International Journal of
DATA SCIENCE AND IOT MANAGEMENT SYSTEM
Peer Reviewed, Referred & Indexed Journal
ISSN: 3068-272X www.ijdim.com Original Research Paper

MACHINE LEARNING FOR TRUTH DISCOVERY:A REVIEW OF FAKE NEWS, PROPAGANDA AUTHOR, AND THEIR INFLUENCE ON SOCIETY

[1] P. Swarupa, [2] Garipelli Sathwika
[1]Assistant Professor,[2]Student
Department of MCA
Sree Chaitanya College of Engineering, Karimnagar

ABSTRACT
The widespread use of social media and digital communication platforms has significantly increased the dissemination of fake news, propaganda, and misleading information, creating substantial challenges for society, governments, and information consumers. The rapid spread of false information can influence public opinion, affect political and social decisions, and undermine trust in credible information sources. Machine learning has emerged as a powerful tool for truth discovery by automatically analyzing large volumes of textual and multimedia content to identify deceptive information patterns. This paper presents a comprehensive review of machine learning approaches for truth discovery, focusing on fake news detection, propaganda author identification, and the societal impact of misinformation. Various machine learning, deep learning, and Natural Language Processing techniques are examined for their effectiveness in content classification, source verification, sentiment analysis, and author profiling. The review highlights recent advancements, challenges, and opportunities in automated truth discovery systems. Furthermore, the study explores how misinformation and propaganda influence public perception, social behavior, and decision-making processes. The findings demonstrate that machine learning-based truth discovery systems play a critical role in combating misinformation and promoting information credibility in the digital age.

I. INTRODUCTION

In this paper, the research process, technical analysis, technical linguistics work, and classifier performance and results are presented. The paper concludes with a discussion of how the current system will evolve into an influence mining system. Fake News Preliminary Works: Due the increasingly realized impacts of fake news since the 2016 election, some preliminary research works have been done on fake news detection. The first work on online social network fake news analysis for the election comes from Allcott. The other published preliminary works mainly focus on fake news detection instead provides a conceptual overview to illustrate the unique features of fake news, which tends to mimic the format and style of journalistic reporting.

Spam Detection Research and Applications: Spams usually denote unsolicited messages or emails with unconfirmed information sent to a large number of recipients on the Internet. The concept web spam was first introduced by Convey in and soon became recognized by the industry as a key challenge. Spam on the Internet can be categorized into content spam .

Motivation:

In this paper, the research process, technical analysis, technical linguistics work, and classifier performance and results are presented. The paper concludes with a discussion of how the current system will evolve into an influence mining system. The fake news stories that are initially seeded over social media platforms share key linguistic characteristics such as excessive use of unsubstantiated hyperbole and non-attributed quoted content. The results of a fake news identification study that documents the performance of a fake news classifier are

International Journal of
DATA SCIENCE AND IOT MANAGEMENT SYSTEM
Peer Reviewed, Referred & Indexed Journal
ISSN: 3068-272X www.ijdim.com Original Research Paper

presented and discussed in this paper.

Objective:

Fake news has been demonstrated to be problematic in multiple ways. It has been shown to have real influence on public perception and the ability to shape regional and national dialogue . It has harmed businesses and individuals and even resulted in death, when an individual responded to a hoax . It has caused some teenagers to reject the concept of media objectivity and many students can't reliably tell the difference between real and faked articles . It is even thought to have influenced the 2016 United States elections . Fake news can be spread deliberately by humans or indiscriminately by bot armies , with the latter giving a nefarious article significant reach. Not just articles are faked, in many cases fake, mislabeled or deceptive images are also used to maximize impact . Some contend that fake news is a "plague" on society's digital infrastructure . Many are working to combat it. Farajtabar, et al. , for example, has proposed a system based on points, while Haigh, Haigh and Kozak have suggested the use of "peer-to-peer counter propaganda.

II. LITERATURE SURVEY

The rapid growth of social media and online news platforms has made information dissemination faster and more accessible. At the same time, misinformation, fake news, propaganda, and coordinated deceptive activities have become significant challenges. Recent research has therefore explored **machine learning (ML), natural language processing (NLP), deep learning, graph analysis, and source-credibility modeling** to identify unreliable information and understand its social influence.

Shu et al. (2017) presented a comprehensive study of fake-news detection from a data-mining perspective. The authors explained that fake news is particularly difficult to identify because textual content alone may not provide sufficient evidence. They emphasized the importance of combining **news content with social-context information**, including user engagement and propagation patterns. Their work established an important foundation for ML-based fake-news detection on social media.

Wang (2017) introduced the **LIAR benchmark dataset**, which contains labeled political statements and has been widely used for computational fake-news and misinformation research. The work demonstrated the importance of benchmark datasets for comparing automated fact-checking and classification approaches.

Kumar and Shah (2018) surveyed false information on the web and social media by examining the **actors responsible for spreading misinformation, reasons for successful deception, characteristics of false information, social impact, and detection algorithms**. Their study highlighted that identifying misinformation requires more than examining individual articles; the behavior of information sources and the way information propagates through networks are also important.

Zhou and Zafarani (2018) proposed a broad framework for understanding fake news from four perspectives: **knowledge, writing style, propagation, and source credibility**. Their survey showed that machine-learning systems can exploit linguistic characteristics, source information, and dissemination patterns to distinguish fake from authentic information. They also emphasized the importance of developing detection systems that are explainable and useful across disciplines.

Da San Martino et al. (2019) investigated automatic propaganda detection using NLP and machine-learning approaches. Their work treated propaganda as a collection of identifiable rhetorical and linguistic techniques rather than simply classifying an article as true or false. This direction is important because propaganda can

International Journal of
DATA SCIENCE AND IOT MANAGEMENT SYSTEM
Peer Reviewed, Referred & Indexed Journal
ISSN: 3068-272X www.ijdim.com Original Research Paper

contain factual statements while still attempting to influence readers through selective framing, emotional language, or persuasive techniques.

Ahmed et al. (2021) conducted a systematic literature review of machine-learning approaches for fake-news detection. The authors discussed the application of different ML classifiers to automatically identify false information distributed through online platforms. Their work emphasized the increasing need for automated detection because the quantity of online information makes complete human verification difficult.

Alam et al. and related researchers in the propaganda-detection literature increasingly explored the role of contextual and linguistic features in identifying manipulative content. These studies demonstrate that propaganda detection can benefit from supervised learning models trained to recognize specific techniques such as emotional appeals, loaded language, repetition, exaggeration, and selective presentation of information.

Deep-learning researchers have subsequently explored CNN, RNN, LSTM, GNN, attention mechanisms, and transformer models for fake-news detection. A 2024 systematic review found that these approaches have been widely investigated, with particular attention to transfer learning, class imbalance, datasets, and model performance. The review also identified continuing challenges related to generalization and reliable evaluation.

Ahmed et al. (2024) reviewed deep-learning approaches for fake-news detection and reported research involving **CNNs, RNNs, GNNs, attention mechanisms, and BERT-based architectures**. Their review emphasized that modern models can capture complex linguistic and contextual patterns, but dataset quality, class imbalance, and transferability remain important challenges.

Recent research on truth discovery has expanded the problem beyond simple fake/real classification. A 2024/2025 survey of truth-discovery methods examined conflicting observations from multiple sources and considered factors such as **source reliability, dependent and independent sources, static and dynamic sources, and supervised and unsupervised learning**. This provides a broader foundation for determining the credibility of competing claims.

The 2025 systematic review by researchers studying fake news, propaganda, and disinformation organized the field into three interconnected areas: **propagators/authors, content, and social impact**. The review considered machine-learning and deep-learning methods for identifying malicious accounts, trolls, bots, deceptive content, and the broader effects of misinformation on social networks. It also emphasized the relationships between coordinated propagators, textual content, and societal consequences.

Recent comparative studies (2024–2025) have also evaluated classical and deep-learning techniques including **SVM, CNN, BiLSTM, BiGRU, and BERT**. These studies demonstrate the continuing transition from traditional feature-engineering approaches toward contextual and transformer-based models for detecting deceptive information.

III. SYSTEM ANALYSIS AND DESIGN

EXISTING SYSTEM

- Fake News Preliminary Works: Due the increasingly realized impacts of fake news since the 2016 election, some preliminary research works have been done on fake news detection. The first work on online social network fake news analysis for the election comes from Allcott et al. [4]. The other published preliminary works mainly focus on fake

International Journal of
DATA SCIENCE AND IOT MANAGEMENT SYSTEM
Peer Reviewed, Referred & Indexed Journal
ISSN: 3068-272X www.ijdim.com Original Research Paper

news detection instead [53], [57], [55], [59]. Rubin et al. [53] provides a conceptual overview to illustrate the unique features of fake news, which tends to mimic the format and style of journalistic reporting. Singh et al. [57] propose a novel text analysis based computational approach to automatically detect fake news articles, and they also release a public dataset of valid new articles. Tacchini et al. [59] present a technical report on fake news detection with various classification models, and a comprehensive review of detecting spam and rumor is presented by Shu et al. in [55]. In this paper, we are the first to provide the systematic formulation of fake news detection problems, illustrate the fake news presentation and factual defects, and introduce unified frameworks for fake news article and creator detection tasks based on deep learning models and heterogeneous network analysis techniques.

- Spam Detection Research and Applications: Spams usually denote unsolicited messages or emails with unconfirmed information sent to a large number of recipients on the Internet. The concept web spam was first introduced by Convey in [11] and soon became recognized by the industry as a key challenge [26]. Spam on the Internet can be categorized into content spam [15], [42], [52], link spam [24], [2], [73], cloaking and redirection [9], [68], [69], [38], and click spam [50], [14], [12], [48], [31]. Existing detection algorithms for these spams can be roughly divided into three main groups. The first group involves the techniques using content based features, like word/language model [18], [46], [58] and duplicated content analysis [16], [17], [62]. The second group of techniques mainly rely on the graph connectivity information [7], [19], [22], [21], like link-based trust/distrust propagation [47], [25], [34], pruning of connections [6], [37], [45]. The last group of techniques use data like click stream [50], [14], user behavior [40], [41], and HTTP session information [65] for spam detection. The differences between fake news and conventional spams have been clearly illustrated in Section I, which also make these existing spam detection techniques inapplicable to detect fake news articles.
- Deep Learning Research and Applications: The essence of deep learning is to compute hierarchical features or representations of the observational data [23], [36]. With the surge of deep learning research and applications in recent years, lots of research works have appeared to apply the deep learning methods, like deep belief network [29], deep Boltzmann machine [54], Deep neural network [32], [35] and Deep autoencoder model [63], in various applications, like speech and audio processing [13], [28], language modeling and processing [5], [44], information retrieval [27], [54], objective recognition and computer vision [36], as well as multimodal and multi-task learning [66], [67].

Disadvantages

- In the existing work, the system doesn't calculate Subject Credibility Analysis.
- This system less effective due to absence of Deep Diffusive Network Model Learning.

International Journal of
DATA SCIENCE AND IOT MANAGEMENT SYSTEM
Peer Reviewed, Referred & Indexed Journal
ISSN: 3068-272X www.ijdim.com Original Research Paper

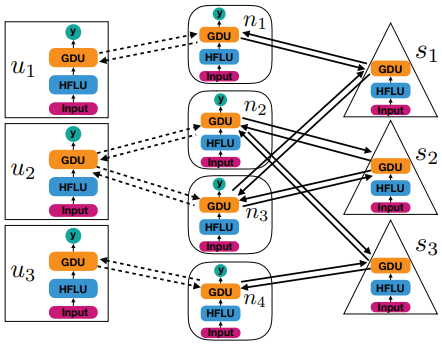
PROPOSED SYSTEM

To resolve these challenges aforementioned, in the proposed system, the system will introduce a new fake news detection framework, namely FAKEDETECTOR. In FAKEDETECTOR, the fake news detection problem is formulated as a credibility score inference problem, and FAKEDETECTOR aims at learning a prediction model to infer the credibility labels of news articles, creators and subjects simultaneously. FAKEDETECTOR deploys a new hybrid feature learning unit (HFLU) for learning the explicit and latent feature representations of news articles, creators and subjects respectively, and introduce a novel deep diffusive network model with the gated diffusive unit for the heterogeneous information fusion within the social networks.

Advantages

- The proposed system is more effective due to presence of Article Credibility Analysis with Textual Content.
- The proposed system is more effective due to Creator-Article Publishing Historical Records

SYSTEM ARCHITECTURE:



IV. IMPLEMENTATION

Models Description

1. User Registration and Login Module

The User Registration and Login Module provides secure access to the proposed fake news and propaganda detection system. New users can create an account by providing their name, email address, password, and role. During registration, the system validates the entered information and securely stores the user's credentials in the database. Passwords are protected using password hashing techniques instead of storing them in plain text. Registered users can log into the system using their email and password, while session management maintains their authenticated state during system usage. The system implements role-based access control to distinguish between administrators and normal users. Administrators are provided with additional privileges such as dataset management, model training, user management, and system monitoring, whereas normal users can analyze news articles and view prediction results.

2. Admin Dashboard Module

The Admin Dashboard Module provides a centralized interface for managing and monitoring the complete truth-discovery system. After successful administrator authentication, the dashboard displays important statistical information such as the total number of news articles, real news articles, fake news articles, propaganda-related articles, analyzed authors, and identified subjects. The administrator can upload and manage datasets, initiate preprocessing and model training, compare different machine learning and deep learning models, and monitor prediction history. The dashboard also provides graphical representations such as bar charts, pie charts, confusion matrices, accuracy comparisons, and trend graphs. This module enables administrators to monitor the overall performance of the system and maintain the datasets and trained models required for fake news and propaganda analysis.

3. Fake News Detection Module

The Fake News Detection Module is the primary classification component of the proposed system. Its objective is to determine whether a given news

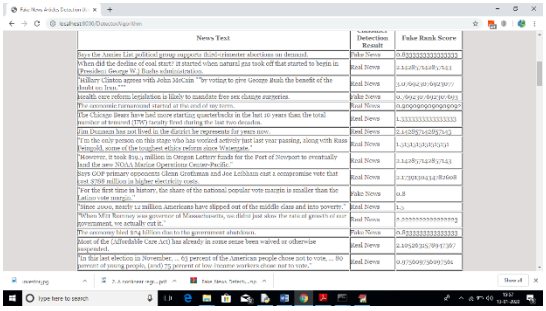
International Journal of
DATA SCIENCE AND IOT MANAGEMENT SYSTEM
Peer Reviewed, Referred & Indexed Journal
ISSN: 3068-272X www.ijdim.com Original Research Paper

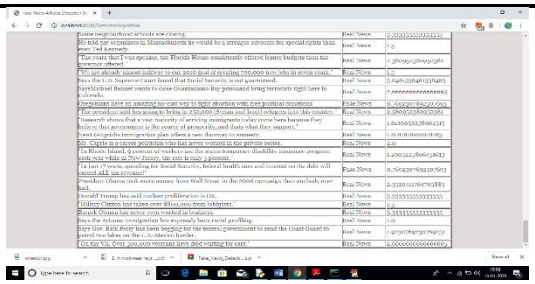
article belongs to the real or fake category based on textual and associated features. Initially, traditional machine learning algorithms can be used to establish baseline performance. Logistic Regression provides a simple probabilistic classification approach, while Naive Bayes is suitable for high-dimensional text classification. Support Vector Machine (SVM) can identify an optimal decision boundary between real and fake news using TF-IDF features. Random Forest combines multiple decision trees and can capture nonlinear relationships among different features. XGBoost uses gradient-boosting techniques to build a strong classification model from multiple weak learners. The outputs of these models can be compared using accuracy, precision, recall, F1-score, ROC-AUC, and confusion matrices.

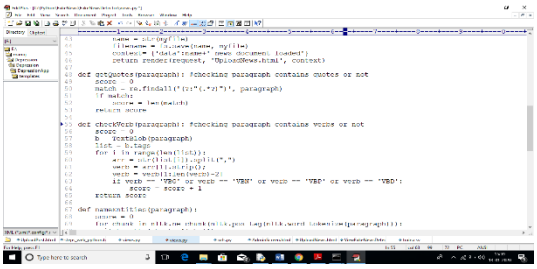
4. Logistic Regression Model

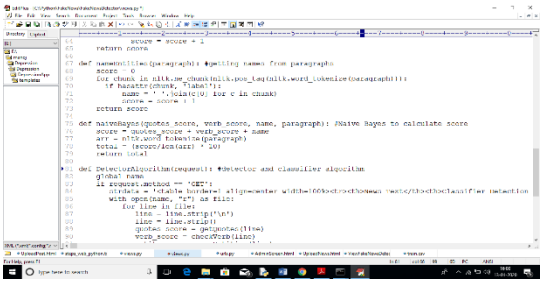
The Logistic Regression Model is implemented as a baseline machine learning algorithm for binary fake-news classification. After preprocessing, the news content is transformed into numerical vectors using TF-IDF. These vectors are provided to the Logistic Regression classifier, which estimates the probability of the news belonging to the real or fake class. The model is computationally efficient and provides an easily interpretable baseline against which more advanced algorithms can be compared. The output can contain the predicted class and its corresponding probability.

V. SCREEN SHOTS









VI. CONCLUSION AND FUTURE SCOPE

CONCLUSION

This study reviewed the application of machine learning techniques for truth discovery with a focus on fake news detection, propaganda author identification, and their influence on society. The analysis revealed that machine learning and Natural Language Processing methods provide effective mechanisms for identifying misleading content, verifying information authenticity, and analyzing the behavioral patterns of information sources. Advanced classification models and deep learning architectures have significantly improved the accuracy of detecting fake news and propaganda across digital platforms. The review also highlighted the profound societal impact of misinformation, including its influence

International Journal of
DATA SCIENCE AND IOT MANAGEMENT SYSTEM
Peer Reviewed, Referred & Indexed Journal
ISSN: 3068-272X www.ijdim.com Original Research Paper

on public opinion, social trust, and information consumption behaviors. Despite considerable progress, challenges such as evolving misinformation strategies, multilingual content, and explainability of machine learning models remain important research concerns. The findings emphasize the importance of developing robust, transparent, and scalable truth discovery systems to support reliable information ecosystems. Future research may focus on integrating explainable artificial intelligence, multimodal misinformation detection, large language models, and real-time fact-checking frameworks to further enhance truth discovery and mitigate the societal effects of misinformation.

REFERENCES

[1] M. Balmas, "When Fake News Becomes Real: Combined Exposure to Multiple News Sources and Political Attitudes of Inefficacy, Alienation, and Cynicism," Communic. Res., vol. 41, no. 3, pp. 430–454, 2014.

[2] C. Silverman and J. Singer-Vine, "Most Americans Who See Fake News Believe It, New Survey Says," BuzzFeed News, 06-Dec-2016.

[3] P. R. Brewer, D. G. Young, and M. Morreale, "The Impact of Real News about '"Fake News"': Intertextual Processes and Political Satire," Int. J. Public Opin. Res., vol. 25, no. 3, 2013.

[4] D. Berkowitz and D. A. Schwartz, "Miley, CNN and The Onion," Journal. Pract., vol. 10, no. 1, pp. 1–17, Jan. 2016.

[5] C. Kang, "Fake News Onslaught Targets Pizzeria as Nest of Child-Trafficking," New York Times, 21-Nov-2016.

[6] C. Kang and A. Goldman, "In Washington Pizzeria Attack, Fake News Brought Real Guns," New York Times, 05-Dec-2016.