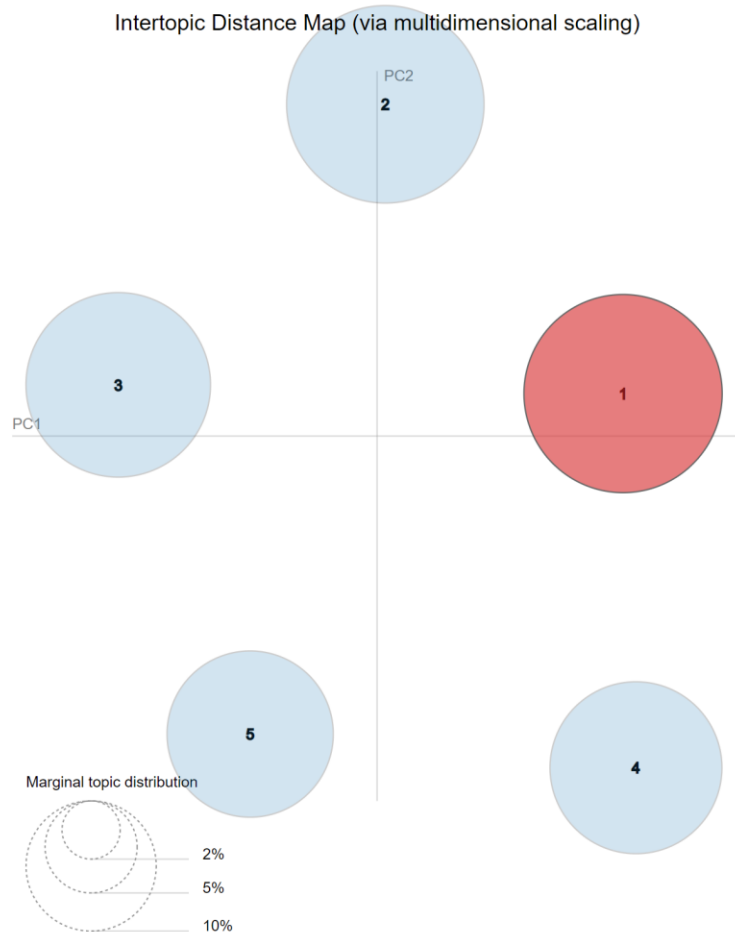
- Tweets
 - Player, Team, Coaches, Approaches
 - As files
 - As content
- Significance of emojis
 - Results
 - Included
 - Filtered



Topic Modeling - Files



Topic Modeling - Content



1. $\text{saliency}(\text{term } w) = \text{frequency}(w) * [\sum_t p(t | w) * \log(p(t | w)/p(t))]$ for topics t ; see Chuang et. al (2012)
2. $\text{relevance}(\text{term } w | \text{topic } t) = \lambda * p(w | t) + (1 - \lambda) * p(w | t)/p(w)$; see Sievert & Shirley (2014)



Question and Problem to Solve

Business Driver

- NFL revenue grew an estimated \$900 million to \$14 billion in 2017, in 2018 it generated about \$15 billion.
- Fantasy football and the spread of legalized sports betting across the U.S. promises to lock in fans and keep them focused on the game.
- As a Fantasy football player, how can Data Science help me make the most intelligence selections when deciding my weekly roster? “How do I win more?”

Problem to Solve

- Identify if real-time public popular opinion on NFL teams, players, and coaches is a predictor of their weekly fantasy football stats.

About the Data:

- Text data will be mined from three primary sources

- 1) Fantasy football websites like Yahoo Sports: <https://sports.yahoo.com/fantasy/>
- 2) Twitter Social Media API streams
- 3) Facebook Social Media API streams

Media Headlines



FAN FAVORITE

**You might not have heard of Fanatics yet—
but it's taking over sports apparel one league
at a time**

Quartz

FANTASY FIGURES

**How the \$7 billion US fantasy
football industry makes its money
in 2017**

**The bizarre, multibillion-dollar industry of
American fantasy sports**

December 13, 2014 • Quartz



CHOOSE WISELY

**Fantasy football now matters more than
official NFL teams**

Quartz



**There's finally a great use for IBM's Watson:
making fantasy football picks**

Quartz



REAL MONEY

**The two charts that explain why Yahoo is
pushing deeper into fantasy sports**

Quartz



**Why investors are pouring millions into
fantasy sports**

Quartz

Fantasy Football Industry

Q: How did fantasy go from weekend hobby to big-time business?

A: 2 words – DAILY FANTASY

In 2006, Congress passed the Unlawful Internet Gambling Enforcement Act (UIEGA), which banned online poker – deemed a game of chance – but left room for fantasy sports wagers – deemed a game of skill.



and

FanDuel

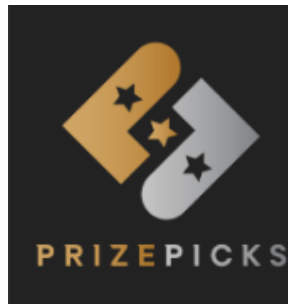


the two largest daily fantasy services – will each pay out more than **\$2 billion** in winnings this year. That's a big chunk of change.



But with entry fees - from \$2 to more than \$5,000 - generating **\$2.6 billion** this year, bearish projections continue.

Notable Fantasy Football Brands



DraftKings Promo Code and Review – Get 3 Free Months of RotoGrinders Premium for DraftKings