A SURVEY ON FAKE NEWS CLASSIFICATION USING MACHINE LEARNING AND NATURAL LANGUAGE PROCESSING

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ABSTRACT

With the rise of social media and the ease of information dissemination, the problem of fake news has become a significant concern. This survey aims to provide an overview of various methodologies and approaches employed to tackle this issue. It covers the utilization of NLP techniques such as text preprocessing, feature extraction, and sentiment analysis, along with machine learning algorithms including support vector machines, random forests, and deep learning models. The survey also discusses the challenges and future directions in this field to enhance the accuracy and effectiveness of fake news detection systems.

Keywords- Deep learning, NLP, machine learning, fake news classification, social networks

1. INTRODUCTION

The proliferation of fake news on social media platforms and online news sources has become a critical issue in recent years. The spread of misinformation can have severe consequences, impacting public opinion, political discourse, and even public safety. As a result, there has been a growing interest in developing effective techniques to automatically detect and classify fake news. Machine learning (ML) and natural language processing (NLP) have emerged as powerful tools in the fight against fake news. ML algorithms can learn patterns and features from large datasets, while NLP techniques enable the understanding and analysis of textual data. This combination offers promising opportunities to develop automated systems capable of distinguishing between genuine and fake news articles. This survey aims to provide a comprehensive overview of the state-of-the-art techniques used in fake news classification using ML and NLP. It explores the various steps involved in the classification process, starting from data preprocessing, feature extraction, and representation to the selection and evaluation of ML models. Text preprocessing techniques, such as tokenization, stemming, and stop-word removal, play a crucial role in transforming raw text into a suitable format for analysis. Feature extraction methods extract meaningful information from text, including linguistic features, syntactic structures, and semantic representations. The survey also covers different ML algorithms commonly employed for fake news classification, such as support vector machines (SVM), random forests, and deep learning models like recurrent neural networks (RNNs) and convolutional neural networks (CNNs). It examines the strengths and limitations of each approach and highlights their performance in detecting fake news. Furthermore, this survey discusses the challenges associated with fake news classification, including the presence of evolving news dynamics, the need for large annotated datasets, and the issue of adversarial attacks. It also explores potential directions for future research and suggests ways to enhance the accuracy and robustness of fake news detection systems. Overall, this survey serves as a valuable resource for researchers and practitioners interested in understanding the current landscape of fake news classification using ML and NLP techniques.

A. Machine Learning for Fake news Classification:

Machine learning for fake news classification involves using algorithms and statistical models to automatically detect and classify misinformation. By analyzing patterns, linguistic features, and contextual information in textual data, machine learning techniques can effectively distinguish between fake and genuine news articles, helping to combat the spread of misinformation.

B. NLP (Natural Language Processing) for fake news classification:

NLP (Natural Language Processing) for fake news classification involves utilizing computational techniques to analyze and understand human language. By applying NLP methods like sentiment analysis, lexical analysis, and topic modeling, it becomes possible to extract relevant information and characteristics from textual data, aiding in the identification and classification of fake news articles.

2. BACKGROUND AND RELATED WORK

Many researchers, authors, data scientists, scholars have published many articles and papers of their results in the fake news detection field. Here we are explaining some of the famous work that has been carried out in the recent past.

Author [11] used web crawler, data preprocessing, Jieba and NLP to train the computer. After many times to trainings, a large amount of training data, the experimental results show that the accuracy rate of news classification is 97.43%.

This work [12] presented in this paper is also promising, because it demonstrates a relatively effective level of machine learning classification for large fake news documents with only one extraction feature. Finally, additional research and work to identify and build additional fake news classification grammars is ongoing and should yield a more refined classification scheme for both fake news and direct quotes.

In this paper [13], we have explored distinguished mechanisms of NLP and designs of detection of fake news. Authors explicitly investigated some of the previous remarkable results obtained in fake news detection along with some brainstorming analysis of the mitigating effect of dynamic fake news proliferation. We have elaborated all the prerequisite terminology associated with various models of machine learning found its great relevance in the discovery of fake news.

This study [14] is to develop a reliable and accurate model that uses ML algorithms and NLP techniques to classify given news article as false or genuine, allowing only authentic news to be presented to the public.

The proposed work [15] uses machine learning and natural language processing approaches to identify false news specifically, false news items that come from unreliable sources. The dataset used here is ISOT dataset which contains the Real and Fake news collected from various sources. Web scraping is used here to extract the text from news website to collect the present news and is added into the dataset. Data pre-processing, feature extraction is applied on the data. It is followed by dimensionality reduction and classification using models such as Rocchio classification, Bagging classifier, Gradient Boosting classifier and Passive Aggressive classifier. To choose the best functioning model with an accurate prediction for fake news, we compared a number of algorithms.

Dataset Used for Fake News Classification:

Researchers have used various datasets for fake news classification, depending on their specific research objectives. Some commonly used datasets include:

Fake News Net: This dataset contains news articles from various sources labeled as either fake or real. It includes textual content, metadata, and social context information.

LIAR: The LIAR dataset consists of fact-checking articles labeled with different levels of truthfulness. It includes statements made by politicians and their corresponding fact-checking labels.

BuzzFeedNews: BuzzFeedNews dataset includes news articles and headlines labeled as either fake or real. It covers a wide range of topics and sources.

Kaggle Fake News: This dataset includes news articles from different sources labeled as fake or real, contributed by users on the Kaggle platform.

PolitiFact: PolitiFact dataset consists of fact-checks performed by the PolitiFact organization. It includes statements made by politicians and their corresponding truthfulness labels.

3. FINDINGS OF THE SURVEY

The findings of the survey are firstly, various machine learning techniques, including supervised learning algorithms like Naive Bayes and Support Vector Machines, as well as unsupervised learning approaches like clustering and topic modeling, have been successful in identifying and classifying fake news. Secondly, the integration of natural language processing techniques, such as sentiment analysis and lexical analysis, has significantly improved the accuracy of classification models. Thirdly, feature selection and ensemble methods have proven effective in enhancing the performance of fake news detection systems. These findings emphasize the potential of combining machine learning and natural language processing for effective fake news classification.

4. CONCLUSION

This survey on fake news classification using machine learning and natural language processing provides valuable insights into the advancements and challenges in this field. The research highlights the effectiveness of various machine learning techniques, such as supervised and unsupervised learning, feature selection, and ensemble methods, in identifying and classifying fake news. Additionally, the integration of natural language processing techniques, such as sentiment analysis, lexical analysis, and topic modeling, has proven beneficial in enhancing the accuracy of

classification models. However, further research is needed to address the evolving nature of fake news and to develop robust models capable of handling sophisticated techniques employed by malicious actors. Overall, this survey contributes to the growing body of knowledge in combating fake news and lays the foundation for future advancements in this critical area.

5. REFERENCES

[1] Allende-Cid, J. Zamora, P. Alfaro-Faccio and M.F.Alonso-Sánchez, "A Machine Learning Approach for the Automatic Classification of Schizophrenic Discourse ," in IEEE Access, vol. 7, pp. 45544-45553, 2019, doi: 10.1109/ACCESS.2019.2908620.

[2] Alhawarat and A. O. Aseeri, "A Superior Arabic Text Categorization Deep Model (SATCDM)," in IEEE Access, vol. 8, pp. 24653-24661, 2020, doi: 10.1109/ACCESS.2020.2970504.

[3] H. A. Ahmed, N. Z. Bawany and J. A. Shamsi,"CaPBug-A Framework for Automatic Bug Categorization and Prioritization Using NLP and Machine Learning Algorithms," in IEEE Access, vol. 9, pp. 50496- 50512, 2021, doi: 10.1109/ACCESS.2021.3069248.

[4] Huynh, Hiep & Nguyen, Vu & Duong Trung, Nghia & Pham, Van-Huy & Phan, Cang. (2019). Distributed Framework for Automating Opinion Discretization From Text Corpora on Facebook. IEEE Access. PP. 1-1. 10.1109/ACCESS.2019.2922427.

[5] Z. Tan, J. Chen, Q. Kang, M. Zhou, A. Abusorrah and K.Sedraoui, "Dynamic Embedding Projection-Gated Convolutional Neural Networks for Text Classification," in IEEE Transactions on Neural Networks and Learning Systems, doi: 10.1109/TNNLS.2020.3036192.

[6] A. M. Alghoson, "Medical Document Classification Based on MeSH," 2014 47th Hawaii International Conference on System Sciences, 2014, pp. 2571-2575, doi: 10.1109/HICSS.2014.324.

[7] S. Li and Y. Liu, "News Video Title Extraction Algorithm Based on Deep Learning," in IEEE Access, vol. 9, pp. 12143 12157,2021,doi:10.1109/ACCESS.2021.3051613.

[8] [8] Saleh, Hager & Alharbi, Abdullah & Alsamhi, Saeed. (2021). OPCNNFAKE: Optimized Convolutional Neural Network for Fake News Detection. IEEE Access. PP. 1-1. 10.1109/ACCESS.2021.3112806.

[9] D. Rogers, A. Preece, M. Innes and I. Spasić, "Real-Time Text Classification of User-Generated Content on Social Media: Systematic Review," in IEEE Transactions on Computational Social Systems, doi:10.1109/TCSS.2021.3120138.

[10] Rapid Detection of fake news based on machine learning methods", Volume 192, 2021, Pages 2893-2902, ISSN 1877-0509, https://doi.org/10.1016/j.procs.2021.09.060.

[11] Meng-Jin Wu, Tzu-Yuan Fu, Chia-Wei Lee, Yao-Chung Chang "A Study on Natural Language Processing Classified News" 978-1-7281-4999-8/20/$31.00 ©2020 IEEE

[12] Terry Traylor, Jeremy Straub, Gurmeet, Nicholas Snell "Classifying Fake News Articles Using Natural Language Processing to Identify In-Article Attribution as a Supervised Learning Estimator" 2019 IEEE 13th International Conference on Semantic Computing (ICSC)

[13] Chetan Agrawal, Anjana Pandey, Sachin Goyal "A Survey on Role of Machine Learning and NLP in Fake News Detection on Social Media" 2021 IEEE 4th International Conference on Computing, Power and Communication Technologies (GUCON) University of Malaya, Kuala Lumpur, Malaysia. Sep 24-26, 2021

[14] K. Yasaswi, Vijaya Kumar Kambala, P. Sai Pavan "News Classification using Natural Language Processing" 2022 3rd International Conference on Intelligent Engineering and Management (ICIEM)

[15] Sanjana Madhav Balgi1 , Sneha H2 , Suma Y Gouda3 , Arunakumari V R4 , Ashritha R Murthy5 "Fake News Detection using Natural Language Processing" ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538 Volume 10 Issue VI June 2022- Available at www.ijraset.com