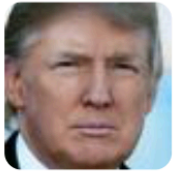


Refining Fake News Classification with Sentiment Analysis

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EMIS 8331

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Donald J. Trump  @realDonaldTrump · Apr 29

Mainstream (FAKE) media refuses to state our long list of achievements, including 28 legislative signings, strong borders & great optimism!



31K



19K



75K

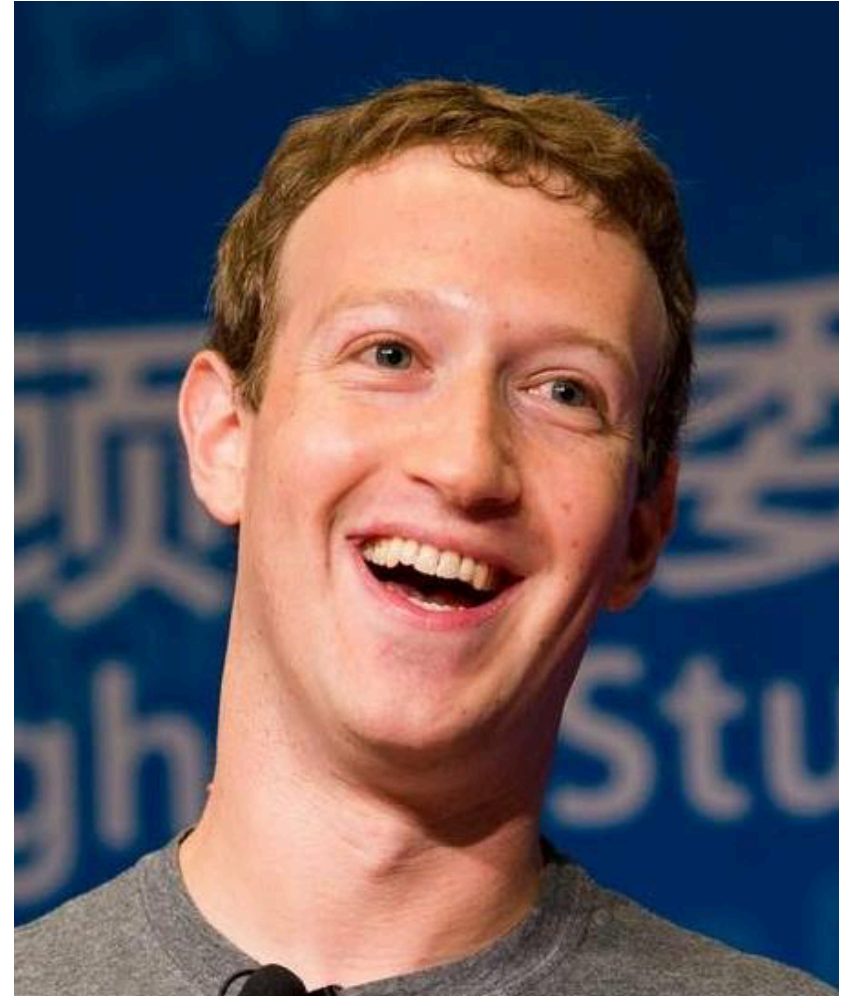


Who Makes Up the World of Fake News?

- Despite high-profile labeling, the main problem with leading news organizations is **bias**, **speculation**, and **sensationalism**, not **authenticity**
- Americans at all educational levels **consistently cannot distinguish** between high-quality and low-quality/sponsored content
- Fake news producers can churn out **reputable-looking articles** and rake in advertising dollars

“This is an area where I believe we must proceed very carefully though. **Identifying the "truth" is complicated.** While some hoaxes can be completely debunked, a greater amount of content, including from mainstream sources, often gets the basic idea right but some details wrong or omitted. An even greater volume of stories express **an opinion that many will disagree with and flag as incorrect even when factual.** I am confident we can find ways for our community to tell us what content is most meaningful, but I believe we must be **extremely cautious about becoming arbiters of truth ourselves.**”

November 12, 2016



Data Source

- Kaggle dataset of fake news
- B.S. Detector
- AllSides
- George McIntire



Review of McIntire Classifier

- Classic spam detector feature creator: count vectorizer (using bigrams)
- Best cross-validated accuracy: 91.7%
- Naive Bayes classifier: bigrams independent

Sentiment Analysis Tools

- VADER (in NLTK)
 - Compound (-1 to 1)
 - Positive, neutral, negative (sum to 1)
- TextBlob
 - Polarity (-1 to 1)
 - Subjectivity (0 to 1)

Feature Extraction & Reduction

- Scores
 - First sentence and last sentence
 - Average sentence
 - Extreme sentences for each score
- Chi-squared test

Table 3.1. Chi-Squared Test Results on Sentiment Features, Unimportant Attributes

Sentence(s)	Metric	Sentence	Metric
Title	Compound	First	Compound
Title	Negative	First	Negative
Title	Neutral	First	Positive
Title	Positive	First	Polarity
Title	Polarity	First	Subjectivity
Title	Subjectivity	Last	Compound

Note: Unimportant attributes have an attribute importance score of 0.

Table 3.2. Chi-Squared Test Results on Sentiment Features, Important Attributes

Sentence(s)	Metric	Attribute Importance
All	Max Positive	0.21321541
All	Max Subjectivity	0.20296909
All	Avg Compound	0.19837011
All	Min Polarity	0.19497042
Last	Neutral	0.19253449
All	Avg Negative	0.16982564
All	Avg Neutral	0.16706355
All	Max Polarity	0.16446193
All	Max Negative	0.14360528
Last	Positive	0.14156118
All	Avg Polarity	0.14137369
All	Max Neutral	0.13824885
All	Avg Positive	0.13775082
Last	Subjectivity	0.13166259
Last	Polarity	0.13009030
All	Avg Subjectivity	0.12324180
First	Neutral	0.09195362
Last	Negative	0.06512418

Classifier Comparison

Table 5. Cross-Validated Results of Classifiers on Final Sentiment Feature Dataset

Classifier	Accuracy	Kappa
Recursive Partitioning (CART)	0.6397823	0.2794821
Conditional Inference Tree	0.7452250	0.4904563
C4.5	0.7136430	0.4272483
Rule-Based (PART)	0.6786100	0.3571448
Linear Support Vector Machine	0.6069461	0.2137527
Artificial Neural Network	0.6735694	0.3470616
Random Forest	0.9695329	0.9390653

Example Fake Article

Figure 2.1 Correctly Identified Fake Article

<p>X = 9143</p> <p>“Israel: Ancient Papyrus Proves Jerusalem Belongs to Israel”</p> <p>Fragment of Old Tax Bill Meant to Undercut Muslims' Claim to Important Mosque by Jason Ditz, October 26, 2016 Share This</p> <p>While the UNESCO resolution which recognized the al-Aqsa Mosque in Jerusalem as a “Muslim holy site of worship” was barely reported around the world, and considered fairly non-controversial, Israeli officials have been expressing fury over the matter for two solid weeks. And the Muslims may have a huge, ancient mosque that has been a key part of Islam for 1,300 years, but Israel has a small strip of papyrus they found in a cave, which they’re pretty sure is a far more conclusive document, since it mentioned the word Jerusalem and was written in Hebrew. Israeli officials have claimed that the UNESCO resolution, in recognizing the mosque as important to Islam, was tantamount to denying Israel’s absolute and eternal control over the entire city of Jerusalem. Israeli Culture Minister Miri Regev said the papyrus strip proved Jerusalem “was and will remain the eternal capital of the Jewish people.” The al-Aqsa mosque was built on a site which is believed to have previously housed an important Jewish temple, and some Israelis advocate the eventual destruction of the mosque and the construction of a new temple, though the details of such a construction would be hugely religiously complicated, and since the destruction of the mosque would undoubtedly start a massive war, it is considered unlikely. Still, the far-right government wants to ensure that they have some international precedent for their claim to the territory. Last 5 posts by Jason Ditz</p>				
<u>Title Scores</u>	<u>First Sentence Scores</u>	<u>Last Sentence Scores</u>	<u>Sentence Avg. Scores</u>	<u>Sentence Max. Scores</u>
Compound = 0	Compound = 0	Compound = 0	Compound = 0.02937	Negative = 0.123
Negative = 0	Negative = 0.056	Negative = 0	Negative = 0.0418333	Neutral = 1
Neutral = 1	Neutral = 0.843	Neutral = 1	Neutral = 0.881	Positive = 0.162
Positive = 0	Positive = 0.101	Positive = 0	Positive = 0.07716667	High Polarity = 0.25
Polarity = 0.3	Polarity = 0.25	Polarity = 0	Polarity = 0.1157087	Low Polarity = - 0.07
Subjectivity = 0	Subjectivity = 0.46	Subjectivity = 0.06667	Subjectivity = 0.45742	Subjectivity = 0.84167

Example Real Article

Figure 2.1 Correctly Identified Real Article

<p>X = 626</p> <p>“Donald Trump Is Changing His Campaign Slogan to Prove He’s Not Racist”</p> <p>After a week of nonstop criticism from Democrats and Republicans alike for comments many condemned as racially charged, Donald Trump claims to be altering his campaign to be a little more inclusive. While the presumptive G.O.P. has long promised to make America great again, Trump now says he’s adding two words to slogan to illustrate just how non-racist he really is. “You know, I have the theme ‘make America great again,’ and I’ve added a couple of things,” Trump announced to supporters at a campaign rally in Richmond, Virginia, on Friday night. “Right now I’m adding make America great again,’ adding ‘for everyone,’ because it’s really going to be for everyone. It’s not going to be for a group of people, it’s going to be for everyone. It’s true.” The allegedly amended slogan, which has yet to appear on any official signage or Trump merchandise, comes after the presidential candidate spent the first half of June repeatedly denouncing Gonzalo Curiel, the federal judge of Mexican heritage presiding over the Trump University class action lawsuit, as inherently biased against him. (Curiel was born in Indiana.) His comments were widely condemned by the Washington political establishment, including Senate Minority Leader Mitch McConnell, who suggested he may be an idiot, and House Speaker Paul Ryan, who called Trump’s statement the “textbook definition of a racist comment.” Trump, who hasn’t apologized or taken back any of his comments, indicated on Friday that he realized his words have had a negative effect on his campaign and declared he is not a racist. “I am the least racist person. The least racist person that you’ve ever seen. I mean give me a break,” he said at the rally. “I am the least racist person that you’ve ever looked at, believe me.”</p>				
<u>Title Scores</u>	<u>First Sentence Scores</u>	<u>Last Sentence Scores</u>	<u>Sentence Avg. Scores</u>	<u>Sentence Max. Scores</u>
Compound = -0.6124	Compound = -0.765	Compound = 0.4973	Compound = 0.11539	Negative = 0.22
Negative = 0.267	Negative = 0.22	Negative = 0	Negative = 0.039	Neutral = 1
Neutral = 0.733	Neutral = 0.78	Neutral = 0.788	Neutral = 0.8404615	Positive = 0.392
Positive = 0	Positive = 0	Positive = 0.212	Positive = 0.1205385	High Polarity = 0.8
Polarity = 0	Polarity = 0.2708333	Polarity = -0.3	Polarity = 0.03163004	Low Polarity = -0.313
Subjectivity = 0	Subjectivity = 0.5	Subjectivity = 0.4	Subjectivity = 0.35614	Subjectivity = 0.75

Next Steps

- More sophisticated ensemble classifier using more than sentiment features
- Fake news with different style, non-political content
- Cost-benefit analysis: false positive vs. false negative
- Public discussion of how to integrate a fake news identification tool

Presentation References

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