

Fake News Detection Using Recurrent Neural Network

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Abstract—This work focuses on detecting fake news in Portuguese language texts using advanced machine learning techniques. The key approach involves using Distributed Representations (methods like fastText, GloVe, and word2vec) to process the text and extract features. These features are then fed into a Recurrent Neural Network (RNN), specifically a Long Short-term Memory (LSTM) network, for classification. The research addresses the rising issue of fake news on social media and its potential to manipulate public opinion. The novelty here is the focus on Portuguese language, which has been less studied in this context. The study tests three different algorithms for creating text representations and finds that the combination of word2vec for feature extraction and LSTM for classification yields the best results. Compared to simpler models, this approach shows superior performance in identifying fake news, and it holds up well even against more complex or deeper architectures. The effectiveness is validated using a publicly available labeled news dataset.

Index Terms—Fake news detection, Word embedding, Recurrent neural networks, Long short-term memory.

I. INTRODUCTION

Fake news exist even before the emergence of the Internet. Generally, fake news imply that editors use false or misleading information to promote their interests. After the advent of web, more consumers began to abandon traditional media channels, thus producing a growing segment of population receiving news only through social media. The term “fake news” can be applied when information is published with no guarantee of being true, its credibility cannot be proven, or when false information is spread for the purpose of deceiving people. The existence of tools to support automatic detection of fake news in languages other than English, more specifically in Portuguese, is still unsubstantial in both, the industry and academia. This is due to that the computational methods for this purpose are mostly developed for English-language texts.

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II. METHODOLOGY

This section presents the methods proposed to tackle the problem, which is the detection of fake news in texts. We propose methods considering the use of Deep Learning (DL) and text-oriented feature extraction, which have been widely used for text classification. The main hypothesis that we intend to explore in this work addresses the possibility that fake news can be identified through a computational model composed of distributed representations and a kind of Recurrent Neural Networks (RNNs), named Long Short-Term Memory (LSTM) architecture. The LSTM architecture has been selected due to its capability to process long sequences of data and given that it allowed to achieve state-of-art results for various tasks related to text processing. Distributed representations are obtained using techniques known as word embeddings, which allow better generalisation for classification models due to similarity relationships between words.

III. DATASETS

The set of news composed of fake news from the Fake.Br corpus was collected manually, while the news that form part of the true news sub-dataset were collected in a semi-automatic manner. According to [35], the first stage of the collection was performed using a web crawler⁸, seeking news based on keywords from a fake news story. After this step, for each fake news, a measure of lexical similarity with the real news collected was applied, choosing the most similar to the fake news. The last step of the collection of the true news was a manual check to ensure that for every true news there would be a fake one related to the same subject. The dataset can be broken down into 6 categories related to their main subjects: politics, TV and celebrities, society and daily news, science and technology, economics and religion. The amount of news per category in corpus Fake.Br is as follows: 4; 180 political news.

CONCLUSION

Due to the growing concern with impact that fake news may cause to the society, it emerges the need for automated methods for detecting fake news using computational approaches. Methods such as DL and NLP have been widely used to assign categories to texts according their content. In this sense, distributed representations of words and RNNs are widely used for text classification tasks. Thus, in order to contribute to the detection of fake news in texts, this work focused on obtaining distributed representation from words with three methods of word embedding,

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