

Emotion 'Eare' O deling: 'Wnpredictable and' P onlinear' Gvents

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Abstract: In economics, individuals' decisions are not always guided by pure rationality; emotional factors often influence choices related to consumption, investment, and saving. Emotions can thus determine market confidence, influence economic cycles, and even affect monetary and fiscal policies. In this regard, the development of social media has increased the formation and dissemination of fake news, whose impact requires particular attention. To detect and contain the spread of fake news in real time, some Artificial Intelligence tools are used. This contributes to promoting more reliable information and protecting society from media manipulation. A focus was placed on the impact of fake news on political elections. Building on this, the capabilities of the Bidirectional Encoder Representations from Transformers (BERT) classifier were tested to distinguish real news from fake news in order to mitigate the aforementioned problem and provide useful tools for the real-time identification of news that could alter not only political impact but also other areas.

Key-Words: Emotions, Fake news, Artificial Intelligence tools, BERT classifier.

Received: May 23, 2024. Revised: December 17, 2024. Accepted: January 19, 2025. Published: April 28, 2025.

1 Introduction

Emotions play a key role in decision-making, judgment and reasoning processes and are able to influence behavior. Emotion, as an unpredictable feeling state, introduces the possibility of instability and disequilibria. This, together with the development of social media, contributes to the increasing spread of fake news. Fake news constitutes a form of disinformation, encompassing hoaxes, frauds, or deceptions intended to mislead information consumers. The proliferation of largely unmonitored shared information platforms, such as social media and blogs, has heightened the potential influence of fake and biased news, raising growing concerns, [1].

One of the areas where the impact of fake news is

most evident is in political elections, as they can distort voters' perceptions, influence public opinion, and alter election outcomes. The spread of these false or misleading information through social media and other digital channels can create misinformation, sow distrust, and further polarize the electorate. Often, the primary goal of fake news is to manipulate voters' emotions, generating unfounded fear or enthusiasm for a particular candidate or party. This phenomenon poses a challenge, as it undermines the transparency and integrity of the electoral process, making the role of accurate and verified information crucial.

2 Related Works

Emotions influence the perception of economic agents and their rational decision-making. In this regard, several studies have been conducted. In

particular, [2], analysed the relationship between dispositional optimism and investment in shares, showing a positive and significant correlation between optimism and share ownership, as well as the percentage of income invested in shares. The authors in [3], suggest that emotions and feelings present during decision-making frequently drive behavior in ways that deviate from what would result from a rational assessment of the long-term costs and benefits of various actions. According to [4], dispositional optimism induces individuals to overestimate the likelihood of favorable events and underestimate the likelihood of unfavorable events occurring.

Emotions also affect the formation and spread of fake news in the economic sphere, which fuels uncertainty and disinformation. The authors in [5], contend that social media platforms facilitate the rapid spread of content without substantial third-party filtering or oversight, enabling false information to quickly circulate across extensive social networks. The authors in [6], propose an equilibrium model in which an adversary deploys fake news to target agents with biased private signals, and the agents, aware of the adversary's tactics, consequently discount all news.

Furthermore, [7], categorize the challenge of fake news detection into three types: serious fabrication, large-scale hoaxes, and humorous fake news. The authors in [8], have developed a fake news detection system using a hybrid approach, which integrates linguistic cue analysis with network analysis methods.

The authors in [9], have applied an innovative hybrid algorithm that incorporates an attention-based long short-term memory network to address the fake news detection problem. Artificial intelligence tools are crucial in this field.

The authors in [10], also investigated the effectiveness of four different sentiment analysis techniques, including the BERT classifier. To conduct this study they utilized publicly accessible labeled datasets comprising 50,000 movie reviews originally sourced from the Internet Movie Database (IMDB). The study highlighted the unequivocal superiority of the pre-trained advanced supervised deep learning BERT model for sentiment analysis of text data.

The purpose of our study is to highlight the usefulness of the BERT classifier as an effective tool for analysing data and obtaining reliable results that do not falsely alter the user's perception with superfluous data or false information, perception with superfluous data or false informations [11].

3 Methods

3.1 The Influence of Fake News on Political Election: A Qualitative Analysis using an Algorithm in Python

Our goal was to test the abilities of a classifier, in this case Bidirectional Encoder Representations from Transformers (BERT), to classify real news from fake news in order to mitigate the open issue of fake news and provide useful tools for real-time identification of news that could alter political impact. Starting from the code provided here

```
fake_data=pd.read_csv("../input/fake-news-detection-dataset-english/Fake.csv/Fake.csv")
real_data=pd.read_csv("../input/fake-news-detection-dataset-english/True.csv/True.csv")
```

Fig. 1: Dataset containing fake data and real data

This code uses the Pandas library to import datasets related to fake news and real news as two variables `fake_data` e `real_data` as it has shown in Figure 1

The dataset is imported in the form of two CSV files. The data is explored using the `.head` function. This function returns the first few rows of the object. It is useful for quickly verifying whether the object contains the correct type of data. This function returns the first n rows for the object based on position. It is useful for quickly testing if the dataset has the right type of data in it, as shown in Figure 2.

```
fake_data.head()
```

| | title | text | subject | date |
|---|---|---|---------|-------------------|
| 0 | Donald Trump Sends Out Embarrassing New Year... | Donald Trump just couldn't wish all Americans ... | News | December 31, 2017 |
| 1 | Drunk Dragging Trump Staffer Started Russian ... | House Intelligence Committee Chairman Devin Nu... | News | December 31, 2017 |
| 2 | Sheriff David Clarke Becomes An Internet Joke ... | On Friday, it was revealed that former Milwaukee... | News | December 30, 2017 |
| 3 | Trump Is So Obsessed He Even Has Obama's Name ... | On Christmas day, Donald Trump announced that ... | News | December 29, 2017 |
| 4 | Pope Francis Just Called Out Donald Trump Dur... | Pope Francis used his annual Christmas Day mes... | News | December 25, 2017 |

Fig. 2: `.head` function

We then use the `.shape` function (Fig.3) to understand the structure or size of arrays and tables without having to visually inspect the entire content.

```
real_data.shape
(21417, 4)

fake_data.shape
(23481, 4)
```

Fig. 3: `.shape` function of fake data and real data

The two datasets, contained in the variables

fake_data and real_data, are concatenated, into a single variable final_data (Figure 4).

```
final_data.shape
(44898, 2)
```

Fig. 4: .shape function of final data

Pie charts in Fig.5 represent what has been achieved.



Fig 5: The first graph represents the real data; the second graph contains the fake data; the third graph is the combination of the previous two

The text is tokenized using BertTokenizer and a Bert model is created. A tokenizer is responsible for the preparation of inputs to a model.

Thereafter, the function create_model() created a neural network model using BERT as the base for features extraction. Model.summary() shows the architecture and parameters of the neural network model incorporating BERT for feature extraction. The model includes input layers for token IDs and attention masks, a BERT layer producing contextual embeddings, followed by dropout and dense layers for classification. Then, the Adam optimizer is used and Early stopping allows us to mitigate overfitting. An EarlyStopping callback can be used during model training to stop training early if there is no significant improvement in validation metrics. This prevents the network from overfitting on the training data. The model is then trained (model.fit).

From the confusion matrix, that shows the performance of the classification model on test data, it can be observed that the model achieved good accuracy, as most of the classified news are on the main diagonal, as shown in Fig.6. Therefore, the news articles have been correctly classified. Therefore, this analysis accurately conducted a classification of fake news compared to real news. The process just described was represented via the ETL process, as shown in Figure 7.

In the extraction phase, data were collected from different csv sources to be processed and combined in a single file. In the transform phase, the data were

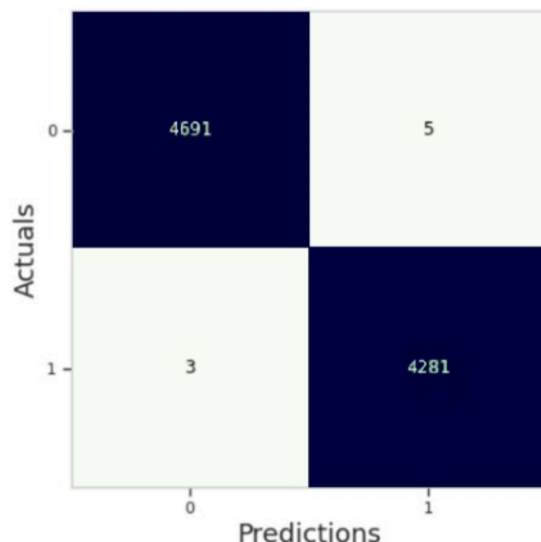


Fig. 6: Confusion matrix

cleaned, converted and formatted to ensure that they were consistent. Useful information has been merged and unnecessary information has been removed. In the load phase, the transformed data is loaded into the target system, i.e. the dataset is input into a neural network.

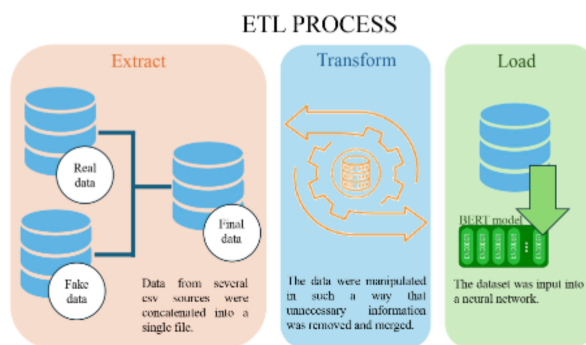


Fig. 7: The ETL (Extract, Transform, Load) process is a fundamental process in data management, used to collect, transform and load data from different sources to a target system, such as a database

The text classifier from real news to fake news is intended to support information channels in promptly identifying potential sources of false information. This aims to provide readers with reliable news and avoid misleading considerations driven by groups attempting to manipulate information. The classifier was tested on a dataset containing a large amount of data labeled as real and fake news, achieving high accuracy in binary classification. Therefore, this tool can be considered valuable

support for communication experts, offering feedback with negligible inference times compared to humans processing large datasets. Despite its high accuracy, this classifier should be used in conjunction with communication specialists due to the sensitive nature of the investigation area, where human supervision in information management is crucial. Hence, the analyzed classifier provides support and enhances the efficiency of potential analyses of political campaigns or other contexts.

4 Conclusion

Fake news can have significant impacts both economically and socially. From an economic standpoint, they can influence financial markets and the economy at large by spreading false information that alters investor decisions and consumer confidence. This can lead to market fluctuations, financial losses, and reputational damage to involved companies. Socially, fake news can increase misinformation, weaken trust in institutions and traditional media, thus shaping public opinion. This can have adverse effects on social cohesion, interpersonal relationships, and civic participation.

Addressing these impacts necessitates educating about the importance of source verification and developing more effective mechanisms to identify and counter false information. Finally, digital platforms and media outlets must adopt policies and tools to reduce the spread of fake news and ensure accurate and reliable content.

In this regard, the classifier was tested on a dataset containing a large amount of data labeled as real and fake news and provided high accuracy in binary classification. Therefore, this tool can be considered a valuable support for communication experts because it provides feedback with negligible inference times compared to what would be required by humans to identify large amounts of data. Thus, Artificial Intelligence tools make the fight against disinformation more effective and timely, anticipating further future developments that will increasingly ensure greater accuracy in the results obtained.

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Contribution of Individual Authors to the Creation of the Scientific Article

The authors equally contributed in the present research, at all stages from the formulation of the problem to the final findings and solution.

Sources of Funding for Research Presented in the Scientific Article

No funding was received for conducting this study.

Conflicts of Interest

The authors have no conflicts of interest to declare that are relevant to the content of this article.

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