Deep learning project proposal

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1. Motivation and problem definition

Fake news detection is a critical yet challenging problem in Natural Language Processing (NLP). The rapid rise of social networking platforms has not only yielded a vast increase in information accessibility but has also accelerated the spread of fake news. Thus, the effect of fake news has been growing, sometimes extending to the offline world and threatening public safety. Given the massive amount of Web content, automatic fake news detection is a practical NLP problem useful to all online content providers, in order to reduce the human time and effort to detect and prevent the spread of fake news. Nowadays, Twitter has become one of the main sources of information where even world leaders express themseleves, and thus has become a conducive environment to spread fake news. That's why in this project, we will detect fake tweets based on the dataset from "Real or Not? NLP with Disaster Tweets" Kaggle challenge. We will review and compare the task formulations and NLP solutions that have been developed for this task, and apply them to our use case.

2. Methodology

General steps:

Our main goal in this project is to review state of the art algorithms for fake news detections and apply it to Kaggle dataset. In order to do that we will proceed as follow:

- First, we will start by reveiwing articles that propose some methodologies to tackle this task
- Second, we will review the dataset and preprocess it
- Third, we wil implement the proposed algorithms ranging from non neural network model such as SVM and Naive Bayes Classifier to neural network models based on RNNs , LSTMs and CNNs.
- Last, We will evaluate these models based on the test dataset provided in the Kaggle challenge

Deep Learning algorithms:

In this project we are going to use different fake news detection models such as:

- Multi-source Multi-class Fake news Detection framework (MMFD) proposed by Karimi et al. (2018), in which CNN analyzes local patterns of each text in a claim and LSTM analyze temporal dependencies in the entire text, then passing the concatenation of all last hidden outputs through a Fully Connected Network. This model takes advantage of the characteristics of both models because LSTM works better for long sentences.

- Attention mechanisms are often incorporated into neural networks to achieve better performance. Long et al. (2017) used an attention model that incorporates the speaker's name and the statement's topic to attend to features first, then weighted vectors are fed into an LSTM.

3. Evaluation

The evaluation of the used model will be based on the F1 score between the predicted and expected values calculated as follows :

$$F1 = 2 \times \frac{precision \times recal}{precision + recall}$$

Where :

- $precision = \frac{TP}{TP+FP}$
- $recall = \frac{TP}{TP+FN}$

and:

- TP : True Positive
- TN : True Negative
- FP : False Positive
- FN : False Negative

The dataset we are aiming to use can be accessed from thefollowing the link : twitter dataset

References

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