Identifying Clickbaits using GloVe

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About this work

- A short paper
- Accepted at RANLP 2017
- A by-product of the research done for “Weird News Identification”
- Original title was “We used GloVe vectors along with Handcrafted Features to Detect Clickbaits: And the results will completely blow your mind”

Definition

- Clickbait is web content that is aimed at generating online advertising revenue.
- At the expense of quality or accuracy
- Rely on sensationalist headlines.
- Eye-catching thumbnail pictures to attract click-throughs.
- Encourage forwarding of the material over online social networks

Examples

- 21 Completely Engrossing Fan Fictions You Won't Be Able To Stop Reading
- These White Tiger Cubs Are The Most Beautiful Creatures You'll See Today
- 19 Snacks We'll Probably Never Get To Eat Again
- 28 Things You Probably Didn't Know About "Dil Chahta Hai"

Attributes of clickbaits

Exploit the cognitive phenomenon - curiosity gap

Forward referencing cues to generate curiosity

Hyperbolic words, lengthy headlines, word contractions, possessive case, punctuation patterns, questions, internet slangs

Related work

- Abhijnan Chakraborty, Bhargavi Paranjape, Sourya Kakarla, and Niloy Ganguly. Stop Clickbait: Detecting and Preventing Clickbaits in Online News Media. ASONAM2016.
  - Rich set of 14 hand-crafted features to detect clickbait headlines
  - Ex. Sentence structure, Word patterns, Clickbait language, ngram features
  - Created the dataset of 20K clickbaits and 20K normal items

Related work

- Martin Potthast, Sebastian Kopsel, Benno Stein, and Matthias Hagen. 2016. Clickbait Detection.[ECIR16]
  - Identify clickbaity Tweets in Twitter by using common words occurring in clickbaits, and by extracting some tweet specific features.
  - Ex. character and word level ngrams, sentiment, stop words ratio, abbreviations, readability, @mentions, wordlength etc.

Related work

- Chen, Yimin, Niall J. Conroy, and Victoria L. Rubin. “Misleading Online Content: Recognizing Clickbait as False News 15–19. ACM Press, 2015.[WMDD15]
  - Proposes techniques to identify cues of clickbaits
  - Ex. Unresolved pronouns, suspenseful language, overuse of numerals etc.
  - No experimental results !

Related work

- Anand, Ankesh, Tanmoy Chakraborty, and Noseong Park. “We Used Neural Networks to Detect Clickbaits: You Won’t Believe What Happened Next!” [ECIR17]
  - Uses DL methods BiLSTMs with char and word embeddings
  - Current state of the art results.

Solution Overview

- Used GloVe pre trained word embeddings (trained on 840B tokens ,300 dimensions) and
- Augmented them with few hand crafted features
  - Some features taken from related work
  - Some newly created features
- Used simple ML techniques.[LR, SVM, RF, MLP, XGB]
- Our model outperforms the state of the art in F1 score.

Features from related work

- Number of words [Chakraborty et al., 2016]
- Number of stopwords [Chakraborty et al., 2016]
- Average length of word [Chakraborty et al., 2016]

Proposed features

- Question form - When, What, Which, Who, When, Whose, Whom, How, Where, Which, Can, Should
- Digits at the beginning of the headline
- Verb+ing i.e continuous form of the verb like walking, eating, attending etc.
- Superlative forms of adjectives like cutest, best, hottest, greatest, ugliest etc.

Classification Results

- All cells are F1 scores

Features	NN	SVM	RF	LR	XGBoost
Hand crafted features only (HC)	0.9437	0.9443	0.9455	0.9435	0.9435
Word Embedding features only (WE)	0.9671	0.9662	0.9471	0.9661	0.9502
HC+WE	0.9892	0.9891	0.9805	0.9861	0.9837

print(classification_report(y_test, y_pred, digits=4)) #Print 4 digits after the decimal(default is 2)

Comparison with baseline methods

Model	Accuracy	Precision	Recall	F1
(Chakraborty et al., 2016) SVM	0.9300	0.9500	0.9000	0.9300
(Chakraborty et al., 2016) Decision Tree	0.9000	0.9100	0.8900	0.9000
(Chakraborty et al., 2016) Random Forest	0.9200	0.9400	0.9100	0.9200
(Anand et al., 2016) BiRNN (CE+WE)	0.9666	0.9530	0.9787	0.9655
(Anand et al., 2016) BiGRU (CE+WE)	0.9774	0.9662	0.9893	0.9819
(Anand et al., 2016) BiLSTM (CE+WE)	0.9819	0.9839	0.9799	0.9819
Our Method Logistic Regression (HC+WE)	0.9880	0.9880	0.9880	0.9880
Our Method Neural Network (HC+WE)	0.9892	0.9893	0.9892	0.9892

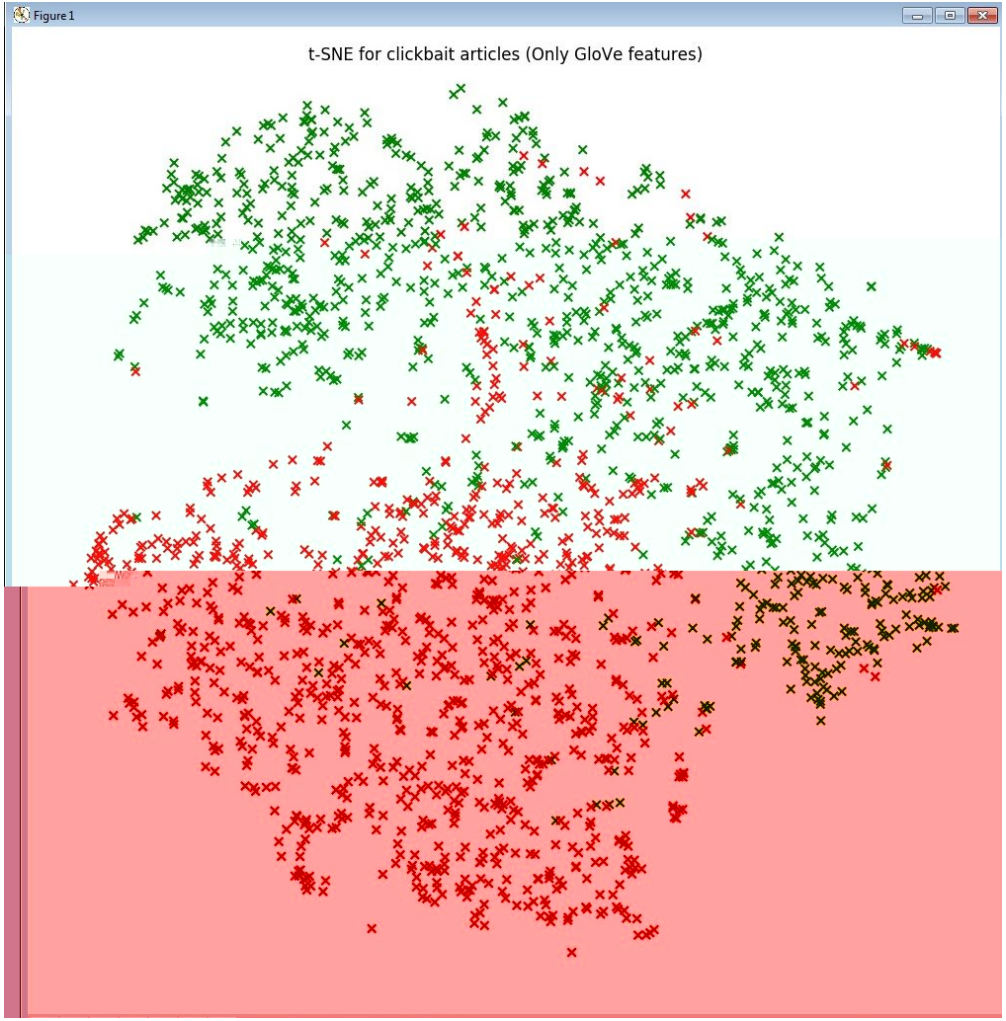
Figure 1
t-SNE for clickbait articles (Only GloVe features)

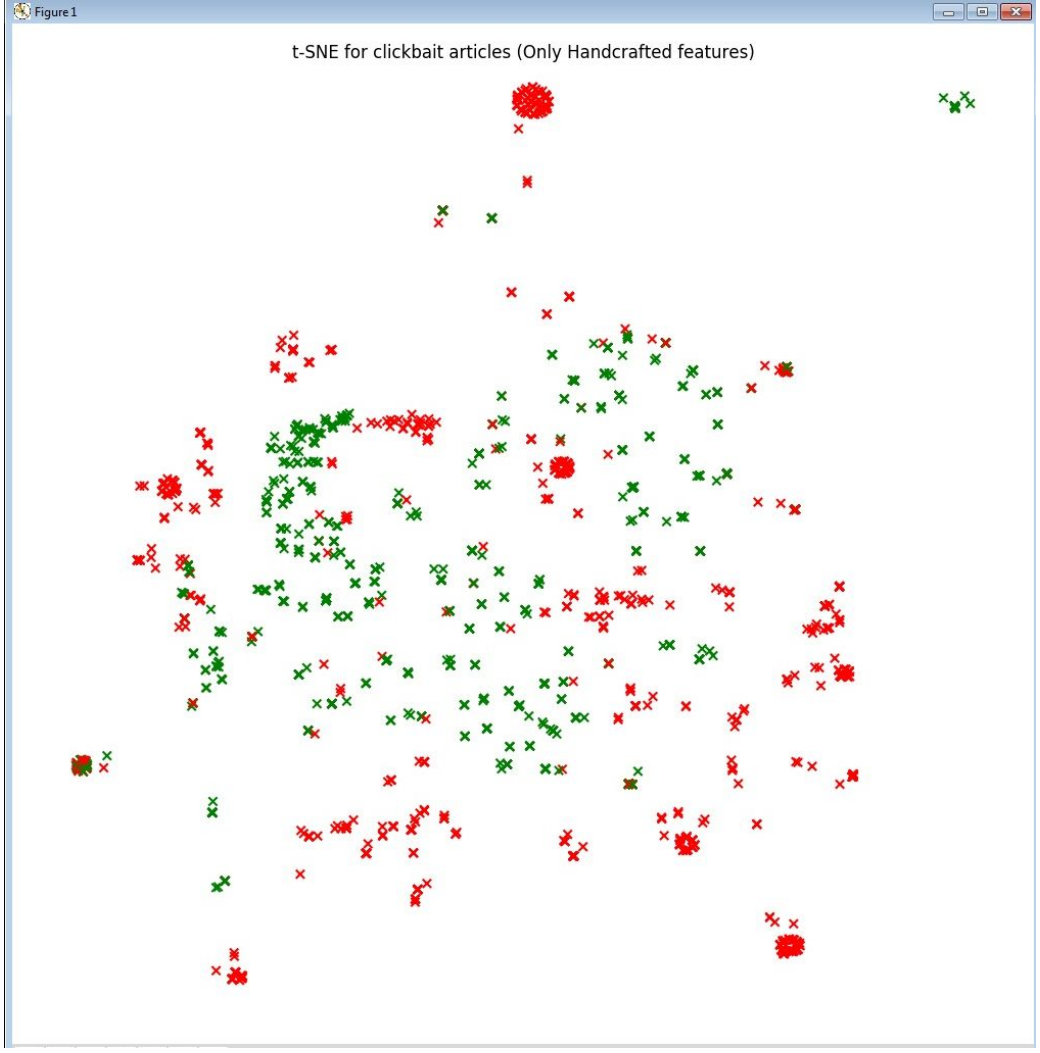
Figure 1
t-SNE for clickbait articles (Only Handcrafted features)

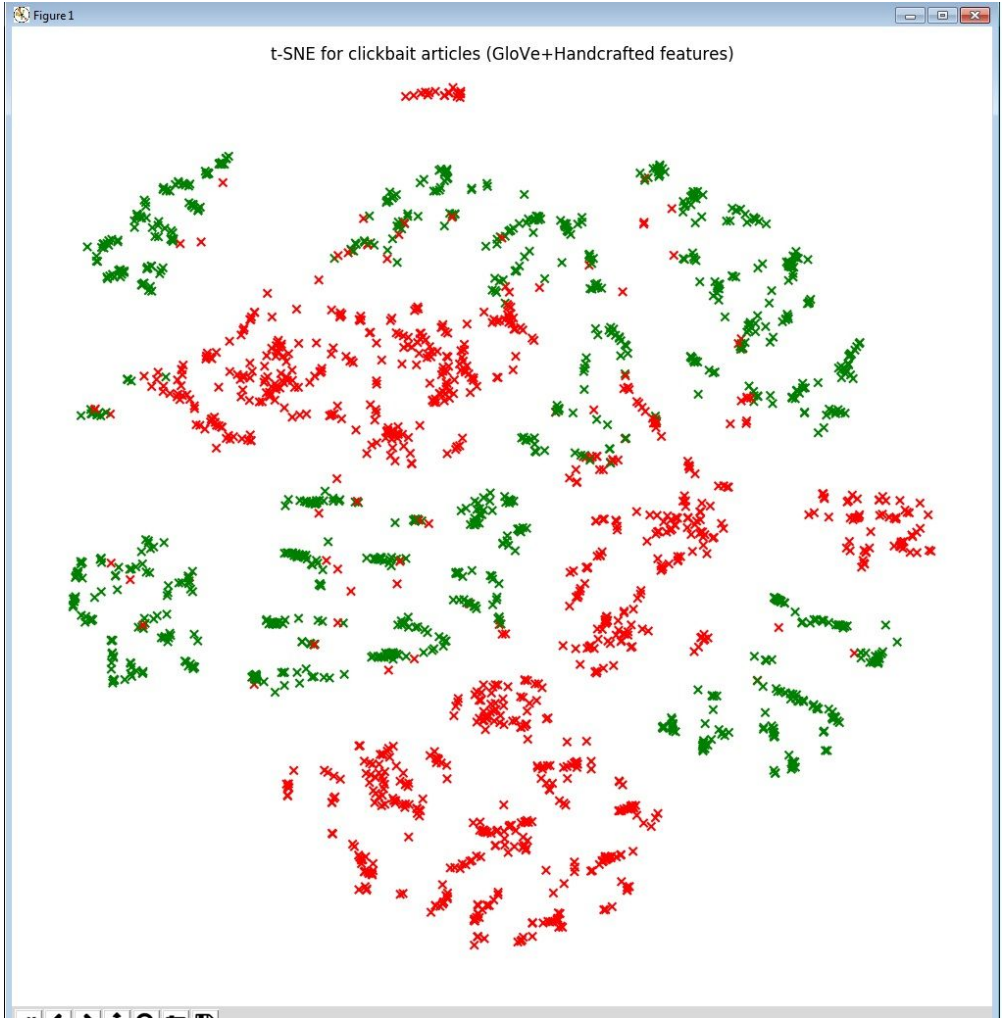
Figure 1
t-SNE for clickbait articles (GloVe+Handcrafted features)

Error analysis

- Clickbaits classified as not clickbaits
  - German Prosecutors Open Investigation Into Former Volkswagen CEO Martin Winterkorn
  - Two Twin Brothers Separated Since World War II Have Finally Been Reunited
  - What Does GOP Even Stand For
  - Which country should you live in based on your zodiac sign

Error analysis

- Non-Clickbaits classified as clickbaits
  - Russian Authorities Say They Know Who Killed the Human Rights Worker Natalya Estemirova
  - Basketball Study Examines How Midmajors Get Stars
  - Teenage Sailor Is Rescued From Her Damaged Boat
  - 2 Apps Let iPad Users Perform Actual Work

Lessons

- GloVe works out of the box can be used as a baseline performance measure for Short Text Classification.
- Iterate by adding hand crafted features one by one.
- Try different pretrained embeddings.
- Best performance for 300d GloVe on 840B tokens.
- Used similar approach for Weird News Identification.

Future work

- For short text classification problems, GloVe out of the box can be used as a baseline performance measure.
- Iterate by adding hand crafted features one by one.
- Try different pretrained embeddings.
- Best performance for 300d GloVe on 840B tokens.

Thank you

- Questions ?
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