Online Social Network Analysis

work realised by

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Do people believe in fake news?

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Master of Computer Science, Fall 2019

1 Problem overview

Fake news is a plague of the Internet. In response, research on fake news detection has exploded in the few last years. Very few research however has been made to analyse readers' belief of the news.

The goal of the project is to make a classifier able to guess if a user believes or not to a news article via one of his comments. It will involve NLP methods similar to sentiment analysis and machine learning classification methods.

Applications of a such classifier could be: analysing fake news propagation; analysing people's credulity and critical thinking about these news; identifying critical topics whose reader could have use of helper tools; analysing the impact over time of fake news debuking: are there group movements and changes of mind, what influence can popular people have.

2 Data

We found a database of fake news from Politifact, Snopes and Emergent websites found the Kaggle website. This dataset contains titles for each of the articles. Then we wrote a script which will go found and collect every first-comments (no responses to comments) associated to each news post on Reddit. For the moment we only gathered Politifact's comments' news which represent a bit more than 13000 comments.

Then we labelized 3000 random comments among these 13000 with the labels: -1 for non-believer; 1 for believer; 0 for non-belief related or ambigious comments.

We plan to do the same with articles from Snopes and Emergent according to the learning curve we get.

3 Method

We are planning to use scientific programming tools along this project: pandas for data handling, numpy, sklearn for machine learning tasks, keras for neural network tasks and textblob for NLP.

In order to get features, we consider using a bag of words or word2vec representation, sentiment analysis by an existing model or a lexicon based method, and a sarcasm indicator provided by an existing model.

We then plan to try supervised learning algorithms to make the classifier:

- naive bayes
- logistic regression
- simple neural networks

If we want to go further, we could also do part of speech analysis with textblob and try unsupervised learning methods as k-mean clusterization.

We will pay close attention not to get overfitting or underfitting by analysing the accuracy on the data set.

4 Preliminary experiments and results

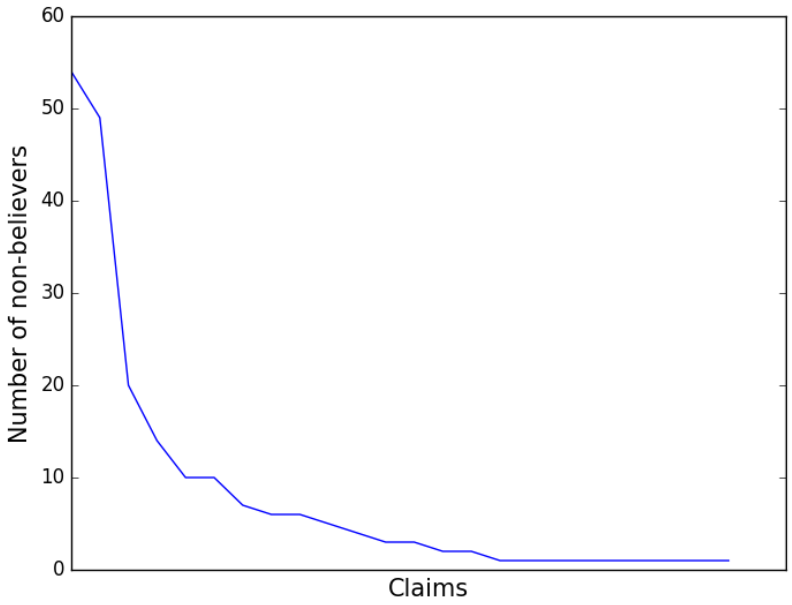
We labelized 3000 comments on the 13684 comments from Reddit related to Politifact headlines and have some insight on this data.

Number of articles with labelized comments: 53

Number of labelized comments per class

- For category "non-believer", we have 204 comments
- For category "believer", we have 1992 comments
- For category "none of the above", we have 798 comments

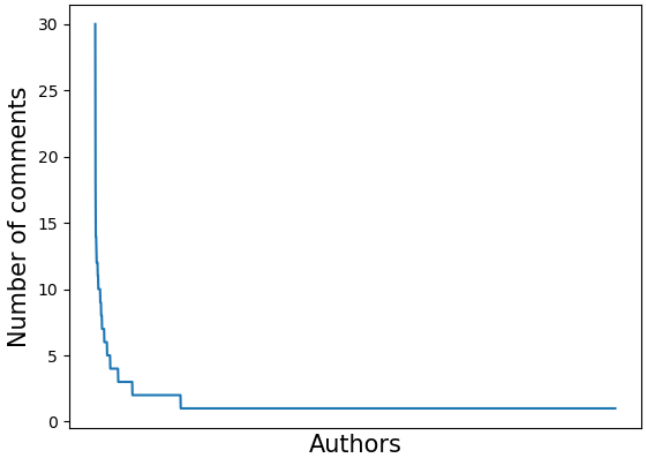
Graphic of the sorted numbers of non-believer by article



In this labelized data, only few comments belongs to non-believer class. It highlights our biggest worry when we began this project: comments labelized as "non-believer" are very few and might not be enough for our classification models to categorize new comments correctly. Accuracy may be quite low.

Labelization also revealed lots of disputes between users, which are considered belonging to the "none of the above" class, hence mostly unuseful for our categorization. That is why we shuffled our database hoping radomness would decrease these non-related comments.

Graphic of author depending on number of comments



We have 1831 auhtors in our labelized data and most users comment only once in our database. The most active one has written 30 comments.

5 Related work

The essential subject about Fake News detection in our papers and more generally is to determine if a news is fake or not with only his content wihtout taking care about people reactions over this. There is different way to detect it , some with a bag-of-word principles, some with LSTM neural Networks and other using a k-means clusterig over a vectorial representation of the content with word2vec. Our goal vary from these articles because our goal is to use the poeple reaction in order to determine if a news is fake or not. Another advantage is that with this technique we can observe how the belief is evolving during the time.

6 Team work

Alan Collet

- Labelize 1000 comments
- Find sarcasm model to use results on labelled comments as feature
- Categorize comments with logistic regression (bag of words representation)
- Create presentation and participate in writing the report

Remi Blaise

- Labelize 1000 comments

- Use TextBlob sentiment analysis model on comments
- Categorize comments with a simple neural network (bag of words representation)
- Matching osna commands with our code and participate in website creation

Agnes Gaspard

- Labelize 1000 comments
- Use lexicon-based (Afin) and Naïve Bayes algorithms for sentiments analysis
- Categorize comments with Naïve Bayes (bag of words representation)
- Participate in writing the report and in website creation

Team

- Write proposal and milestone documents
- Analyse results
- Create evaluation graphics

7 Timeline

Date	Agenda
Wed. 10/30	3000 comments labelized and analysis on this labelized data.
Mon. 11/4	Sarcasm model and sentiment analysis used on labelized comments.
Fri. 11/8	Comments categorized, with bag of words representation.
Wed. 11/13	Results analysis and evaluation graphics. Improve models and labelize more data if necessary.
Sun. 11/17	Report, presentation and website made. Osna commands match code.
Wed. 11/20	TextBlob part of Speech if planning was well respected. Deadline of the project.

8 References

References

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