Detect a News is Fake or Not

Abstract

With the development of social media, people can get and send more and more information from internet. People get news from internet for their daily life. However, many news in the internet including bias and other bad impact on people. When people read this bias news online, they don’t realize it and will spread this bias news to others. Our project may help people to detect the reality of the news. Detection fake news is a hard topic. We plant to use LSTM and tensor flow to build the model to do detection.

Literature reviews

“I trained fake news detection Al with > 95% accuracy, and almost went crazy.” *Toward Data Science,* 11/01 <https://towardsdatascience.com/i-trained-fake-news-detection-ai-with-95-accuracy-and-almost-went-crazy-d10589aa57c>

This source talks about what is achievement for others to detect the news. In that blog, the author get the high accuracy and he indicates that in order to improve the accuracy of the prediction, we may get more real news data because fake news have many different characteristics. It is hard to detect. But the characteristic of real news is more clearly than fake news.

“Keras.” *TensorFlow,* 8/08/2018 <https://www.tensorflow.org/guide/keras>

This blog indicates that how to use Keras package in the python to implement Tensorflow and provides us many examples about how to use it.

“SMOTE with Imbalanced Data.” *Kaggle* <https://www.kaggle.com/qianchao/smote-with-imbalance-data>

“SMOTE.” *Microsoft Azure.* 01/09/2018.

https://docs.microsoft.com/en-us/azure/machine-learning/studio-module-reference/smote

This blog talks about how to use SMOTE package as a oversampling method in python. SMOTE is Synthetic Minority Oversampling Technique. This will generate new instance from the existing minority class. “The new instances are not just copies of existing minority cases; instead, the algorithm takes samples of the *feature space* for each target class and its nearest neighbors, and generates new examples that combine features of the target case with features of its neighbors. This approach increases the features available to each class and makes the samples more general.” (SMOTE)

“Keras LSTM tutorial – How to easily build a powerful deep learning language mode.” Adventures in Machine Learning, 02/03/2018 <http://adventuresinmachinelearning.com/keras-lstm-tutorial/>

This blog talks about what is LSTM model and how to apply it in python. LSTM model is a sequential model that can be used in predict time and predict the content that have order.

“GloVe: Global Vectors for Word Representation.” 08/2014. <https://nlp.stanford.edu/projects/glove/>

This is the website that I download the GloVe dictionary.

“keras-team/keras.” *GitHub*. 09/07. <https://github.com/keras-team/keras/blob/master/examples/pretrained_word_embeddings.py>

This is the website how others to load GloVe dictionary to the python.

We don’t know how others solve this problem because we didn’t see any code to solving this problem online. We just saw one blog that indicates that he uses Natural language processing to do it. And then he finds that trying to detect the fake news is not as good as detecting the real news. So, he finally try to gathering real news information and detect if a news a real. We don’t know the details about how he solves this problem. However, we also use Natural language processing approach this problem. We use LSTM algorithm to build the model because we think the contents in the news have order.

Detail of your approach

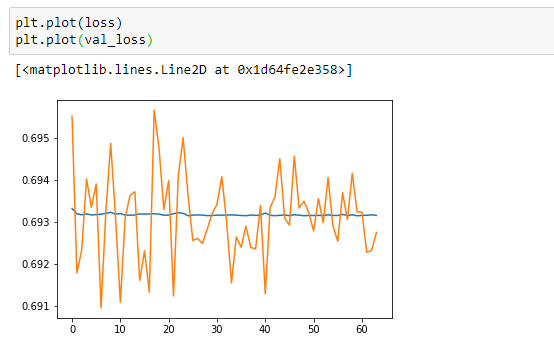
The basic idea is converting a news into vector and fitting this vector to TensorFlow model by adding LSTM layer. For the first part, we read data from json files and csv files and store them in panda dataframe. Then padding these data into integer. After that, we load GloVe dictionary.

For the second part, we found the data is imbalance. There are many fake news and less real news. So we use oversampling method to make the data balance. For the third part, we split data after padding into train and validation. For the forth part, we start to train the model. We use packages from keras to build model. In the last part, we extract a new news content from BBC website and padding it. We predict this new news. The prediction result is close to 0.

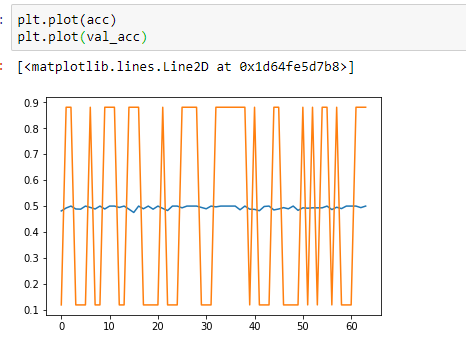
Dataset description

Our data include 443 bias news, 430 conspiracy news, 246 hate news, 146 satire news, 121 state news, 102 junksci news, 230 fake news and 211 real news. We consider bias, conspiracy, hate, satire, state, junksci and fake are both fake news and labeled these news as class 1 and real news as class 0.

Experiment detail



This graph shows the loss and validation loss, the blue line is loss and the orange line is validation loss. As we can see, the loss from training set doesn’t change with training and it is close to 0.693. The loss from validations set goes up and down when training and finally close to 0.693. This means our model is not overfitting.



The blue line is training set and the orange line is validation set. This graph shows the accuracy of the model from training set is around 0.5. The accuracy goes up and down around 0.5 for validation set.

Error analysis

I think the reason loss and accuracy doesn’t change in the training set is news data is not appropriate to oversampling. We assume there are half fake news and half fake news. So, we sample the data to half fake and half real news in the real word. The oversampling method will select each real news (less records) 8 times and this selection will make there are 50% fake news and 50% real news. We think we need search more real news content online to make the data balance rather than oversampling.

Conclusion

we extract a new news from BBC website and padding it. We found the prediction result is close to 0. The prediction result is real. We are not solving this problem very well. We are not realized there are too many types of fake news and it is hard to find all the characteristic of these fake news. There is two ways to improve our project. The first way we think is gathering more real news data. The second way is changing the way we deal with class imbalance like using weighted cross entropy.