

Fake New Detection Challenge

Abstract -

The challenge was about classifying the news to be fake or not. We have to do binary classification task (true, false) also in a six-way classification task (pants on fire, false, mostly false, half true, mostly true, true).

Dataset -

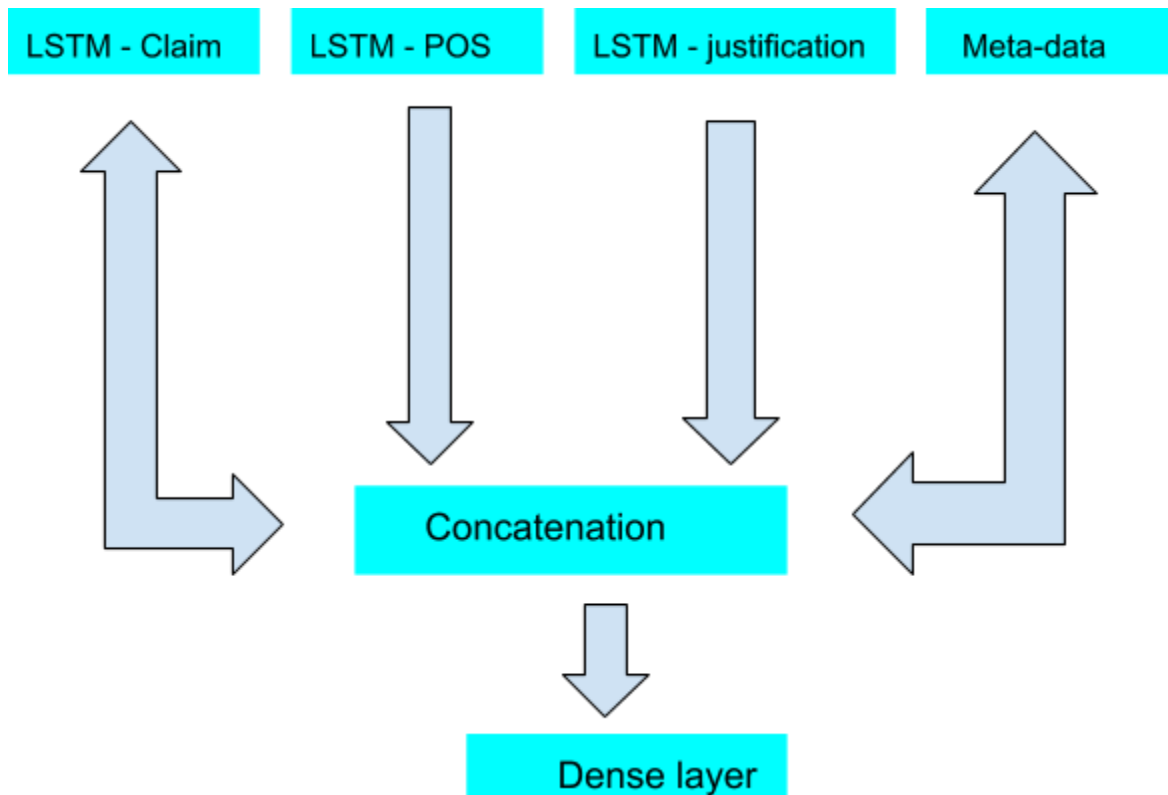
The dataset that was used is LIAR++ which is an extension of LIAR having claims from PolitiFact, justification corresponding to each claim has been added as an extension. Some of metadata associated with each claim are subject, speaker, job, state, party, context. The dataset is fairly balanced in terms of classification labels.



Methodology -

- Preprocessing data - Since the claims and its justification are natural language expressions, the basic preprocessing involves removal of stop-words, though techniques like lemmatization and stemming doesn't works good for our task.
- Use of Part of Speech Tagging - POS has been used to categories the words that makes sense grammatically. It is used to form/show relationship with adjacent and related words in a phrase, sentence, or paragraph. Spacy works better than nltk POS tag.
- GloVe embedding - Pretrained vector representation is used for words having dense vector representation of length 100. Embedding matrix is used as initial weights to generate the embeddings for each input statements.

- Bi-directional LSTM - Bi-LSTM has been used to model the architecture.



Results -

- Surprisingly, SGD works better in our case as compared to RMSprop and Adam.
- Early stopping is a good idea because our model overfits easily.
- I tried LSTM, bi-dir LSTM, GRU and bi-dir GRU and LSTM network seem to beat GRU as far as accuracy is concerned.
- Bi-directional LSTM gives max
- Accuracy 6 Way Classification -
 - Validation Acc - 28.816 %
 - Test Acc - 26.28 %
- Accuracy Binary Classification -
 - Validation Acc - 65.26 %
 - Test Acc - 62.03 %

Classes	No of Misclassification
Pants-fire	9
False	227
Barely-True	47
Half-True	178
Mostly-True	361
True	112

Classes	No of Misclassification
False	187
True	294

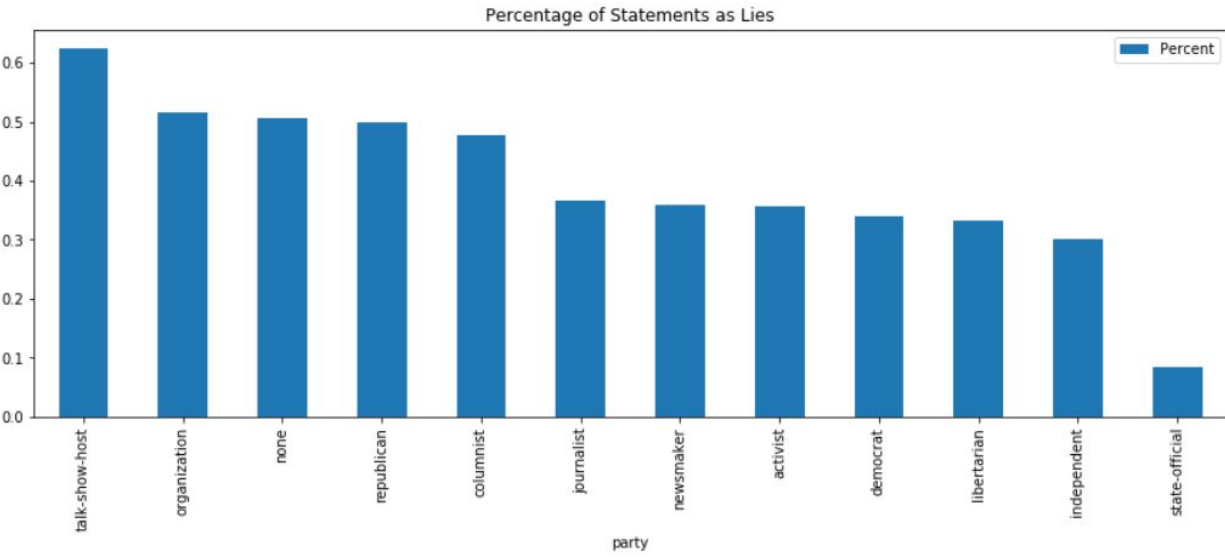
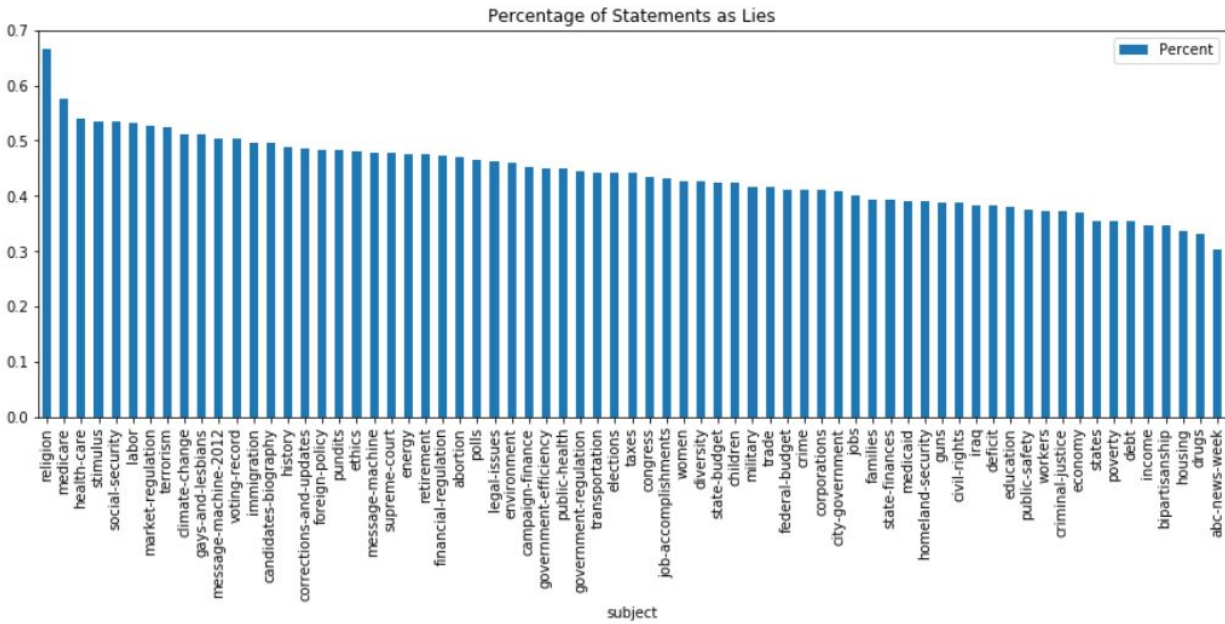
Clearly, for 6 way classification “Mostly-True” got highly misclassified and class “True” got highly misclassified for binary classification.

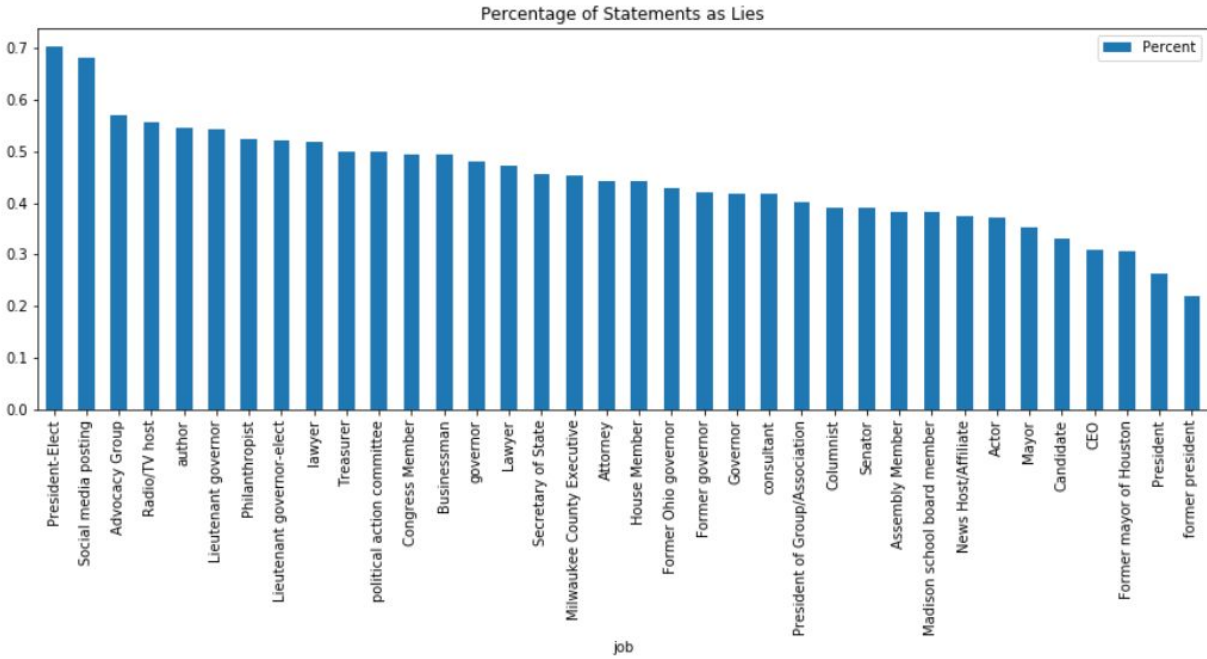
Boosting the accuracy further -

After doing data exploration few things that I noticed is that -

- Firstly the “claims” and “justifications” as too long sentences, careful pre-processing will help in the identification of major key words. After this creating an embedding of dense representation (like length=300) might help.
- Adding contextual attention layer to LSTM network (didn’t found good implementation in keras).
- Ensembling - creating and average ensembling model by averaging the probabilities obtained from lstm model + normalized scores/probabilities of the meta data features.

Below given few plots of % Lies of different classes from meta-tags. Using this might help because usually these informations are lost in deep networks.





Library used -

- Keras
- Matplotlib
- Numpy
- Pandas
- Spacy
- NLTK
- Pickle

References -

- <https://github.com/Tariq60/LIAR-PLUS/tree/master/dataset>
- <https://aclweb.org/anthology/W18-5513>
- <https://arxiv.org/pdf/1705.00648.pdf>
- <https://github.com/bedarkarpriyanka/NLP-Project-Fake-News-Detection>
- <https://github.com/ExploringLies/lies-have-short-legs>