

# Classifying Fake News

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Driven to Discover<sup>SM</sup>

# Real or Fake? - Can You Tell?



# Misinformation Campaigns Have Long Been Used With Varying Intentions

Though England was preparing to declare war, a false report of peace between England and France led to a 5% rise in stocks in London.

1803



to a rumor that the gum contained spider eggs. Life Savers Inc. spent over \$100,000 to combat



A fake campaign against Starbucks advertising "Dreamer's Day", when the coffee chain would give free drinks to undocumented immigrants



# Misinformation can Damage a Company's Brand and Finances

- Tesla self-driving car kills robot at CES<sup>1</sup>
- **\$9.5B spent on brand management** annually to combat damaging misinformation<sup>2</sup>
- Opportunity to leverage predictive analytics to help companies **find and debunk fakes faster**



<sup>1</sup> Atkinson, 2019

<sup>2</sup> Cavazos, 2019

<sup>3</sup> dailymail.co.uk

# Cleanly Labeled “Fake News” Datasets Are Difficult to Find

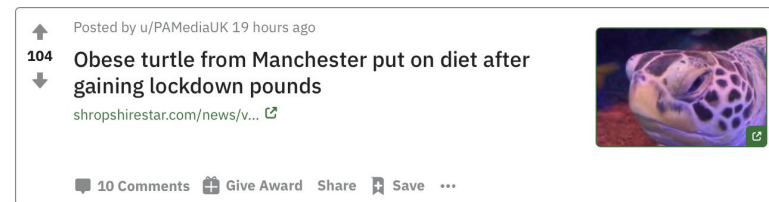
- Reddit subreddits for headlines from The Onion and real headlines that seem satirical but are real

## “The Onion” Headline



- Data Acquisition Process:
  - Use Pushshift Reddit API to scrape posts from Nov 2018 to today
  - 5.2K Onion Headlines & 9.6K Not The Onion Headlines

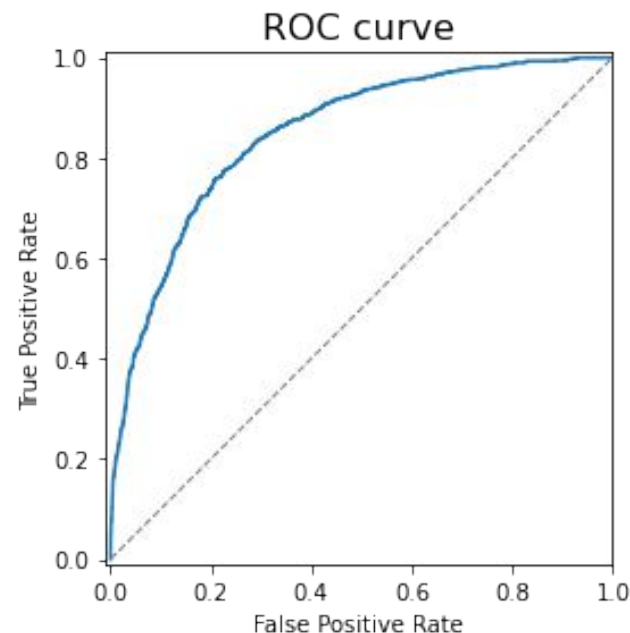
## “Not The Onion” Headline





# Classification Model built with Countvectorizer and Naive Bayes methods

- Countvectorizer
  - Each appearance of a word is counted to create a matrix of words to train the model
- Naive Bayes
  - Calculates the probability of a data point belonging to fake/real news and selects the class with the highest probability
- Performance metrics:
  - AUC score: 0.7631
  - Precision (Onion): 0.6779
  - Recall (Onion): 0.6922



# Important Features Can be Categorized

new	white hous	ruth bader ginsburg
man	berni sander	new york time
trump	introduc new	new york citi
time	new york	test posit covid
announc	thing know	wear face mask
nation	announc plan	daili flash post
say	donald trump	daili flash post hopperj
rort	high school	flash post hopperj
like	everi day	gender reveal parti
make	look like	

- Features fall into various categories
  - Media
  - Political
  - Trend
  - Bizzare



# Model Does Not Perform As Well On External Data

- Data source:
  - Kaggle dataset that contains political articles
    - Real news from Reuters
    - Fake news from multiple sources identified by Politifact
  - Same dataset used in published articles
- Classification result
  - Precision (Onion): 0.7103
  - Recall (Onion): 0.5640
- Precision is higher than on our original test dataset - not many “false positives” for fake news.

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# How Businesses Can Use the Model

- Businesses can use a model like this and filter through fake-news headlines that mention their name

**Find** fake news that is spreading about the business

**Learn** how widespread fake news is

**Analyze** speed at which fake news is spreading



**Create** a plan to mitigate the harm caused by the fake news

**Demotivate** fake news creators

**Save** business from harmful fake news

# Outcomes and Limitations of the Model

## Outcomes:

- Demotivate fake news spreaders
  - Flag fake news on social media and search engines
  - Companies can stop the spread of fake news
- Tool for businesses to become aware and act on fake news

## Limitations:

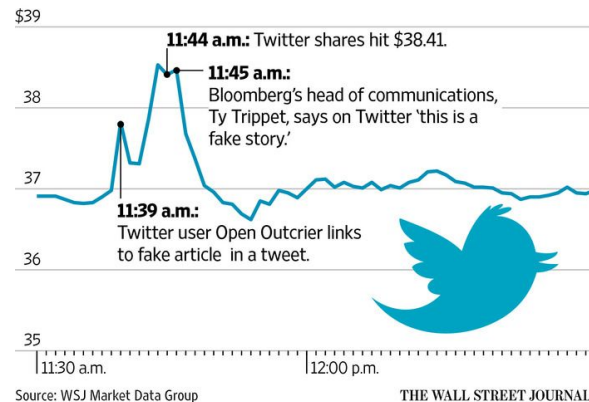
- Model did not test as well on a political fake news dataset
  - Compared to Onion dataset
- Model needs to be regularly re-trained to learn about current news topics

# Conclusion

- False information can be extremely harmful to companies
  - Public image
  - Stock prices
- Businesses can integrate the classification model to automatically detect articles about their company
- Our model will detect whether or not the articles are fake
  - Businesses can then take action and halt the spread of fake news through removal or public relation mitigation

## Bumpy Flight

Twitter's intraday share price from 11:30 a.m. to 12:30 p.m.



# References

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