INTERNATIONAL JOURNAL OF PROGRESSIVE RESEARCH IN ENGINEERING MANAGEMENT AND SCIENCE (IJPREMS)

e-ISSN : 2583-1062

Impact Factor : 5.725

www.ijprems.com
editor@ijprems.com

Vol. 04, Issue 01, January 2024, pp : 207-213

NAVIGATING THE HORIZON: A SYSTEMATIC REVIEW OF E-LEARNING IN CLOUD COMPUTING ENVIRONMENTS

K Ramesh Babu[1], Khader Basha Sk[2], Lavanya Dalavai[3]

[1]Asst. Professor, Dept of ECE, Chalapathi Institute of Technology, Guntur, A.P, India.

[2, 3]Asst. Professor, Dept of CSE-Data Science, Chalapathi Institute of Technology, Guntur, A.P, India.

ABSTRACT

The educational landscape is undergoing a transformative shift, propelled by new technologies that are reshaping traditional offline learning into dynamic online experiences. This study investigates the integration of e-learning and cloud computing, aiming to unravel the synergies between these two domains and explore their potential impact on various educational facets. Two primary research questions guide our inquiry: firstly, the examination of how e-learning influences critical factors such as architecture, software, performance, security, hardware, network, and virtual aspects; and secondly, an exploration of cloud computing services and models, including Software as a Service (SaaS), Platform as a Service (PaaS), Infrastructure as a Service (IaaS), and Service-Oriented Architecture (S.O.A). The research seeks to provide valuable insights into the incorporation of e-learning within a cloud computing environment. Motivated by the desire to understand the intricate relationship between e-learning and cloud computing, our study analyzes 154 scientific papers, delving into specific aspects of this integration and highlighting trends and areas that have garnered increased attention. The focus areas include architecture (27%), general topics (21%), software (19%), and performance (18%), shedding light on the diverse dimensions of e-learning in a cloud computing environment. Our findings reveal that virtual environments face fewer security issues, with greater emphasis on storage and network considerations. Cloud computing services are predominantly characterized by a diverse range, encompassing Software as a Service (18%), Infrastructure as a Service (17%), and Platform as a Service (10%). The majority of studies center around public clouds (74%), with limited exploration into other models (11%) and hybrid clouds (3%). Furthermore, the study identifies key limitations in the integration of e-learning in cloud computing, particularly in the contexts of hybrid and private clouds, specialized infrastructure, and a noticeable gap in platforms and infrastructure offerings. These insights contribute to a deeper understanding of the challenges and opportunities presented by the intersection of e-learning and cloud computing, offering a foundation for future research and the enhancement of educational practices in the digital era.

Keywords- Cloud computing, E-learning, environment, educational, e-learning based Cloud computing, systematic.

1. INTRODUCTION

The COVID-19 pandemic accentuated the pivotal role of e-learning in mitigating educational disruptions during lockdowns. This led to the proliferation of e-learning platforms facilitating seamless access to educational resources and real-time virtual classrooms. Simultaneously, the maturation of the cloud computing environment has established itself as the standard for such applications, reshaping traditional web-based e-learning by providing internal or external programs that optimize academic performance in a cloud-based setting. This paradigm shift offers full software support and substantial computing resources that can be accessed anywhere, anytime, aligning with the dynamic needs of educational institutions. Termed as the "Cloud Campus," this approach reduces infrastructure burdens and enhances technological flexibility for higher institutions.

The convergence of e-learning and cloud computing has witnessed a surge in prevalence, opening new avenues for online learning and collaboration. E-learning, leveraging electronic technologies for educational content delivery, offers unparalleled flexibility and accessibility to learners. In parallel, cloud computing, utilizing remote servers for data storage, management, and processing, presents scalability and cost-effectiveness for educational institutions. However, the intricate interaction and the potential benefits and limitations of these technologies in educational settings remain areas of exploration.

To bridge this knowledge gap, this study delves into the impact of e-learning in a cloud computing environment through the analysis of 154 scientific papers. Focused research questions address the effects of e-learning and cloud computing services and models, covering architecture, software, performance, security, hardware, network, and virtualization. By scrutinizing existing research, the study provides insights into the current state of e-learning in a cloud computing environment, unveiling potential areas for future research and development. The study centers on discerning the empirical use of cloud computing environments for constructing e-learning platforms. Employing a systematic study method to answer research questions, the results highlight a predominant focus on architecture in selected studies, followed by general topics such as software, performance, security, storage, network, hardware,

INTERNATIONAL JOURNAL OF PROGRESSIVE RESEARCH IN ENGINEERING MANAGEMENT AND SCIENCE (IJPREMS)

e-ISSN : 2583-1062

Impact Factor : 5.725

www.ijprems.com
editor@ijprems.com

Vol. 04, Issue 01, January 2024, pp : 207-213

control, management, and virtualization. This study serves as an introduction to a comprehensive exploration of the multifaceted dimensions of the interplay between e-learning and cloud computing, offering a foundation for continued advancements in educational technologies.

1.1 Motivation of the Study:

The motivation of this study is rooted in the profound impact of emerging technologies on the educational landscape, marked by a significant shift from traditional offline learning to dynamic online platforms. The rapid evolution of new technologies has given rise to innovative learning environments, with e-learning gaining substantial prominence in this transformative journey. This shift sparks a natural curiosity about the untapped potential synergies that could be unlocked through the integration of e-learning with another groundbreaking technology: cloud computing.

As both e-learning and cloud computing continue to shape the future of education, there exists a compelling need to understand how their convergence could establish a mutually beneficial relationship. The motivation behind this study is to explore and unravel the intricate dynamics between e-learning and cloud computing. By doing so, we aim to gain insights into how this integration could potentially elevate the quality, accessibility, and overall efficiency of educational experiences. In essence, the study seeks to address the curiosity surrounding the potential enhancements that may arise from the symbiotic relationship between e-learning and cloud computing. By delving into this intersection, we aspire to contribute valuable knowledge to the ongoing discourse on educational technology, laying the groundwork for informed decision-making, innovative practices, and the continued advancement of the educational landscape in the digital era.

1.2 Related Work

Cloud computing has emerged as a compelling choice for various logical reasons, including cost-effectiveness, improved performance, availability of software packages, enhanced processing capabilities in hardware, automatic software upgrades, time savings through cloud-based login, and heightened data reliability. The security benefits of cloud computing are underscored by the assurance that all data is stored securely in the cloud, impervious to unauthorized access. These advantages make cloud computing technologies a common and impactful choice for enhancing the effectiveness, cost-efficiency, and overall acceptability of educational institutions

2. RESEARCH METHODOLOGY

The structural design of e-learning systems constitutes the organizational, architectural, and framework elements that form the backbone of digital learning environments. It encompasses various components designed to facilitate effective online education. Numerous studies delve into the structural design of e-learning within the realm of cloud computing. In a notable study a standardized proposal or model is presented, outlining a three-layered structure. The first layer, known as the Cloud Management System, incorporates subsystems dedicated to content delivery, resource management, content creation, evaluation, and monitoring. Users interact with these subsystems via the Internet using user interface software. The second layer encompasses cloud-provided services, including software, platforms, and infrastructure. The third layer represents the hardware components such as computers, networks, central processing units, and memory. This structural framework serves as a foundational model for understanding the organization and interaction of components within e-learning systems deployed on cloud computing platforms. The study contributes to the broader understanding of how cloud computing architecture can optimize the delivery and management of educational content, providing a robust foundation for further research and development in this dynamic field.

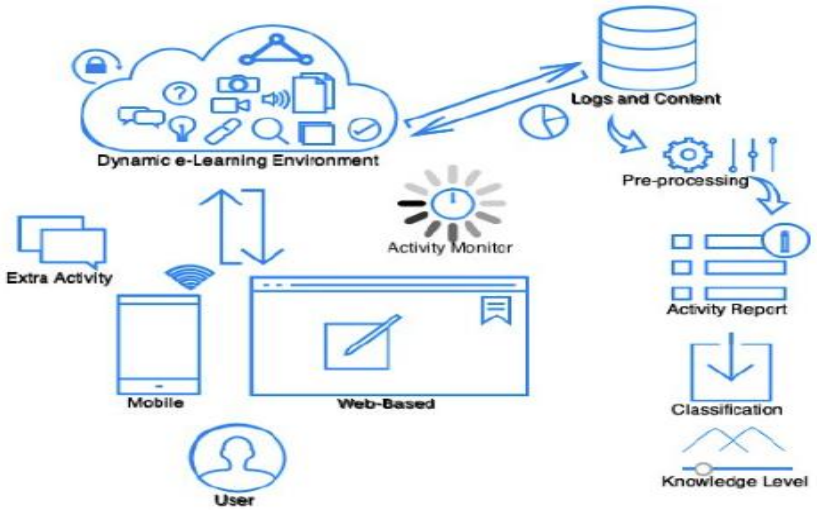

Figure 1: E-Learning systems in cloud computing

INTERNATIONAL JOURNAL OF PROGRESSIVE RESEARCH IN ENGINEERING MANAGEMENT AND SCIENCE (IJPREMS)

e-ISSN : 2583-1062

Impact Factor : 5.725

www.ijprems.com
editor@ijprems.com

Vol. 04, Issue 01, January 2024, pp : 207-213

2.1 Implementing E-learning-Based Cloud Computing Challenges

The successful implementation of e-learning-based cloud computing in educational institutions is not without its challenges. Several key hurdles must be addressed to facilitate a seamless transition to this technology-driven approach to education.

2.1.1 Security Concerns:

Security emerges as a primary challenge in implementing e-learning-based cloud computing within academic institutions. Ensuring the protection of sensitive educational data is paramount, and robust security measures must be in place to safeguard against potential threats and unauthorized access.

2.1.2 Bandwidth Limitations:

A second challenge lies in optimizing bandwidth to enhance internet connectivity. Improved bandwidth is crucial for delivering uninterrupted educational services. The availability and quality of internet bandwidth directly impact the efficiency and effectiveness of e-learning platforms.

2.1.3 Resistance to Change:

Resistance to change poses a significant hurdle, especially when convincing officials and stakeholders to transition from traditional learning environments to e-learning-based cloud computing. Overcoming skepticism and garnering acceptance for this technology-driven shift is a complex task that requires effective communication and educational efforts.

2.1.4 Learning Management Rules:

Differences in learning management between traditional and cloud-based learning environments present another challenge. Variances in managing learning content, teaching methods, courses, exams, and learner engagement must be addressed and adapted to align with the unique aspects of cloud-based learning management.

Educational institutions, along with students and teachers, need to be educated and prepared for the transition to an e-learning-based cloud computing environment. The choice of transition mechanisms, whether through paid services or utilizing internal resources within the institution, involves creating a robust cloud computing infrastructure and adjusting the e-learning structure accordingly.

The increasing interest in leveraging technology, particularly the Internet, for learning purposes. However, it acknowledges that e-learning systems may pose financial challenges for some institutions due to significant hardware and software resource requirements. Cloud computing emerges as a potential solution, offering a cost-effective means to access necessary resources. The study anticipates that cloud computing is the future platform for e-learning, focusing on its application in the e-learning environment.

In the context of the COVID-19 pandemic, another study [11] discusses the urgency for educational institutions to become more efficient, emphasizing the role of cloud computing in addressing these efficiency needs. As institutions navigate these challenges, the study explores how cloud computing can be a pivotal tool in transforming and optimizing the educational landscape.

3. RESULT ANALYSIS

In this stage of the study, the obtained results are presented through graphs, providing visual representations to answer the research questions posed earlier. The figures below showcase the distribution of published papers from 2010 to 2022, offering insights into the trends and patterns observed in the literature.

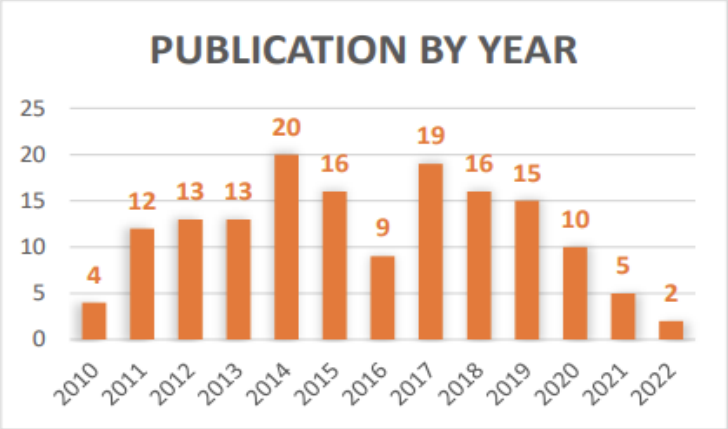

Figure 2: Publication by year

INTERNATIONAL JOURNAL OF PROGRESSIVE RESEARCH IN ENGINEERING MANAGEMENT AND SCIENCE (IJPREMS)

e-ISSN : 2583-1062

Impact Factor : 5.725

www.ijprems.com
editor@ijprems.com

Vol. 04, Issue 01, January 2024, pp : 207-213

The graph illustrates the number of papers published over the years, with a notable observation that the lowest number of articles was recorded in 2022, comprising only two publications. This decline in publications in 2022 may be attributed to challenges related to accessing new papers, such as limitations in data availability or publication delays. The majority of the articles, as evident from the graph, are concentrated between the years 2014 and 2022. This trend suggests a growing and recent interest in the research area, indicating an upswing in scholarly attention to the integration of e-learning and cloud computing.

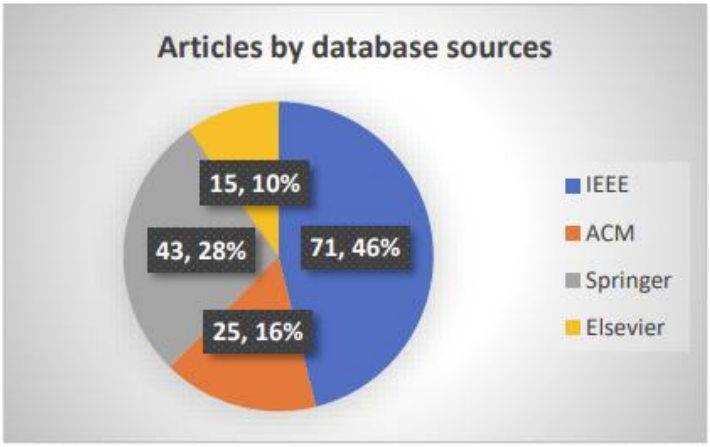

Figure 3: Distribution of articles by database sources

The chronological distribution of publications offers valuable insights into the evolution of research interests and highlights the recent surge in attention to this interdisciplinary field. This information sets the stage for further discussions and analyses, enabling a comprehensive understanding of the trajectory of academic contributions and trends in the integration of e-learning and cloud computing.

Figure 4: Distribution publication source

Fig: 4 shows the distribution of the publication sources. A variety of research data sources were used, including journals (24%), conferences (66%), workshops (2%), and book chapters (12%). Table 4 shows the variety of publications per specified sources.

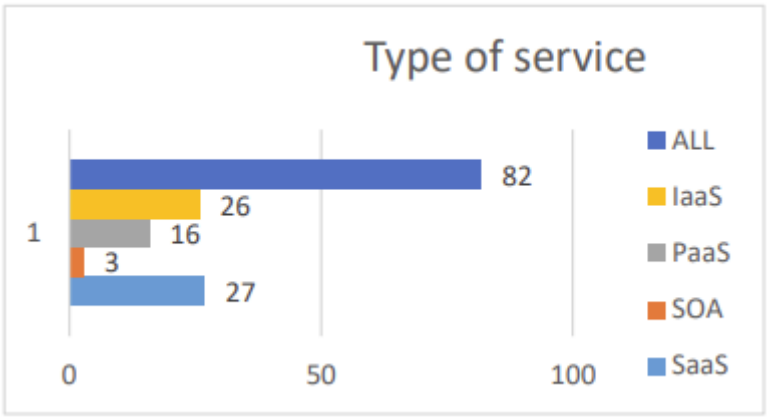

Figure 5: Distribution of type of service

INTERNATIONAL JOURNAL OF PROGRESSIVE RESEARCH IN ENGINEERING MANAGEMENT AND SCIENCE (IJPREMS)

e-ISSN : 2583-1062

www.ijprems.com
editor@ijprems.com

Vol. 04, Issue 01, January 2024, pp : 207-213

Impact Factor : 5.725

Fig: 5 shows the distribution service of cloud computing. The results show that in the percentage of the paper that discusses all benefits in general (53%), software as a service (18%), infrastructure as a service (17%), service-oriented architecture (2%), and platform as a service (10%).

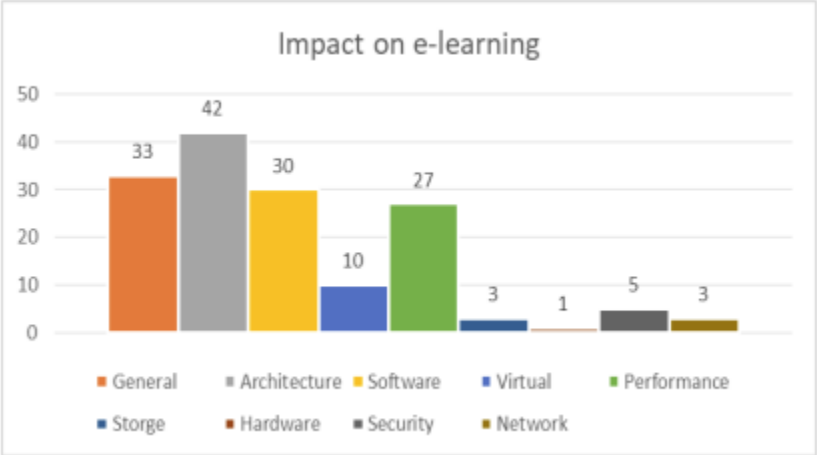

Figure 6: Distribution of papers discussing the effect of e-learning

Architecture (27%): The majority of studies concentrate on the architectural aspects of e-learning in cloud computing. This encompasses the design, organization, and framework of digital learning environments within the cloud. General (21%): A significant portion of studies falls under the general category, focusing on broader discussions regarding the definition, advantages, and challenges of e-learning in the context of cloud computing, without delving into specific environment details.

Software (19%): Many studies apply software processes to e-learning in cloud computing, particularly in the form of learning management systems and other software applications tailored for cloud-based educational platforms. Performance (18%): Some studies delve into factors that enhance performance, such as monitoring programs and strategies to increase speed and efficiency in e-learning environments on cloud computing platforms.

Virtual (6%): A smaller percentage of studies explore the virtual aspects of e-learning, examining the virtual environments that contribute to the overall learning experience.

Security (4%): A limited number of studies focus on security considerations in the e-learning environment within cloud computing. Storage (2%), Network (2%), Hardware (1%): These areas receive less attention in the selected studies, indicating a lower emphasis on storage, network infrastructure, and hardware aspects in the context of e-learning on cloud computing platforms.

4. CONCLUSION

In the ever-evolving landscape of education, the transition to online learning is gaining momentum, driven by technological advancements and the demand for on-demand, metered access to computing resources offered by cloud computing. This study delves into the integration of e-learning and cloud computing, scrutinizing scholarly works from 2010 to 2022. With a focus on practical implementations and comprehensive integration across hardware, software, security, and other facets, the study recognizes the potential for remote engagement in education and employment. The review reveals that while public cloud computing provides cost efficiency, data security remains a crucial consideration, especially for sensitive information such as student grades. The role of cloud computing in shaping e-learning is acknowledged, yet persistent challenges call for ongoing innovation to establish a comprehensive educational environment.

5. REFERENCES

[1] Kommineni, K. K. ., & Prasad, A. . (2023). A Review on Privacy and Security Improvement Mechanisms in MANETs. International Journal of Intelligent Systems and Applications in Engineering, 12(2), 90–99. Retrieved from https://ijisae.org/index.php/IJISAE/article/view/4224

[2] Vellela, S.S., Balamanigandan, R. Optimized clustering routing framework to maintain the optimal energy status in the wsn mobile cloud environment. Multimed Tools Appl (2023). https://doi.org/10.1007/s11042-023- 15926-5

[3] Vellela, S. S., Reddy, B. V., Chaitanya, K. K., & Rao, M. V. (2023, January). An Integrated Approach to Improve E-Healthcare System using Dynamic Cloud Computing Platform. In 2023 5th International Conference on Smart Systems and Inventive Technology (ICSSIT) (pp. 776-782). IEEE.

[4] K. N. Rao, B. R. Gandhi, M. V. Rao, S. Javvadi, S. S. Vellela and S. Khader Basha, "Prediction and Classification of Alzheimer's Disease using Machine Learning Techniques in 3D MR Images," 2023 International Conference on Sustainable Computing and Smart Systems (ICSCSS), Coimbatore, India, 2023, pp. 85-90, doi: 10.1109/ICSCSS57650.2023.10169550.

[5] VenkateswaraRao, M., Vellela, S., Reddy, V., Vullam, N., Sk, K. B., & Roja, D. (2023, March). Credit Investigation and Comprehensive Risk Management System based Big Data Analytics in Commercial Banking. In 2023 9th International Conference on Advanced Computing and Communication Systems (ICACCS) (Vol. 1, pp. 2387-2391). IEEE [6]

[6] S Phani Praveen, RajeswariNakka, AnuradhaChokka, VenkataNagarajuThatha, SaiSrinivasVellela and UddagiriSirisha, "A Novel Classification Approach for Grape Leaf Disease Detection Based on Different Attention Deep Learning Techniques" International Journal of Advanced Computer Science and Applications(IJACSA), 14(6), 2023. http://dx.doi.org/10.14569/IJACSA.2023.01406128

[7] Vellela, S. S., & Balamanigandan, R. (2022, December). Design of Hybrid Authentication Protocol for High Secure Applications in Cloud Environments. In 2022 International Conference on Automation, Computing and Renewable Systems (ICACRS) (pp. 408-414). IEEE.

[8] Vullam, N., Vellela, S. S., Reddy, V., Rao, M. V., SK, K. B., & Roja, D. (2023, May). Multi-Agent Personalized Recommendation System in E-Commerce based on User. In 2023 2nd International Conference on Applied Artificial Intelligence and Computing (ICAAIC) (pp. 1194-1199). IEEE.

[9] Vellela, S. S., Balamanigandan, R., & Praveen, S. P. (2022). Strategic Survey on Security and Privacy Methods of Cloud Computing Environment. Journal of Next Generation Technology (ISSN: 2583-021X), 2(1).

[10] Vellela, S. S., & Krishna, A. M. (2020). On Board Artificial Intelligence With Service Aggregation for Edge Computing in Industrial Applications. Journal of Critical Reviews, 7(07), 2020.

[11] Madhuri, A., Jyothi, V. E., Praveen, S. P., Sindhura, S., Srinivas, V. S., & Kumar, D. L. S. (2022). A New Multi-Level Semi-Supervised Learning Approach for Network Intrusion Detection System Based on the 'GOA'. Journal of Interconnection Networks, 2143047.

[12] Madhuri, A., Praveen, S. P., Kumar, D. L. S., Sindhura, S., &Vellela, S. S. (2021). Challenges and issues of data analytics in emerging scenarios for big data, cloud and image mining. Annals of the Romanian Society for Cell Biology, 412-423.

[13] Praveen, S. P., Sarala, P., Kumar, T. K. M., Manuri, S. G., Srinivas, V. S., &Swapna, D. (2022, November). An Adaptive Load Balancing Technique for Multi SDN Controllers.In 2022 International Conference on Augmented Intelligence and Sustainable Systems (ICAISS) (pp. 1403-1409).IEEE.

[14] Vellela, S. S., Basha Sk, K., & Yakubreddy, K. (2023). Cloud-hosted concept-hierarchy flex-based infringement checking system. International Advanced Research Journal in Science, Engineering and Technology, 10(3).

[15] Rao, M. V., Vellela, S. S., Sk, K. B., Venkateswara, R. B., & Roja, D. (2023). SYSTEMATIC REVIEW ON SOFTWARE APPLICATION UNDERDISTRIBUTED DENIAL OF SERVICE ATTACKS FOR GROUP WEBSITES. Dogo Rangsang Research Journal UGC Care Group I Journal, 13(3), 2347-7180.

[16] Venkateswara Reddy, B., Vellela, S. S., Sk, K. B., Roja, D., Yakubreddy, K., & Rao, M. V. Conceptual Hierarchies for Efficient Query Results Navigation. International Journal of All Research Education and Scientific Methods (IJARESM), ISSN, 2455-6211.

[17] Sk, K. B., Roja, D., Priya, S. S., Dalavi, L., Vellela, S. S., & Reddy, V. (2023, March). Coronary Heart Disease Prediction and Classification using Hybrid Machine Learning Algorithms. In 2023 International Conference on Innovative Data Communication Technologies and Application (ICIDCA) (pp. 1-7). IEEE.

[18] Sk, K. B., & Vellela, S. S. (2019). Diamond Search by Using Block Matching Algorithm. DIAMOND SEARCH BY USING BLOCK MATCHING ALGORITHM", International Journal of Emerging Technologies and Innovative Research (www. jetir. org), ISSN, 2349-5162.

[19] Yakubreddy, K., Vellela, S. S., Sk, K. B., Reddy, V., & Roja, D. (2023). Grape CS-ML Database-Informed Methods for Contemporary Vineyard Management. International Research Journal of Modernization in Engineering Technology and Science, 5(03).

[20] Vellela, Sai Srinivas and Chaganti, Aswini and Gadde, Srimadhuri and Bachina, Padmapriya and Karre, Rohiwalter, A Novel Approach for Detecting Automated Spammers in Twitter (June 24, 2023). Mukt Shabd Journal Volume XI, Issue VI, JUNE/2022 ISSN NO : 2347-3150, pp. 49-53 , Available at SSRN: https://ssrn.com/abstract=4490635

[21] Vellela, Sai Srinivas and Pushpalatha, D and Sarathkumar, G and Kavitha, C.H. and Harshithkumar, D, ADVANCED INTELLIGENCE HEALTH INSURANCE COST PREDICTION USING RANDOM FOREST

(March 1, 2023). ZKG International, Volume VIII Issue I MARCH 2023, Available at SSRN: https://ssrn.com/abstract=4473700

[22] D, Roja and Dalavai, Lavanya and Javvadi, Sravanthi and Sk, Khader Basha and Vellela, Sai Srinivas and B, Venkateswara Reddy and Vullam, Nagagopiraju, Computerised Image Processing and Pattern Recognition by Using Machine Algorithms (April 10, 2023). TIJER International Research Journal, Volume 10 Issue 4, April 2023, Available at SSRN: https://ssrn.com/abstract=4428667

[23] Vellela, Sai Srinivas and Basha Sk, Khader and B, Venkateswara Reddy and D, Roja and Javvadi, Sravanthi, MOBILE RFID APPLICATIONS IN LOCATION BASED SERVICES ZONE (June 14, 2023). International Journal of Emerging Technologies and Innovative Research, Vol.10, Issue 6, page no. ppd851-d859, June2023, http://www.jetir.org/papers/JETIR2306410.pdf

[24] Vellela, Sai Srinivas and Sk, Khader Basha and B, Venkateswara Reddy, Cryonics on the Way to Raising the Dead Using Nanotechnology (June 18, 2023). INTERNATIONAL JOURNAL OF PROGRESSIVE RESEARCH IN ENGINEERING MANAGEMENT AND SCIENCE (IJPREMS), Vol. 03, Issue 06, June 2023, pp : 253-257,

[25] Vellela, Sai Srinivas and D, Roja and B, Venkateswara Reddy and Sk, Khader Basha and Rao, Dr M Venkateswara, A New Computer-Based Brain Fingerprinting Technology (June 18, 2023). International Journal Of Progressive Research In Engineering Management And Science, Vol. 03, Issue 06, June 2023, pp : 247-252 e-ISSN : 2583-1062.,

[26] Gajjala, Buchibabu and Mutyala, Venubabu and Vellela, Sai Srinivas and Pratap, V. Krishna, Efficient Key Generation for Multicast Groups Based on Secret Sharing (June 22, 2011). International Journal of Engineering Research and Applications,Vol. 1, Issue 4, pp.1702-1707, ISSN: 2248-9622

[27] Kiran Kumar Kommineni, Ratna Babu Pilli, K. Tejaswi, P. Venkata Siva,Attention-based Bayesian inferential imagery captioning maker,Materials Today: Proceedings,2023,ISSN 2214-7853,https://doi.org/10.1016/j.matpr.2023.05.231.

[28] Venkateswara Reddy, B., &KhaderBashaSk, R. D. Qos-Aware Video Streaming Based Admission Control And Scheduling For Video Transcoding In Cloud Computing. In International Conference on Automation, Computing and Renewable Systems (ICACRS 2022).

[29] Reddy, N.V.R.S., Chitteti, C., Yesupadam, S., Desanamukula, V.S., Vellela, S.S., Bommagani, N.J. (2023). Enhanced speckle noise reduction in breast cancer ultrasound imagery using a hybrid deep learning model. Ingénierie de Systèmesd'Information, Vol. 28, No. 4, pp. 1063-1071. https://doi.org/10.18280/isi.280426

[30] Vellela, S.S., Balamanigandan, R. An intelligent sleep-awake energy management system for wireless sensor network. Peer-to-Peer Netw. Appl. (2023). https://doi.org/10.1007/s12083-023-01558-x

[31] Rao, D. M. V., Vellela, S. S., Sk, K. B., &Dalavai, L. (2023). Stematic Review on Software Application Under-distributed Denial of Service Attacks for Group Website. DogoRangsang Research Journal, UGC Care Group I Journal, 13.

[32] S. S. Priya, S. SrinivasVellela, V. R. B, S. Javvadi, K. B. Sk and R. D, "Design And Implementation of An Integrated IOT Blockchain Framework for Drone Communication," 2023 3rd International Conference on Intelligent Technologies (CONIT), Hubli, India, 2023, pp. 1-5, doi: 10.1109/CONIT59222.2023.10205659.

[33] N. Vullam, K. Yakubreddy, S. S. Vellela, K. BashaSk, V. R. B and S. SanthiPriya, "Prediction And Analysis Using A Hybrid Model For Stock Market," 2023 3rd International Conference on Intelligent Technologies (CONIT), Hubli, India, 2023, pp. 1-5, doi: 10.1109/CONIT59222.2023.10205638.

[34] K. K. Kumar, S. G. B. Kumar, S. G. R. Rao and S. S. J. Sydulu, "Safe and high secured ranked keyword searchover an outsourced cloud data," 2017 International Conference on Inventive Computing and Informatics (ICICI), Coimbatore, India, 2017, pp. 20-25, doi: 10.1109/ICICI.2017.8365348.

[35] Sk, K. B., Vellela, S. S., Yakubreddy, K., &Rao, M. V. (2023). Novel and Secure Protocol for Trusted Wireless Ad-hoc Network Creation. KhaderBashaSk, Venkateswara Reddy B, SaiSrinivasVellela, KancharakuntYakub Reddy, M VenkateswaraRao, Novel and Secure Protocol for Trusted Wireless Ad-hoc Network Creation, 10(3).

[36] Vellela, S. S., Sk, K. B., Dalavai, L., Javvadi, S., &Rao, D. M. V. (2023). Introducing the Nano Cars Into the Robotics for the Realistic Movements. International Journal of Progressive Research in Engineering Management and Science (IJPREMS) Vol, 3, 235-240.

[37] Kumar, K. & Babu, B. & Rekha, Y.. (2015). Leverage your data efficiently: Following new trends of information and data security. International Journal of Applied Engineering Research. 10. 33415-33418.

[38] S. S. Vellela, V. L. Reddy, R. D, G. R. Rao, K. B. Sk and K. K. Kumar, "A Cloud-Based Smart IoT Platform for Personalized Healthcare Data Gathering and Monitoring System," 2023 3rd Asian Conference on Innovation in Technology (ASIANCON), Ravet IN, India, 2023, pp. 1-5, doi: 10.1109/ASIANCON58793.2023.10270407.