IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 4, November 2026
Impact Factor: 8.2

# Fake News Detection using Machine Learning and Natural Language Processing

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**Abstract:** *The use of websites social media and online news platforms has made it possible to receive information quickly at the same time the amount of misleading and false news available online has increased checking every news article manually can be time-consuming this study therefore explores a machine learning-based method for automatically classifying news articles the proposed system uses the t fake news separate collections of fake and real news articles the news text is cleaned and converted into using term frequency-inverse document frequency tf-idf these features are given to a logistic regression classifier for binary assigns each article fake or real category on the test data the developed model obtained an accuracy of 9882 the results indicate that the selected combination of text performs well on in study keywords fake news detection machine learning natural language processing tf-idf logistic regression.*

**Keywords:** *logistic regression*

## I. INTRODUCTION

Online platforms have changed the way people receive and share news is now available through websites social media mobile applications blogs and other digital platforms this makes information easily accessible but it also allows incorrect or misleading content to spread rapidly fake news is information that is presented as news but does not represent reliable or truthful information when a large amount of information is available online readers may find it difficult to determine whether a particular article is genuine an automated system can assist with this initial classification by identifying patterns present in previously labelled news articles machine learning provides a way to perform such classification using examples from an existing dataset a model can be trained using news articles whose categories are already known and can then use the learned patterns to predict the category of new text this study develops a text-based fake news system using python the ISOT fake news for experiment tf-idf is applied to represent the textual information logistic used to classify resulting vectors as fake or real .

**Literature Review :**

Researchers have investigated different approaches for identifying fake news from online content. Earlier studies have examined the use of linguistic patterns and machine learning methods for distinguishing unreliable information from genuine content.

Ahmed et al. investigated fake news detection using n-gram analysis techniques. Their work demonstrated that textual patterns can provide useful information for identifying different categories of online news. Ahmed et al. also studied text classification for detecting opinion spam and fake news. Shu et al. discussed fake news detection from a data-mining perspective and highlighted the importance of analysing information available on social media. Wang introduced the LIAR dataset as a benchmark for fake news-related classification research. Other studies have examined linguistic and satirical characteristics that may help distinguish misleading news from truthful content. Pérez-Rosas et al. investigated automatic fake news detection using linguistic characteristics of news articles. Buntain and Golbeck studied the identification of fake news in Twitter discussions.

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These studies indicate that the content and language used in news can provide useful features for automated classification. Different machine learning methods can be combined with numerical representations of text in text classification. TF-IDF is one commonly used representation because it assigns numerical importance to words according to their occurrence within documents and across the dataset.

**Research Gap :**

Previous research has explored several methods for fake news detection using different datasets, text representation techniques, classification algorithms, and more complex computational approaches. However, the performance of a particular method can depend on the dataset and the characteristics of the news content used during training. For a student-level experimental study, there is a need for an approach that is relatively simple to implement while still providing measurable and reliable classification results.

Understanding the complete process of fake news detection is also important, including data preparation, text representation, model training, prediction, and evaluation. Another limitation of text-based classification is that the model learns patterns from the examples provided during training. It does not independently verify whether the factual statements in a news article are actually true or false.

Therefore, this research focuses on developing and evaluating a straightforward text classification system using the ISOT Fake News Dataset, TF-IDF feature extraction, and Logistic Regression. The study examines whether this combination can effectively distinguish between fake and real news articles within the selected dataset while providing a simple and understandable approach for experimental evaluation.

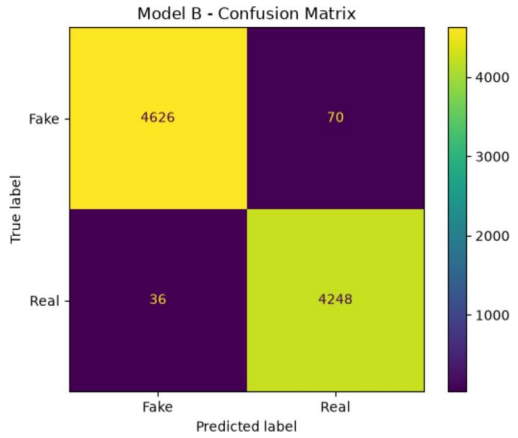
**Methodology :**

The proposed system follows the sequence below dataset collection cleaning text train-test split the proposed system follows the sequence below dataset collection cleaning text train-test split tf-idf logistic regression prediction

Data collection - the isot fake news dataset provided by the information security and object technology research group at the university of victoria is used in this study the dataset is organised into two main files fakecsv contains fake news articles truecsv contains real or truthful news articles the articles contain textual information that can be used for two files are combined before training

Data preparation - before applying the classification algorithm the news data is prepared for text processing unnecessary information is removed and the relevant textual content is used as input for the model the fake and real articles are assigned numerical class labels so that they can be processed by classifier class labels used in are 0 fake news 1 real news .

**Result :**



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Shows that tf-idf combined with logistic regression was able to separate the two news categories effectively on the selected test made relatively few incorrect compared with test articles can be related to the way tf-idf words present in the news articles instead using text directly the method produces be processed by the classifier logistic regression then uses these features to determine the likely category of an article the confusion matrix shows that most articles in both classes were assigned to their correct categories the number of incorrect predictions was 70 for fake articles and 36 for real articles these results suggest that the textual patterns present in the dataset were useful for task however the obtained accuracy interpreted in relation to the dataset used for the experiment a model can perform well on one dataset but may give different results when it receives articles from other publishers topics writing styles or time periods the system also does not verify the actual claims made in a news article its decision is based on testing with newer and more varied news sources would therefore be useful for further evaluation .

## II. CONCLUSION

This research developed a machine learning-based system for classifying news articles as fake or real the experiment was performed using the isot fake news dataset and focused on the textual information contained in the articles the text was represented using tf-idf and logistic regression was used to perform the final classification the model achieved an overall 9882 on 8980 test articles 4626 fake articles and 4248 real articles the results indicate that a relatively simple combination of text processing can effective results for selected also demonstrates the complete workflow of a text system preparation training prediction and evaluation at the same time the system should not be treated as a complete fact-checking tool the model learns patterns from the dataset and does not independently establish whether the claims made in an article are factually correct.

### Limitations

The performance of the developed model influenced for testing since learns from the available examples its performance may change when it is applied to news from different sources or domains the system also focuses mainly on textual information it does not verify external evidence or independently confirm the factual claims made in an article articles with writing styles or topics are substantially from training therefore classified incorrectly another limitation is that the current experiment uses a fixed dataset news language and writing patterns can change over time so evaluation with newer and more diverse news data would provide a better understanding of the models performance in real-world conditions .

## REFERENCES

[1] H. Ahmed, I. Traore, and S. Saad, “Detection of Online Fake News Using N-Gram Analysis and Machine Learning Techniques,” Intelligent, Secure, and Dependable Systems in Distributed and Cloud Environments, Springer, 2017.
[2] H. Ahmed, I. Traore, and S. Saad, “Detecting Opinion Spams and Fake News Using Text Classification,” Security and Privacy, Vol. 1, No. 1, 2018.
[3] ISOT Research Group, University of Victoria, “ISOT Fake News Dataset,” University of Victoria.
[4] K. Shu, A. Sliva, S. Wang, J. Tang, and H. Liu, “Fake News Detection on Social Media: A Data Mining Perspective,” ACM SIGKDD Explorations Newsletter, Vol. 19, No. 1, pp. 22–36, 2017.
[5] W. Y. Wang, “Liar, Liar Pants on Fire: A New Benchmark Dataset for Fake News Detection,” Proceedings of the 55th Annual Meeting of the Association for Computational Linguistics, pp. 422–426, 2017.
[6] V. L. Rubin, N. J. Conroy, Y. Chen, and S. Cornwell, “Fake News or Truth? Using Satirical Cues to Detect Potentially Misleading News,” Proceedings of the Second Workshop on Computational Approaches to Deception Detection, pp. 7–17, 2016.
[7] H. Rashkin, E. Choi, J. Y. Jang, S. Volkova, and Y. Choi, “Truth of Varying Shades: Analyzing Language in Fake News and Political Fact-Checking,” Proceedings of the 2017 Conference on Empirical Methods in Natural Language Processing, pp. 2931–2937, 2017.

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[8] V. Pérez-Rosas, B. Kleinberg, A. Lefevre, and R. Mihalcea, "Automatic Detection of Fake News," Proceedings of the 27th International Conference on Computational Linguistics, pp. 3391–3401, 2018.
[9] C. Buntain and J. Golbeck, "Automatically Identifying Fake News in Popular Twitter Threads," 2017 IEEE International Conference on Smart Cloud, pp. 208–215, 2017.
[10] G. Gravanis, A. Vakali, K. Diamantaras, and P. Karadais, "Behind the Cues: A Benchmarking Study for Fake News Detection," Expert Systems with Applications, Vol. 128, pp. 201–213, 2019.
[11] K. Shu, S. Wang, and H. Liu, "Beyond News Contents: The Role of Social Context for Fake News Detection," Proceedings of the 12th ACM International Conference on Web Search and Data Mining, pp. 312–320, 2019.
[12] K. Shu, S. Wang, and H. Liu, "Exploiting Tri-Relationship for Fake News Detection," 2019 IEEE International Conference on Data Mining Workshops, 2019.
[13] M. Mersinias, S. Afantenos, and G. Chalkiadakis, "CLFD: A Novel Vectorization Technique and Its Application in Fake News Detection," Proceedings of the 12th Language Resources and Evaluation Conference, 2020.
[14] R. Oshikawa, J. Qian, and W. Y. Wang, "A Survey on Natural Language Processing for Fake News Detection," Proceedings of the 12th Language Resources and Evaluation Conference, 2020.
[15] K. Shu, A. Cui, S. Wang, D. Lee, and H. Liu, "defend: Explainable Fake News Detection," Proceedings of the 25th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, 2019.