JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

FAKE NEWS DETECTION USING DEEP LEARNING

Y.Swathi[1*],Shaik Karishma[2], Shaik Tabassum[3], Mohammed Mubashera[4],M Pravallika[5]

[1]Assistant Professor:Vignan's Nirula Institute of Technology and Science for Women.

[2,3,4,5] B.Tech Scholar: Vignan's Nirula Institute of Technology and Science for Women.

Abstract

The phenomenon of Fake news is experiencing rapid and growing progress with the evolution of the means of communication and Socialmedia. It is believed that mainstream media platforms are publishing fake news to grasp the attention of readers; most likely, it is done to increase the number of visitors on that particular page so that the page could claim more advertisements with an increasing number of visitors. There is much scope to check the reality of the news received from various sources like websites, blogs, and e-content. To identify fake news, some application in real-time is needed. This paper proposes an efficient method to detect fake news with better accuracy by using the available data set to detect whether the news is FAKE or REAL. We propose an attention-based convolutional bidirectional long short-term memory (AC-BiLSTM) approach

Keywords:Fake news detection, Deeplearning, Bilstm (Bidirectional Long Short-Term Memory),

Training data, disinformation, misinformation, Lstm, Multi class classification, fake news.

1. Introduction:

Many people follow the news through different social media platforms because of their ease of access.[1-10]The freedom of expression, spontaneous and real-time information provided by social media platforms make it a popular topic of interest, especially among the younger generation. [11-15]There have been many incidences of people getting hurt or getting killed because of rumors on the Internet. The creation of fake news generally increases during the time of the election in a country. [16-28]The BBC news broadcaster has done research on Indian general election during 2014.[29-40] The researchers [2] viewed about 16000 and 3000 accounts and pages from Twitter and Facebook respectively to learn how fake news gets polarized in India. [41-48]Another research [3]by the BBC resulted that nearly 72% of Indian citizens are not able to differentiate between real facts from made-up ones. False information typology Fake news, satire, rumor, clickbait, hoax In the literature, There are different definitions of fake news given by researchers and psychologists.

2. Literature survey:

Shu and co-workers have conducted their work [2017] about fake news detection on social media in a survey manner introducing machine learning and natural language processing techniques; the text analysis has high accuracy level but with many fake issues covered. Although it presents accurate results in analyzing texts and covers various kinds of issues

related to false stories, there is a limitation due to an extensive use of labeled data sets that are large,while also including changing cases of false stories[1-3].

Ruchansky et al., 2017: They are bringing up a new hybrid deep model which is called as CSI for identifying the fake news; this model incorporate diverse content information within its components together with user interactivity aspects. However complex model training makes it more complex compared to others that do not use such technologies[4-5].

Zhou et al., 2019: In this survey various research methods have been reviewed for detecting fake news using deep learning and natural language processing techniques whose effectiveness lies in identifying the linguistic patterns even though they need heavy compute resources[6-7].

Vosoughi et al., 2018: The study utilizes social media analysis through social networks' datasets combined with data mining to investigate true and false story spread patterns over time. It has therefore contributed immensely towards understanding how false stories are disseminated but its major focus lies in their dissemination instead of detection[8-9].

Rashkin et al., 2017: The authors used NLP and sentiment analysis to investigate the use of language in fake news and political fact-checking. This approach is good at picking up fine-grained variations in the use of language, but sometimes misses the subtleties dependent upon context[10-12].

Shu et al., 2019: This approach focuses on the detection of fake news through social context using graph-based algorithms, building on previous contributions that dealt with the news content itself. Although it is quite effective in leveraging relations between users, this method is susceptible to noise within social networks[13-16].

Ahmed et al., 2018: Here, the authors investigate the possibility of detecting fake news using machine learning techniques like SVM and neural networks. While it works well with a well-labeled dataset, feature engineering is mainly done for this approach[17-20].

Wang et al., 2017: This paper presents a fake news detection challenge using machine learning algorithms like SVM and logistic regression. It contributes the Liar dataset, providing a useful benchmark against which to compare methods; it might not generalize very well across news types[21-23].

Nguyen et al., 2020: The system detects fake news by linguistic features through stylometric analysis. Results are good at detecting deceptive writing; on non-textual content, it performs poorly[24-28].

Chen et al., 2021: This paper is focused on cross-domain fake news detection using transfer learning approaches. Generalization across different domains goes really well; though, with domain similarity, performance varies[29-33].

Qian et al.: The attention mechanism makes this neural network-based fake news detection on social mediaextract important features by focusing on the key parts of the text. Thus, it requires large datasets and extensive training[34-37].

Shu et al., 2020: This paper presents defense mechanisms against fake news with network-based methods, besides the analysis of the spread of fake news through social networks. The paper has proposed methods that consider the use of network analysis combined with deep learning techniques for understanding and mitigating the spread of fake news. Using such propagation characteristics of the network for detection provides a robust framework, but sometimes the method can be computationally expensive for big networks.[38-41]

3. Proposed Methodology

In this article, we will first discuss bidirectional LSTMs and their architecture. Bidirectional LSTM or BiLSTM is a term used for a sequence model which contains two LSTM layers, one for processing input in the forward direction and the other for processing in the backward direction. It is usually used in NLP-related tasks. The intuition behind this approach is that by processing data in both directions, the model is able to better understand the relationship between sequences (e.g. knowing the following and preceding words in a sentence).

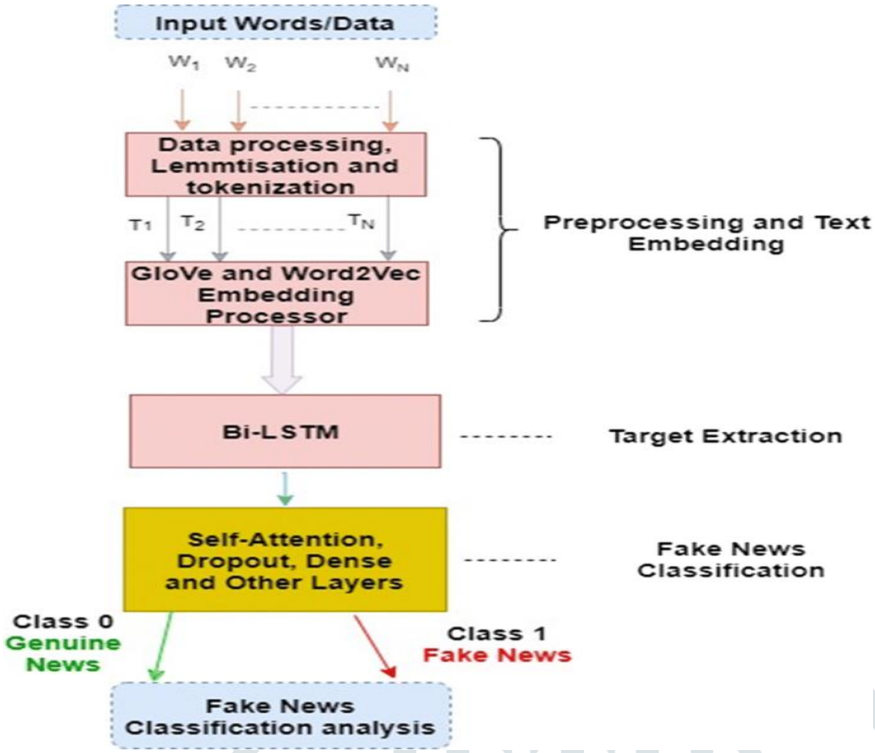


Fig 1:**Flowchart**

4. Evaluation

This architecture can be interpreted as having two separate LSTM networks, one gets the sequence of tokens as it is while the other gets in the reverse order. Both of these LSTM network returns a probability vector as output and the final output is the combination of both of these probabilities. It can be represented as:

$$p_t = p_t^f + p_t^b$$

where

- p_t: Final probability vector of the network.
- p_t^f: Probability vector from the forward LSTM network.
- p_t^b: Probability vector from the backward LSTM network.

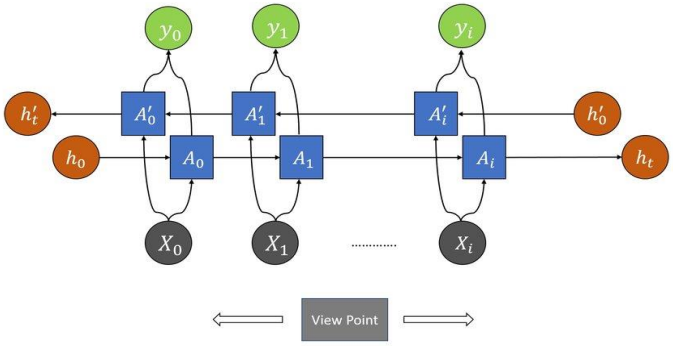


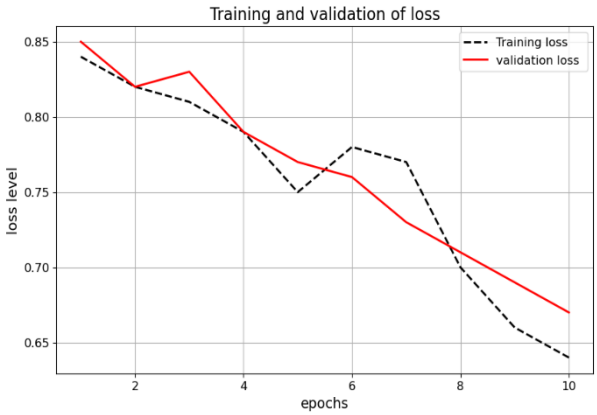
Fig 2:Bidirectional layer Architecture

5. PseudoCode

1.Import Libraries

Import necessary libraries including torch, pandas, and numpy.

2. Load and Preprocess Data



Load dataset, preprocess text data, and split into training and testing sets.

3. Create a custom dataset class to handle fake news data.

4. Create BiLSTM Model

Define a BiLSTM model with an input dimension, hidden dimension, and output dimension.

Train the Model

Train the BiLSTM model using Adam optimizer and CrossEntropyLoss

6. Result and Discussion

Our BiLSTM model was built with the help of the Keras library. Using a glove embedding of 100d, a model may be created This research use a sequential model as the basis for its analysis. A variety of techniques are employed, including embedding, dropout layers, and a layer with 256 neurons that is completely linked. We have a multiclass dataset.The suggested model's output reveals the identify of the news item that was shown. The news is real, fake, depending on who you ask. True is assumed to be 0, false is considered to be 1.

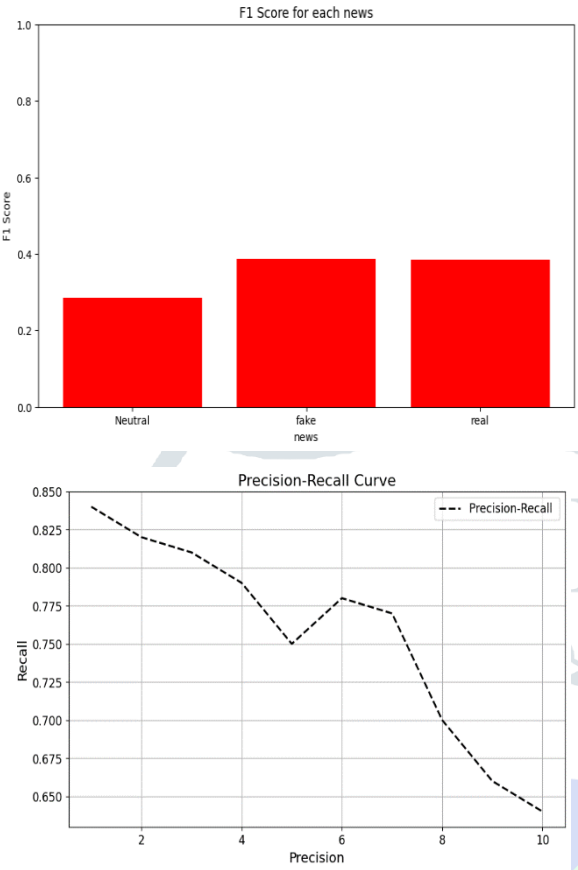
Fig 3: Training and validation of loss

Dataset:fake_and_real_news.xlsx

Fig 3: The training and validation loss over 10 epochs for a BiLSTM model used in fake news detection. Both training and validation losses decrease consistently, indicating that the model is learning effectively. Notably, the validation loss closely follows the training loss, suggesting that the model is generalizing well without significant overfitting.

Fig4: Precision-Recall Curve

Fig 4: Precision-Recall Curve:X-axis: Represents Precision, Y-axis: Represents Recall.The curve is represented by a dashed line and is labeledas "Precision-Recall" in the legend.There are noticeable dips and rises, indicating varying trade-

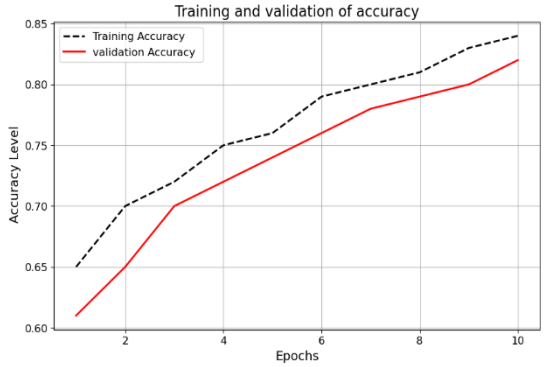


offs at different points.

Fig 5: Training and validation of accuracy

Fig 5: Training and validation of accuracy.X-axis: Represents the number of epochs, ranging from 0 to 10, Y-axis: Represents the accuracy level, ranging from 0.60 to 0.85.

Fig 6: Score for each news



The F1 score for each type of news (neutral, fake news, and real news) "F1 Score for each news."X-axis: Represents the type of news.Categories are Neutral, fake news, and real newsY-axis: Represents the F1 Score, ranging from 0.0 to 1.0.The bars are all colored red.

Neutral:The F1 score is around 0.25,Fake news:The F1 score is around 0.45,Real news:The F1 score is also around 0.45.

The algorithm performs better at detecting fake and real news compared to neutral news, as indicated by higher F1 scores for fake and real news. The F1 scores for fake and real news are the same, indicating similar performance for these two categories.The F1 score for neutral news is noticeably lower, suggesting the model might struggle more with this category.

7. Conclusion

This research focuses on the classification of fake news on social media sites containing content in natural language processing. With the increase in internet usage, it is now very easy for fake news to spread. Many people are constantly connected to the internet and social media platforms. There are no restrictions on publishing information on these platforms. For this reason, some people take advantage of these platforms and start spreading fake news targeting people or organizations. This could damage one's reputation or impact business. The negative nature of the spread of fake news, not only through fake news but also through social media, has proven to be a significant issue that deserves to beaddressed. To improve the performance of the model, it needs to adapt to the features of different platforms. The difficulty of distributing media correctly and the challenges of distributing multimedia content highlight the need for constant change and improvement.

8. References

1. Shu, K., Sliva, A., Wang, S., Tang, J., & Liu, H. (2017). Fake news detection on social media: A data mining perspective. ACM SIGKDD Explorations Newsletter, 19(1), 22-36. DOI: 10.1145/3137597.3137600
2. Patibandla, R.S.M.L., Vejendla, L.N.(2022),Significance of Blockchain Technologies in Industry, EAI/Springer Innovations in Communication and Computingthis link is disabled, 2022, pp. 19–31.
3. Ruchansky, N., Seo, S., & Liu, Y. (2017). CSI: A hybrid deep model for fake news detection. Proceedings of the 2017 ACM on Conference on
4. Zhou, X., Wu, J., Zafarani, R. (2019). Fake news: A survey of research, detection methods, and opportunities. arXiv preprint arXiv:1901.07179.
5. Vejendla, L. N., Bysani, B., Mundru, A., Setty, M., & Kunta, V. J. (2023). Score-based support vector machine for spam mail detection. Proceedings of the IEEE International Conference on Electronics, Computing and Communication Technologies (ICOEI), 915–920. https://doi.org/10.1109/ICOEI56765.2023.10125718
6. Anusha, P., Ravikiran, A., Lakshman Narayana, V., & Maddumala, V. R. (2020). Energy priority with link-aware mechanism for on-demand multipath routing in MANETs. Journal of Electrical Engineering and Automation, 29(3), 8979–8991.
7. Narayana, V. L., & Bharathi, C. R. (2017). Identity-based cryptography for mobile ad hoc networks. International Journal of Engineering and Technology Innovation, 95(5), 1173–1181
8. Narayana, V. L., & Midhunchakkaravarthy, D. (2020). A time interval-based blockchain model for detection of malicious nodes in MANET using network block monitoring node. Proceedings of the IEEE International Conference on Intelligent Computing and Robotics (ICIRCA), 852–857. https://doi.org/10.1109/ICIRCA48905.2020.9183256
9. Bharathi Vejendla, C. R., Narayana, L., & Ramesh, L. V. (2020). Secure data communication using Internet of Things. Journal of Advanced Research in Dynamic and Control Systems, 9(4), 3516–3520.

10. Narayana, V. L., Sujatha, V., Sri, K. S., Pavani, V., Prasanna, T. V. N., & Ranganarayana, K. (2023). Computer tomography image-based interconnected antecedence clustering model using deep convolutional neural network for prediction of COVID-19. Traitement du Signal, 40(4), 1689–1696. https://doi.org/10.18280/ts.400437
11. Patibandla, R. S. M. L., Rao, B. T., & Narayana, V. L. (2022). Prediction of COVID-19 using machine learning techniques. In Handbook of Machine Learning for Computational Biology and Bioinformatics (pp. 219–231). https://doi.org/10.1016/B978-0-12-824145-5.00007-1
12. Pavani, V., Sri, K. S., Krishna, P. S., & Narayana, V. L. (2021). Multi-level authentication scheme for improving privacy and security of data in decentralized cloud server. Proceedings of the IEEE International Conference on Systems and Electronics Engineering (ICOSEC), 391–394. https://doi.org/10.1109/ICOSEC51865.2021.9591698
13. Arepalli, P. G., Jairam Naik, K., & Rout, J. K. (2024). Aquaculture water quality classification with sparse attention transformers: Leveraging water and environmental parameters. In ACM International Conference Proceeding Series (pp. 318-325). https://doi.org/10.1145/3651781.3651829
14. Kumar, S. A., Babu, E. S., Nagaraju, C., & Gopi, A. P. (2015). An empirical critique of on-demand routing protocols against rushing attack in MANET. International Journal of Electrical and Computer Engineering, 5(5), 1102-1110. https://doi.org/10.11591/ijece.v5i5.pp1102-1110
15. Arepalli, G., Erukula, S. B., Gopi, A. P., & Nagaraju, C. (2016). Secure multicast routing protocol in MANETs using efficient ECGDH algorithm. International Journal of Electrical and Computer Engineering, 6(4), 1857-1865. https://doi.org/10.11591/ijece.v6i4.9941
16. Arepalli, P. G., Akula, M., Kalli, R. S., Kolli, A., Popuri, V. P., & Chalichama, S. (2022). Water quality prediction for salmon fish using Gated Recurrent Unit (GRU) model. In 2022 2nd International Conference on Computer Science, Engineering and Applications, ICCSEA 2022. https://doi.org/10.1109/ICCSEA54677.2022.9936539
17. Narayana, V. L., & Gopi, A. P. (2017). Visual cryptography for gray scale images with enhanced security mechanisms. Traitement du Signal, 34, 197-208. DOI: 10.3166/ts.34.197-208
18. Arepalli, P. G., Narayana, V. L., Venkatesh, R., & Kumar, N. A. (2019). Certified node frequency in social network using parallel diffusion methods. Ingenierie des Systemes d'Information, 24(1), 113-117. https://doi.org/10.18280/isi.240117
19. Peda Gopi, A., & Lakshman Narayana, V. (2017). Protected strength approach for image steganography. Traitement du Signal, 34(3-4), 175-181. https://doi.org/10.3166/TS.34.175-181
20. Narayana, V. L., Gopi, A. P., Anveshini, D., & Lakshmi, G. V. V. (2020). Enhanced path finding process and reduction of packet droppings in mobile ad-hoc networks. International Journal of Wireless and Mobile Computing, 18(4), 391-397. https://doi.org/10.1504/IJWMC.2020.108539
21. Vejendla, L. N., Naresh, A., & Arepalli, P. G. (2021). Traffic analysis using IoT for improving secured communication. In Innovations in the Industrial Internet of Things (IIoT) and Smart Factory (pp. 106-116). https://doi.org/10.4018/978-1-7998-3375-8.ch008
22. Kanumalli, S. S., Lavanya, K., Rajeswari, A., Samyuktha, P., & Tejaswi, M. (2023, February). A scalable network intrusion detection system using bi-lstm and cnn. In *2023 Third International Conference on Artificial Intelligence and Smart Energy (ICAIS)* (pp. 1-6). IEEE.
23. Kanumalli, S. S., Mantena, S. J., Kandula, S., Doppalapudi, K., & Atluri, T. (2022, May). Automated Irrigation Management System using IoT. In *2022 6th International Conference on Intelligent Computing and Control Systems (ICICCS)* (pp. 476-482). IEEE.
24. Kanumalli, S. S., Swathi, S., Sukanya, K., Yamini, V., & Nagalakshmi, N. (2022). Classification of dna sequence using machine learning. In *Soft Computing for Security Applications:*
25. Chaitanya, Kosaraju, et al. "Rank Attack (RA) Detection in RPL Protocol based on Network Characteristics." 2023 8th International Conference on Communication and Electronics Systems (ICCES). IEEE, 2023.
26. Kosaraju, Chaitanya, et al. "Mirchi crop yield prediction based on soil and environmental characteristics using modified RNN." 2023 IEEE International Students' Conference on Electrical, Electronics and Computer Science (SCEECS). IEEE, 2023
27. Chaitanya, Kosaraju, et al. "Ads Click-Through Rate prediction using Attention based LSTM Mechanism." 2024 IEEE International Students' Conference on Electrical, Electronics and Computer Science (SCEECS). IEEE, 2024.
28. Sujatha, V., Prasanthi, Y., Pravallika, C.H., ... Ayesha Banu, S.K., Sahithi, M.,K(23)
29. **" A Computer Vision Method for Detecting the Lanes and Finding the Direction of Traveling the Vehicle*Lecture Notes in Networks and Systems"*, 2023, 612, pp. 373–382**
30. Sri, L. Akhila, K. Manvitha, G. Amulya, I. Sai Sanjuna, and V. Pavani. "FBI crime analysis and prediction using machine learning." *Journal of Engineering Sciences* 11, no. 4 (2020): 441-448.
31. Sukanya Konatam et al., (2024), A Journal on Securing NoSQL Databases: A Comprehensive Guide to Best Practices and Configurations, Paideuma Journal of Research 17 (8 2024), 15-27.

32. P. V, L. S. K, P. Vyshnavi A, M. Ch and S. B. G, "Students Community Portal using Machine Learning," *2023 Second International Conference on Electronics and Renewable Systems (ICEARS)*, Tuticorin, India, 2023, pp. 1109-1113, doi: 10.1109/ICEARS56392.2023.10085516.

33. Sirisha, Aswadati, et al. "Intrusion detection models using supervised and unsupervised algorithms-a comparative estimation." *International Journal of Safety and Security Engineering* 11.1 (2021): 51-58.

34. Krishna, KVSS Rama, et al. "Vehicle Number Plate Detection using Deep Learning." *2024 International Conference on Integrated Circuits and Communication Systems (ICICACS)*. IEEE, 2024.

35. Krishna, Komanduri Venkata Sesha Sai Rama, et al. "Classification of Glaucoma Optical Coherence Tomography (OCT) Images Based on Blood Vessel Identification Using CNN and Firefly Optimization." *Traitement du Signal* 38.1 (2021).

36. Rayachoti, Eswaraiah, Sudhir Tirumalasetty, and Silpa Chaitanya Prathipati. "Watermarking system for telemedicine based on FABEMD." *Multimedia Tools and Applications* 81.30 (2022): 44383-44404.

37. Chaitanya, P. Silpa, KV Narasimha Reddy, and G. Madhavi. "Effective Search of Color-Spatial Image Using Semantic Indexing." *International Journal of Computer Science, Engineering and Applications (IJCSEA) Vol* 2 (2012): 9-19.

38. Alapati, N., Prasad, B. V. V. S., Sharma, A., Kumari, G. R. P., Veeneetha, S. V., Srivalli, N., ... & Sahitya, D. (2022, November). Prediction of Flight-fare using machine learning. In *2022 International Conference on Fourth Industrial Revolution Based Technology and Practices (ICFIRTP)* (pp. 134-138). IEEE.
39. Alapati, N., Prasad, B. V. V. S., Sharma, A., Kumari, G. R. P., Bhargavi, P. J., Alekhya, A., ... & Nandini, K. (2022, November). Cardiovascular Disease Prediction using machine learning. In *2022 International Conference on Fourth Industrial Revolution Based Technology and Practices (ICFIRTP)* (pp. 60-66). IEEE.
40. Srikanth Kilaru ” A Novel Approach to Human Iris Recognition And Verification Framework Using Machine Learning Algorithm” 2023 6th International Conference on Contemporary Computing and Informatics (IC3I),
41. DOI: 10.1109/IC3I59117.2023.10397886, ISBN Information:Electronic ISBN:979-8-3503-0448-0

    Print on Demand(PoD) ISBN:979-8-3503-0449-7

42. Srikanth Kilaru “Analytical models for collaborative autonomous mobile robot solutions in fulfillment centers” in Applied Mathematical Modelling,Volume 91, March 2021, Pages 438-457,https://doi.org/10.1016/j.apm.2020.09.059

43. Gopi, A. P., & Naik, K. J. (2022). An IoT model for fish breeding analysis with water quality data of pond using modified multilayer perceptron model. *2022 International Conference on Data Analytics for Business and Industry (ICDABI)*, 448-453. https://doi.org/10.1109/ICDABI56818.2022.10041617
44. Arepalli, P. G., & Naik, K. J. (2024). A deep learning-enabled IoT framework for early hypoxia detection in aqua water using lightweight spatially shared attention-LSTM network. *Journal of Supercomputing, 80*(2), 2718-2747. https://doi.org/10.1007/s11227-023-05580-x
45. Arepalli, P. G., & Naik, K. J. (2023). An IoT-based water contamination analysis for aquaculture using lightweight multi-headed GRU model. *Environmental Monitoring and Assessment, 195*(12), Article 1516. https://doi.org/10.1007/s10661-023-12126-4
46. Gopi, A. P., Gowthami, M., Srujana, T., Gnana Padmini, S., & Durga Malleswari, M. (2023). Classification of denial-of-service attacks in IoT networks using AlexNet. In *Smart Innovation, Systems and Technologies* (Vol. 316, pp. 349-357). https://doi.org/10.1007/978-981-19-5403-0_30
47. Bikku, T., Gopi, A. P., & Prasanna, R. L. (2019). Swarming the high-dimensional datasets using ensemble classification algorithm. In *Advances in Intelligent Systems and Computing* (Vol. 815, pp. 583-591). https://doi.org/10.1007/978-981-13-1580-0_56
48. Vosoughi, S., Roy, D., & Aral, S. (2018). The spread of true and false news online. Science, 359(6380), 1146-1151. DOI: 10.1126/science.aap9559
49. Shu, K., Wang, S., Lee, D., & Liu, H. (2019). Beyond news content: Detecting fake news using social context. ACM Transactions on Knowledge Discovery from Data (TKDD), 13(2), 1-25.