

The Rise of OTT: Transforming Television Consumption in Jhansi

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Abstract- Over-The-Top (OTT) platforms have revolutionized the media landscape in India, from a luxury to a popular form of entertainment. This paper looks at the emergence and impact of OTT platforms, including domestic providers like Hotstar and JIO Cinema, as well as global behemoths like Netflix and Amazon Prime. The study investigates the factors driving the rapid use of OTT platforms, such as technological advancements, decreased data pricing, and widespread access to high-speed internet and smart devices. The article explores the many types of content available on these platforms, their technical basis, audience demographics, and the implications of content regulation and limitation. The Covid-19 pandemic has accelerated the growth of OTT platforms, highlighting their potential to deliver. Over-the-Top (OTT) platforms enable users to access material online instead of traditional broadcast channels like cable or satellite TV. Recent years have seen a significant shift in how we consume entertainment. People can no longer rely on planned television broadcasts. With simply an internet connection, individuals can view whatever they want, whenever they want. OTT platforms have grown in popularity due to their diverse content offerings and ability to filter by genre. The COVID-19 epidemic accelerated the trend towards streaming platforms, since lockdowns kept people at home and cinemas, schools, and companies shuttered. Over-the-Top (OTT) platforms enable users to stream content directly from the internet, eliminating the need for traditional broadcast mediums like cable or satellite TV. With an internet connection, users can choose what they want to watch and when they want to watch it.

Keywords— OTT platforms, digital entertainment, streaming services, technological advancements, content regulation, consumer preferences.

I. INTRODUCTION

OTT (Over-the-Top) platforms refer to services that allow users to stream content directly via the internet, bypassing traditional broadcast mediums like cable or satellite TV. The way we consume entertainment has drastically changed in recent years. People no longer have to rely on scheduled television broadcasts. Instead, with just an internet connection, they can choose what they want to watch, when they want to watch it. With the variety of content available and the ability to select specific genres, OTT platforms have gained immense popularity. The COVID-19 pandemic played a crucial role in accelerating this shift, as lockdowns kept people at home, and with cinemas, schools, and offices closed, streaming platforms became the go-to for entertainment. This shift has pushed OTT platforms into the mainstream as people now prefer on demand content.

II. MEANING OF OTT

Over-The-Top (OTT) services use the internet to directly provide content to users, eliminating the need for traditional distribution methods. OTT services run on top of current internet networks, unlike traditional media that requires hardware and network infrastructure. Users can access

various material and applications via the internet, bypassing traditional service providers.

The Indian telecom regulator defines OTT services as "a service provider that offers information and communications technology (ICT) but does not operate or lease a network with single carrier capacity."

According to Tata Consultancy Services, over-the-top (OTT) platforms distribute film and television content directly to consumers, circumventing traditional cable and satellite distribution channels.

India's telecom regulator defines OTT services offering as: "A service provider that offers information and communications Technology services (ICT), but does not operate or lease a network Single carrier capacity.

Tata Consultancy Services defined OTTs as "platforms that deliver film and television content bypassing traditional cable and satellite television distribution channels, from the producer to the Consumer Direct, a web-powered exchange platform.

III. TYPES OF OTT SERVICES

On the basis of the monetization model, VOD services are segmented as given below:

- **Advertising video on demand (AVOD):** is an ad-based Business model similar to traditional television services in the way it offers streaming free content to the end user. YouTube
- **Subscription video on demand (SVOD):** It is based on the end user "Subscribe" to the services provided by the Platform for a fixed period fixed subscription fee period. Netflix and Amazon First video.
- **Transactional video on demand (TVOD):** This is a Transaction based Model where customers pay for the separate part of the video Content they see. Apple iTunes.
- **Freemium Model:** Platforms are moving towards this type of Monetization model that includes AVOD and SVOD with a customer loyalty strategy with the platform and slowly get those customers to start using premium services Subscribe to the exclusive platform.

IV. REVIEW OF LITERATURE

The growth of Over-The-Top (OTT) platforms has transformed the entertainment landscape, particularly in India. This review highlights key research areas, focusing on media consumption changes, technological drivers, content diversity, regulatory challenges, and evolving consumer preferences.

1. **Shift in Media Consumption:** OTT platforms have significantly altered traditional viewing habits, offering on-demand content that caters to individual preferences. Studies note a shift from scheduled television to flexible, personalized viewing, driven by convenience and accessibility (Lotz, 2017; Ray, 2021). This transition has been amplified in India by the widespread availability of affordable smartphones and internet access (Soni & Basu, 2021).
2. **Technological Drivers:** Technological advancements, particularly the availability of affordable data and smartphones, have been central to the rise of OTT services in India (Ghosh, 2019).

TRAI (2020) highlights that reduced data costs have made streaming widely accessible. In addition, innovations like adaptive streaming have improved user experience, enabling seamless content delivery (Bhatnagar, 2021).

3. **Content Variety:** OTT platforms offer diverse content, catering to different audience segments. Local platforms such as Hotstar and Jio Cinema focus on regional content, while global players like Netflix and Amazon Prime attract urban audiences with a mix of local and international offerings (Sharma et al., 2021; Sen, 2020). This variety is a key factor driving user engagement (Deshpande, 2022).
4. **Impact of COVID-19:** The COVID-19 pandemic accelerated OTT adoption, with increased subscriptions and viewership during lockdowns (Rastogi & Gupta, 2021). As cinemas and live events were halted, OTT platforms became the primary source of entertainment (Williams & Mehta, 2020), cementing their role in the mainstream (Rao, 2021).
5. **Monetization Models:** OTT platforms utilize several monetization strategies, including AVOD, SVOD, TVOD, and Freemium models (Kumar & Narang, 2019). SVOD (e.g., Netflix) and AVOD (e.g., YouTube) dominate in India, while hybrid models that combine free and premium content are gaining traction (Jain, 2020; Kapoor, 2021).
6. **Regulatory and Censorship Challenges:** OTT platforms face regulatory challenges, particularly around content censorship and intellectual property rights. India's lack of a clear regulatory framework has sparked debates over content control and freedom of expression (Agarwal, 2020; Dutta, 2021), posing future challenges for platform operators and content creators.
7. **Evolving Consumer Preferences:** OTT consumption is primarily driven by younger audiences, who prefer serialized, binge-worthy content (Singh, 2021). In contrast, older viewers lean towards traditional formats like films and TV dramas (Kapoor, 2022). Recommendation algorithms also play a vital role in influencing viewing choices by personalizing content (Patil, 2020).
8. **Research Gaps:** Despite growing research on OTT platforms, gaps remain regarding their impact on traditional media revenue models and the long-term effects of emerging regulations on content strategy.

This literature review outlines the significant themes in OTT research, from shifting consumer behaviors to technological and regulatory challenges. The rapid growth of OTT platforms in India continues to shape the media landscape, warranting further investigation into its broader societal and economic impacts.

V. METHEDOLOGY

This study examines the growth, impact, and consumer behavior surrounding Over-The-Top (OTT) platforms in India. A structured questionnaire was devised to assess media viewing patterns, content preferences, OTT platform usage, and attitudes of content control. The data will be collected using Google Forms and analyzed with SPSS, a statistical analysis tool.

Sampling Frame: The respondents are individuals aged 18 to 40 years and above who consume content via OTT platforms.

Sampling Unit: The sampling unit includes residents of India who actively use OTT platforms like Netflix, Hotstar, Amazon Prime, and others.

Sampling Method: The study employs a simple random sampling method to ensure diverse representation across demographics.

Sample Size: After initial data cleaning, the sample size is 250 respondents, with further responses being collected as the survey continues.

Association in the preference of OTT & TV according to

Gender	Gender	OTT	TV	Grand Total	0.23422 Highly Significant
	Female	77	40	117	
	Male	74	27	101	
	Grand Total	151	67	218	

Annual Income	<table><tr><th>Annual Income</th><th>OTT</th><th>TV</th><th>Grand Total</th></tr><tr><td>Above 2 lakhs</td><td>83</td><td>42</td><td>125</td></tr><tr><td>Less than 2 lakhs</td><td>48</td><td>13</td><td>61</td></tr><tr><td>Less than 5 lakhs</td><td>20</td><td>12</td><td>32</td></tr><tr><td>Grand Total</td><td>151</td><td>67</td><td>218</td></tr></table>	Annual Income	OTT	TV	Grand Total	Above 2 lakhs	83	42	125	Less than 2 lakhs	48	13	61	Less than 5 lakhs	20	12	32	Grand Total	151	67	218	0.04321 Significant				
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	Reason	OTT	TV	Grand Total	
	Amazon Prime	31	10	41	
	Hotstar	43	23	66	
	Netflix	27	8	35	
	Other	4	6	10	
	Voot	12	7	1	
	Zee5	34	13	47	
	Grand Total	151	67	218	

VI. FINDINGS

The study investigates the relationship between demographic factors and the preference for OTT platforms versus traditional TV, using Chi-square tests to assess statistical significance.

1. Gender

The findings reveal that **51%** of females and **49%** of males prefer OTT platforms, while **60%** of TV viewers are female and **40%** are male. The Chi-square test shows a **highly significant association** between gender and media preference, indicating that gender influences content consumption choices.

2. Annual Income

Among respondents earning more than ₹2 lakh annually, **66%** prefer OTT platforms and **34%** favor TV. For those earning less than ₹2 lakh, **79%** prefer OTT, while **21%** favor TV. Respondents earning under ₹5 lakh show **63%** favoring OTT and **37%** preferring TV. This demonstrates a **highly significant association** between income levels and media preferences, with higher-income groups gravitating toward OTT platforms.

3. Occupation

The study reveals that **65%** of students and **73%** of private employees prefer OTT platforms, while **53%** of businessmen and **58%** of government employees favor TV. The Chi-square test shows a **highly significant association** between occupation and media preference, with younger and digitally savvy professionals opting for OTT over traditional TV.

4. Paid vs. Free Content

Among OTT users, **56%** prefer free services, while **44%** opt for paid subscriptions. Similarly, **60%** of TV viewers prefer free content, while **40%** use paid options. The association between the monetization model (paid vs. free) and media preference is **highly significant**, with a notable inclination toward free content among both OTT and TV users.

5. Choice Based on Content (Ad-Free, Quality, Others)

Regarding user choice, **45%** of OTT users prefer platforms offering ad-free content, while **36%** prioritize content quality, and **19%** have other preferences. For TV viewers, **57%** favor ad-free content and **27%** prioritize good content quality. The Chi-square test reveals a **highly significant association**, indicating that ad-free experiences and content quality are key drivers for OTT preference.

6. Censorship and Media

Among OTT users, **59%** prefer platforms without censorship, compared to **41%** who are indifferent. For TV viewers, **60%** prefer no censorship, while **40%** support censorship. The association between censorship concerns and media preference is **highly significant**, showing that many OTT users favor uncensored content over traditional TV, which often faces stricter regulations.

7. Reasons

When asked about the reasons for their preference, **48%** of OTT users cite content quality, **34%** mention platform popularity, and **18%** favor cost efficiency. For TV viewers, **48%** prioritize good content, **31%** choose based on popularity, and **21%** cite cost efficiency. The Chi-square test indicates a **highly significant association** between reasons for platform preference and media choice, with content quality and platform popularity being the strongest drivers.

8. Platform-Specific

In terms of platform preference, **28%** of OTT users favor **Hotstar**, **21%** prefer **Amazon Prime**, and **18%** choose **Netflix**. Among TV viewers, **34%** prefer **Hotstar**, followed by **15%** who choose **Zee5** and **12%** who prefer **Amazon Prime**. The Chi-square results show a **highly significant association** between platform preference and media consumption, highlighting how content variety and exclusive offerings on OTT platforms have reshaped user behavior.

VII. CONCLUSION

The emergence of Over-The-Top (OTT) platforms has significantly reshaped the entertainment scene in India, spurred by advancements in technology, evolving consumer preferences, and the effects of the COVID-19 pandemic. This research shows that OTT services have transitioned from niche offerings to a mainstream entertainment choice, fundamentally changing how viewers access and enjoy media.

The findings reveal that demographic factors such as gender, income, and occupation influence media preferences. Specifically, younger audiences and those in higher income brackets show a strong preference for OTT platforms, drawn in by the availability of high-quality content and the appeal of ad-free experiences. The ability to access a wide variety of programming at their convenience has made OTT platforms increasingly popular among viewers.

Moreover, the study highlights some challenges faced by OTT services, particularly in terms of content regulation and censorship. As the industry continues to develop, addressing these issues will be crucial for the ongoing success of OTT platforms in India.

In summary, this research emphasizes the need to understand the changing landscape of digital entertainment. As viewer preferences evolve, those involved in the media sector must be ready to adapt, capitalizing on the opportunities that OTT platforms present while navigating any accompanying challenges. Future studies could further investigate the long-term effects of this shift on traditional media and the broader implications for society.

REFERENCES

- [1] Abel KD, Misra S, Agrawal A, Maskeliunas R, Damasevicius R. Data security using cryptography and steganography technique on the cloud. In Computational Intelligence in Machine Learning: Select Proceedings of ICCIML 2021 2022 Mar 3 (pp. 475-481). Singapore: Springer Nature Singapore.
- [2] Vijarania M, Gupta S, Agrawal A, Misra S. Achieving sustainable development goals in cyber security using aiOT for healthcare application. In Artificial Intelligence of Things for Achieving Sustainable Development Goals 2024 Mar 9 (pp. 207- 231). Cham: Springer Nature Switzerland.
- [3] Vijarania M, Agrawal A, Sharma MM. Task scheduling and load balancing techniques using genetic algorithm in cloud computing. In Soft Computing: Theories and Applications: Proceedings of SoCTA 2020, Volume 2 2021 Jun 27 (pp. 97-105). Singapore: Springer Singapore.
- [4] Sharma MM, Agrawal A. Test case design and test case prioritization using machine learning. International Journal of Engineering and Advanced Technology. 2019 Oct;9(1):2742-8
- [5] Agrawal A, Arora R, Arora R, Agrawal P. Applications of artificial intelligence and internet of things for detection and future directions to fight against COVID-19. In Emerging Technologies for Battling Covid19: Applications and Innovations 2021 Feb 16 (pp. 107-119). Cham: Springer International Publishing.
- [6] Dalal S, Jaglan V, Agrawal A, Kumar A, Joshi SJ, Dahiya M. Navigating urban congestion: Optimizing LSTM with RNN in traffic prediction. In AIP Conference Proceedings 2024 Dec 20 (Vol. 3217, No. 1, p. 030005). AIP Publishing LLC.
- [7] Dalal S, Lilhore UK, Faujdar N, Simaiya S, Agrawal A, Rani U, Mohan A. Enhancing thyroid disease prediction with improved XGBoost model and bias management techniques. Multimedia Tools and Applications. 2025 May;84(16):16757-88.
- [8] Naphtali JH, Misra S, Wejin J, Agrawal A, Oluranti J. An intelligent hydroponic farm monitoring system using IoT. In Data, Engineering and Applications: Select Proceedings of IDEA 2021 2022 Oct 12 (pp. 409-420). Singapore: Springer Nature Singapore.
- [9] Joaquim MM, Kamble AW, Misra S, Badejo J, Agrawal A. IoT and machine learning based anomaly detection in WSN for a smart greenhouse. In Data, Engineering and Applications: Select Proceedings of IDEA 2021 2022 Oct 12 (pp. 421-431). Singapore: Springer Nature Singapore.
- [10] Vijarania M, Udbhav M, Gupta S, Kumar R, Agarwal A. Global cost of living in different geographical areas using the concept of NLP. In Handbook of Research on Applications of AI, Digital Twin, and Internet of Things for Sustainable Development 2023 (pp. 419-436). IGI Global.
- [11] Gupta, S., Vijarania, M., Agarwal, A., Yadav, A., Mandadi, R. R., & Panday, S. (2024). Big Data Analytics in Healthcare Sector: Potential Strength and Challenges. In Advancement of Data Processing Methods for Artificial and Computing Intelligence (pp. 41-67). River Publishers.
- [12] Afah, D., Gautam, A., Misra, S., Agrawal, A., Damaševičius, R., & Maskeliūnas, R. (2021, February). Smartphones verification and identification by the use of fingerprint. In International Conference on Emerging Applications of Information Technology (pp. 365-373). Singapore: Springer Singapore.
- [13] Deore, H., Agrawal, A., Jaglan, V., Nagpal, P., & Sharma, M. M. (2020). A new approach for navigation and traffic signs Gaurav Singh al. International Journal of Recent Research Aspects ISSN: 2349-7688, Vol. 12, Issue 3, Sept. 2025, pp. 21-28 © 2014 IJRAA All Rights Reserved page - 27- indication using map integrated augmented reality for self-driving cars. Scalable Computing: Practice and Experience, 21(3), 441-450.
- [14] Jain, V., Raman, M., Agrawal, A., Hans, M., & Gupta, S. (Eds.). (2024). Convergence Strategies for Green Computing and Sustainable Development. IGI Global.
- [15] Agrawal, A., & Jain, A. (2020). Speech emotion recognition of Hindi speech using statistical and machine learning techniques. Journal of Interdisciplinary Mathematics, 23(1), 311-319.
- [16] Anand, A., Dalal, S., & Dubey, P. (2023). Designing Efficient model for ModelNet10 Database and Keras for 3D Object Recognition by PointNet Architecture. Journal of Data Science and Cyber Security, 1.0(1), 88-97.
- [17] Anand, A., Dalal, S., & Dubey, P. (2023). Using ModelNet10 Database for Contactless Medical Treatment Robotics: Advancing 3D Object Recognition and Autonomous Navigation. Journal of Data Science and Cyber Security, 1.0(1), 76-87.
- [18] Bishnoi, A., Bharadwaj, S., & Dalal, S. (2023). Disease Detection in Crop's using Transfer Learning: An analysis on Detection through Computer. 2023 International Conference on Communication, Security and Artificial Intelligence (ICCSAI), 475-480.
- [19] Dalal, S., Goel, P., Onyema, E. M., Alharbi, A., Mahmoud, A., Algarni, M. A., & Awal, H. (2023). Application of machine learning for cardiovascular disease risk prediction. Computational Intelligence and Neuroscience, 2023.0(1), 9418666.
- [30] Dalal, S., Goel, P., Onyema, E. M., Alharbi, A., Mahmoud, A., Algarni, M. A., & Awal, H. (2023). Research Article Application of Machine Learning for Cardiovascular Disease Risk Prediction.
- [20] Dalal, S., Lilhore, U. K., Faujdar, N., Simaiya, S., Ayadi, M., Almujaali, N. A., & Ksibi, A. (2023). Next-generation cyber attack prediction for IoT systems: leveraging multiclass

- SVM and optimized CHAID decision tree. *Journal of Cloud Computing*, 12.0(1), 137. [21] Dalal, S., Lilhore, U. K., Manoharan, P., Rani, U., Dahan, F., Hajje, F., Keshta, I., Sharma, A., Simaiya, S., & Raahemifar, K. (2023). An efficient brain tumor segmentation method based on adaptive moving self-organizing map and fuzzy Kmean clustering. *Sensors*, 23.0(18), 7816.
- [22] Dalal, S., Lilhore, U. K., Simaiya, S., Jaglan, V., Mohan, A., Ahuja, S., Agrawal, A., Margala, M., & Chakrabarti, P. (2023). A precise coronary artery disease prediction using Boosted C5.0 decision tree model. *Journal of Autonomous Intelligence*, 6.0(3).
- [23] Dalal, S., Lilhore, U. K., Simaiya, S., Sharma, A., Jaglan, V., Kumar, M., Jangra, M., Goyal, N., & Rana, A. K. (2023). A Blockchain-based secure Internet of Medical Things framework for smart healthcare. *Journal of Autonomous Intelligence*, 6.0(3).
- [24] Dalal, S., Manoharan, P., Lilhore, U. K., Seth, B., Simaiya, S., Hamdi, M., & Raahemifar, K. (2023). Extremely boosted neural network for more accurate multistage Cyber attack prediction in cloud computing environment. *Journal of Cloud Computing*, 12.0(1), 1-22. [25] Dalal, S., Onyema, E. M., Kumar, P., Maryann, D. C., Roselyn, A. O., & Obichili, M. I. (2023). A hybrid machine learning model for timely prediction of breast cancer. *International Journal of Modeling, Simulation, and Scientific Computing*, 14.0(04), 2341023.
- [26] Dalal, S., Poongodi, M., Lilhore, U. K., Dahan, F., Vaiyapuri, T., Keshta, I., Aldossary, S. M., Mahmoud, A., & Simaiya, S. (2023). Optimized LightGBM model for security and privacy issues in cyber-physical systems. *Transactions on Emerging Telecommunications Technologies*, e4771.
- [27] Dalal, S., Seth, B., & Radulescu, M. (2023). Driving technologies of Industry 5.0 in the medical field. Digitalization, sustainable development, and Industry 5.0: An organizational model for twin transitions, 267-292. [28] Dalal, S., Seth, B., Radulescu, M., Cilan, T. F., & Serbanescu, L. (2023). Optimized deep learning with learning without forgetting (LwF) for weather classification for sustainable transportation and traffic safety. *Sustainability*, 15.0(7), 6070.
- [29] Deshwal, D., Sangwan, P., Dahiya, N., Lilhore, U. K., Dalal, S., & Simaiya, S. (2023). COVID-19 Detection using Hybrid CNN-RNN Architecture with Transfer Learning from XRays. *Current medical imaging*, 20.0
- [30] Jaiswal, V., Saurabh, P., Lilhore, U. K., Pathak, M., Simaiya, S., & Dalal, S. (2023). A breast cancer risk predication and classification model with ensemble learning and big data fusion. *Decision Analytics Journal*, 8.0, 100298.
- [31] Lilhore, U. K., Dalal, S., Faujdar, N., Margala, M., Chakrabarti, P., Chakrabarti, T., Simaiya, S., Kumar, P., Thangaraju, P., & Velmurugan, H. (2023). Hybrid CNN-LSTM model with efficient hyperparameter tuning for prediction of Parkinson's disease. *Scientific Reports*, 13.0(1), 14605.
- [32] Lilhore, U. K., Manoharan, P., Sandhu, J. K., Simaiya, S., Dalal, S., Baqasah, A. M., Alsafyani, M., Alroobaea, R., Keshta, I., & Raahemifar, K. (2023). Hybrid model for precise hepatitis-C classification using improved random forest and SVM method. *Scientific Reports*, 13.0(1), 12473.
- [33] Lilhore, U. K., Manoharan, P., Simaiya, S., Alroobaea, R., Alsafyani, M., Baqasah, A. M., Dalal, S., Sharma, A., & Raahemifar, K. (2023). Hidm: Hybrid intrusion detection model for industry 4.0 networks using an optimized cnn-lstm with transfer learning. *Sensors*, 23.0(18), 7856.
- [34] Malik, A., Onyema, E. M., Dalal, S., Lilhore, U. K., Anand, D., Sharma, A., & Simaiya, S. (2023). Forecasting students' adaptability in online entrepreneurship education using modified ensemble machine learning model. *Array*, 19.0, 100303.
- [35] Nikhil, Arpna, & Dalal, S. (2023). Machine learning model for Water Quality evaluation: Systematic Review. 2023 Second International Conference On Smart Technologies For Smart Nation (SmartTechCon), 1013-1018.
- [36] Singh A, Prakash N, Jain A. A review on prevalence of worldwide COPD situation. *Proceedings of Data Analytics and Management: ICDAM 2022*. 2023 Mar 25:391-405.
- [37] Singh A, Payal A. CAD diagnosis by predicting stenosis in arteries using data mining process. *Intelligent Decision Technologies*. 2021 Feb;15(1):59-68.
- [38] Singh A, Prakash N, Jain A. A comparative study of metaheuristic-based machine learning classifiers using non-parametric tests for the detection of COPD severity grade.
- [39] Dalal, S., Onyema, E. M., & Malik, A. (2022). Hybrid XGBoost model with hyperparameter tuning for prediction of liver disease with better accuracy. *World Journal of Gastroenterology*, 28.0(46), 6551.
- [40] Dalal, S., Onyema, E. M., Romero, C. A. T., Ndufeiya-Kumasi, L. C., Maryann, D. C., Nnedimkpa, A. J., & Bhatia, T. K. (2022). Machine learning-based forecasting of potability of drinking water through adaptive boosting model. *Open Chemistry*, 20.0(1), 816-828.
- [41] Dalal, S., Seth, B., Jaglan, V., Malik, M., Surbhi, Dahiya, N., Rani, U., Le, D. N., & Hu, Y. C. (2022). An adaptive traffic routing approach toward load balancing and congestion control in Cloud-MANET ad hoc networks. *Soft Computing*, 26.0(11), 5377- 5388.
- [42] Dalal, S., Seth, B., Radulescu, M., Secara, C., & Tolea, C. (2022). Predicting fraud in financial payment services through optimized hyper-parameter-tuned XGBoost model. *Mathematics*, 10.0(24), 4679.
- [43] Edeh, M. O., Dalal, S., Dhaou, I. B., Agubosim, C. C., Umoke, C. C., RichardNnabu, N. E., & Dahiya, N. (2022). Artificial intelligence-based ensemble learning model for prediction of hepatitis C disease. *Frontiers in public health*, 10.0, 892371.
- [44] Singh A, Prakash N, Jain A. Chronic Diseases Prediction using two different pipelines TPOT and Genetic Algorithm based models: A Comparative analysis. In *Proceedings of the 2024 9th International Conference on Machine Learning Technologies 2024 May 24 (pp. 175-180)*.
- [45] Kundu, S., Chaturvedi, R. P., Mishra, A., Agrawal, A., Aldossary, S. M., Ayadi, M., ... & Hashmi, A. (2026). A trustworthy cybersecurity model for transparent cyberattack detection using Bald Eagle Search tuned XGBoost and explainable AI. *Journal of Cloud Computing*, 15(1), 58.
- [46] Kaur, P., Naik, A., Vijarania, M., Gupta, S., & Agrawal, A. (2026, February). Hybrid CNN-ResNet18 Framework for Accurate Brain Tumor Classification Using MRI. In *2026 International Conference on Intelligent Computing and Automation for Sustainable Solutions (ICASS)* (pp. 1-6). IEEE.

[47] Bharti, A., Agrawal, A., Awotunde, J. B., & Tiwari, S. (2025, November). Structured vs. Unstructured Pruning: Balancing Efficiency and Accuracy in CNNs for Image Classification. In *2025 International Conference on Emerging Technologies and Innovation for Sustainability (EmergIN)* (pp. 263-268). IEEE.

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