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Fake News Detection using Social Media Data

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Along with the massive transition to the online social media market, large number of "**Fake News**", i.e., articles that purposefully contain false information, are being spread across the network. Various methods have been proposed to detect fake news. However, as fake news detection is still at the early age of development, only very few methods could produce acceptable results. With the emergence of a new embedding model such as **BERT**, there are still many improvements and new methods that can be explored and thus requires further investigation. In this research, the author will review multiple data sources and apply exploratory data analysis to filter out biased dataset. Moreover, multiple data pre-processing version will be created to find out the trend, pattern and optimal data pre-processing method. Lastly, by introducing implementation techniques and various metrics to reduce overfitting, all models will be trained and fine-tuned to compare the results.

Project Objectives:

The study intends to identify the best "state-of-art" machine learning techniques that can be used to detect and filter fake news with optimal accuracy.

This study sees fake news detection problem as a classification problem and will focus on research, analysis, and implementation of various machine learning techniques.

Experiment Results & Conclusion:

The experiment results reflect that the newest model developed, **transformers model perform the best amongst all models**. The models consistently perform at the highest benchmark surpassing other models with an accuracy of **87-88%** consistently without overfitting.

The result indicate that the transformer model (particularly **ELECTRA and BERT**) is the best "state-of-art" machine learning model for fake news classification problem.

Transformers Model	Test Accuracy	Precision	Recall	F1-Score	MCC
BERT	87.89%	89.61%	94.82%	92.14%	66.36%
RoBERTa	87.73%	88.54%	96.05%	92.14%	65.53%
BERTweet	87.46%	88.96%	95.04%	91.90%	64.96%
DistilBERT	87.30%	88.17%	95.90%	91.87%	64.23%
ELECTRA	87.89%	88.20%	96.76%	92.29%	65.93%
XLM-RoBERTa	87.19%	88.20%	95.69%	91.79%	63.94%
XLNet	87.57%	88.98%	95.18%	91.98%	65.24%

Table 1. The result on transformer models after fine-tune

Future Improvements:

The experiment results imply that further research and experiment can be done by:

- Increase model parameters for training
- Obtain more data sources
- Generative Upscaling using OpenAI GPT-2
- Perform Sentiment Analysis