Analytics Based on Government Land Information System (GLIS) Data

[1]R.Mrudula, [2]Silamkoti Shireesha, [3]R.Shraunak Reddy, [4]Paramesh Babu, [5]Mukku Poojitha

[1]*Assistant Professor, Department of Computer Science and Engineering, Anurag University, Hyderabad Telangana, 500088*
[2,3,4,5]*Department of Computer Science and Engineering, Anurag University, Hyderabad Telangana, 500088*

21eg105h49@anurag.edu.in
21eg105h55@anurag.edu.in
ramacse@anurag.edu.in
21eg505858@anurag.edu.in
21eg105h26@anurag.edu.in

Abstract. The Government Land Information System (GLIS) dataset provides detailed data on land use patterns, population distribution, and demographic characteristics across all States and Union Territories. This dataset serves as an essential tool for making data-driven decisions in areas such as urban planning, infrastructure development, environmental protection, and socio-economic advancement. The goal of analysing this dataset is to uncover key insights into current land use trends and their effects on sustainable urban development. By studying land use changes, the analysis can highlight regions experiencing significant population growth or demographic shifts, identifying areas where infrastructure development may need to be prioritized. Additionally, the dataset offers a valuable opportunity to explore the environmental impacts of land use changes. This includes examining the effects of urban expansion, agricultural growth, and other land use changes on natural resources, ecosystems, and climate resilience. Understanding these impacts is vital for creating policies that balance environmental protection with the demands of urban and economic growth. Furthermore, the relationship between land use and socio-economic factors will be analysed to see how the distribution of land affects issues like income inequality, access to essential services, and community well-being. The insights gained from this analysis can be used to inform land management strategies that balance economic development with environmental sustainability. The goal is to propose actionable recommendations for managing land in a way that supports long-term growth while preserving natural resources for future generations. By integrating these insights into policy-making, it is possible to create more sustainable and equitable land management practices across all States and Union Territories. Ultimately, this analysis aims to support better decision-making in land use planning, promoting sustainable development and improving the quality of life while ensuring environmental conservation.

Keywords. Land utilization, Urban planning, Sustainable development, Infrastructure development, Environmental sustainability

1. INTRODUCTION

The Government Land Information System (GLIS) provides comprehensive geospatial data on land resources, ownership, boundaries, and land use, but turning this data into meaningful insights presents a significant challenge. This hackathon aims to foster the development of innovative analytical solutions that leverage GLIS data to address pressing societal issues and enhance evidence-based policymaking. Participants are encouraged to apply their creativity in exploring how this data can be used across various domains, such as urban planning, infrastructure development, environmental conservation, land management, and socio-economic analysis.

In the field of urban planning, the challenge is to design tools that can optimize land use, zoning, and urban growth patterns, ultimately improving resource distribution and enhancing mobility within cities. For infrastructure development, the focus is on creating models that can identify the most suitable locations for new projects, taking into account factors such as environmental sustainability and population distribution. In the area of environmental conservation, participants will work on solutions to manage natural resources more effectively and pinpoint ecologically vulnerable areas in need of protection. The hackathon also encourages solutions aimed at improving land governance, simplifying land registration processes, and ensuring equitable land distribution across different communities. Additionally, socio-economic analysis is a key area of focus, with participants tasked with using GLIS data to examine demographic trends, economic indicators, and social factors. The solutions developed should demonstrate robust data processing capabilities, predictive modelling, and intuitive user interfaces, empowering decision-makers to support sustainable development initiatives.

2 MOTIVATION

This project offers a valuable opportunity to harness the full potential of the Government Land Information System (GLIS) data to address significant societal challenges. By examining land use patterns, demographic data, and infrastructure, we aim to generate insights that can support more informed, sustainable decision-making. The goal is to explore innovative solutions across urban planning, environmental conservation, and socio-economic development, contributing to the development of efficient and fair land management strategies. Ultimately, this project seeks to guide the responsible use of land resources to foster sustainable growth and improve the quality of life for communities

3 LITERATURE SURVEY

- Kumar et al. (2006) explored the concept of Land Information Systems (LIS), focusing on their role in high-resolution land surface modelling by integrating various data sources.
- Dueker (1979) provided an in-depth analysis of Land Resource Information Systems (LRIS), examining their development, key components, and the challenges associated with their implementation.
- Ho et al. (2021) and Ja'afar et al. (2021) investigated the application of machine learning techniques for predicting property prices, emphasizing the role of data-driven approaches in the real estate sector.
- Manikanta et al. (2022) presented a dashboard solution for businesses to integrate performance metrics, facilitating data-driven decision-making processes.
- Ghosalkar and Dhage (2018), Phan (2018), and Ravikumar (2017) concentrated on using machine learning to predict real estate prices, underlining the significance of data quality and effective feature selection.
- Peters-Lidard et al. (2007) demonstrated NASA's Land Information System (LIS), which combines satellite data with land models to enhance Earth system predictions.
- Loveland and Belward (1997) introduced the Discover dataset, which provides global land cover data, supporting land use, environmental studies, and climate modelling. Kumar et al. (2006) introduced the Land Information System (LIS), focusing on its role in high-resolution land surface modeling through the integration of diverse data sources.

4 PROPOSED SYSTEM

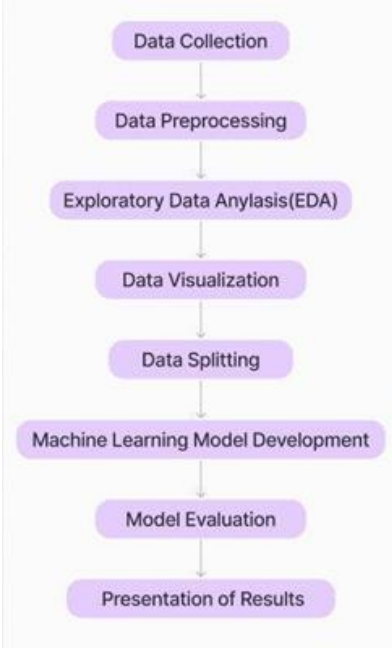
The proposed system utilizes the Government Land Information System (GLIS) dataset to develop a comprehensive framework for sustainable land management. This system integrates various aspects such as urban planning, infrastructure development, environmental protection, and socio-economic analysis. Unlike traditional methods that tend to work in isolation, this approach combines data on land use, population demographics, and socio-economic factors to foster more cohesive, data-driven decision-making. It identifies the most suitable areas for urban growth, highlights regions requiring infrastructure development, evaluates the environmental impacts of land use changes, and analyzes socio-economic interdependencies. By providing policymakers with actionable insights, this integrated model aims to support balanced, sustainable development, promoting improved quality of life, economic equity, and environmental sustainability for future generations.

Advantages Over previous system

- Resource Optimization.
- Environmental Protection.
- Informed Policies.
- Socio-economic Fairness.
- Future-Planning.

- Scalability

5 MODEL IMPLEMENTATION



The system's model implementation combines data preprocessing, machine learning, and visualization techniques to generate actionable insights for sustainable land management. The process begins with data collection, where datasets related to land use, population, and socio-economic factors are gathered and preprocessed. This step involves addressing missing values, merging relevant features, and normalizing the data. For urban planning and infrastructure development, predictive models, such as linear regression and Random Forest, are utilized to forecast urban growth and identify regions that should be prioritized for investment, considering factors like population density and land availability. The model's accuracy is assessed using performance metrics like R-squared and Mean Absolute Error to ensure dependable predictions. Visualization tools are then employed to communicate key results through maps and charts, illustrating areas of potential urban expansion, environmental preservation, and infrastructure requirements. The model is designed to be dynamic, continuously updated as new data becomes available, ensuring it remains adaptable for real-time decision-making.

6 SYSTEM ARCHITECTURE

The proposed system is composed of several key components, designed to work seamlessly together to facilitate sustainable land management. The system integrates land use, population, and socio-economic data into a unified analytical framework, providing a comprehensive approach to urban planning and infrastructure development. Machine learning algorithms are employed to forecast urban expansion, assess infrastructure needs, and evaluate environmental impacts. The system also features interactive visualizations, including maps and charts, to present trends in land use, identify infrastructure gaps, and highlight socio-economic conditions. Collaboration is enabled through platforms like Google Colab, allowing users to work together on data processing and analysis in real time. Furthermore, the system offers actionable policy recommendations aimed at guiding decisions on urban planning, infrastructure investment, and land management.

6.1 Data Flow

The data flow in the system begins by gathering real-time data from the Government Land Information System (GLIS) and other relevant external sources. This data includes land use patterns, population density, socio-economic indicators, and environmental factors. The collected data is then processed, cleaned, and merged to form a cohesive dataset. Key features are extracted for further analysis, followed by the development of predictive machine learning models that focus on urban development, infrastructure planning, environmental conservation, and socio-economic insights. Once the models are trained, their performance is evaluated, and the outcomes are visualized through interactive maps and charts. These visualizations are used to generate actionable insights and policy suggestions to support evidence-based decision-making. The system also includes a feedback loop, allowing for continuous updates to the data and refinement of the models, ensuring ongoing improvement in land management practices.

6.2 Performance Optimization

To ensure the system is efficient and scalable, performance optimization techniques are applied throughout the workflow. For data preprocessing, parallel processing and vectorization techniques will be utilized to speed up data cleaning and feature extraction. The machine learning model training process will be optimized by tuning hyperparameters and leveraging distributed computing resources, such as Dask, to handle large datasets more effectively. For real-time predictions, models will be serialized using tools like Pickle, and caching and load balancing strategies will be implemented to improve response times. The system's resource management strategy will also include efficient data storage using compression formats like Parquet, along with indexing for faster querying. To handle large datasets with minimal latency, visualization will leverage WebGL rendering and data aggregation techniques. Additionally, the system will support real-time processing using streaming analytics, ensuring that computational resources are utilized efficiently while maintaining system adaptability and responsiveness without overloading resources.

6.3 Testing and Validation

The testing and validation process will focus on ensuring the system's accuracy, stability, and reliability. This will involve evaluating machine learning models using key performance metrics such as accuracy and precision, along with cross-validation to assess the generalizability of the models. Data quality will be carefully monitored to identify any inconsistencies or missing values that could affect the analysis. Additionally, performance testing will be conducted to evaluate the system's responsiveness and scalability, including load testing and real-time processing capabilities.

Performance Metrics: The system will be evaluated on several performance metrics, including the accuracy of the models, processing time, resource consumption, scalability, and the ability to handle real-time tasks efficiently. These metrics will help ensure the system operates smoothly and effectively across different scenarios.

6.4 Tools Used

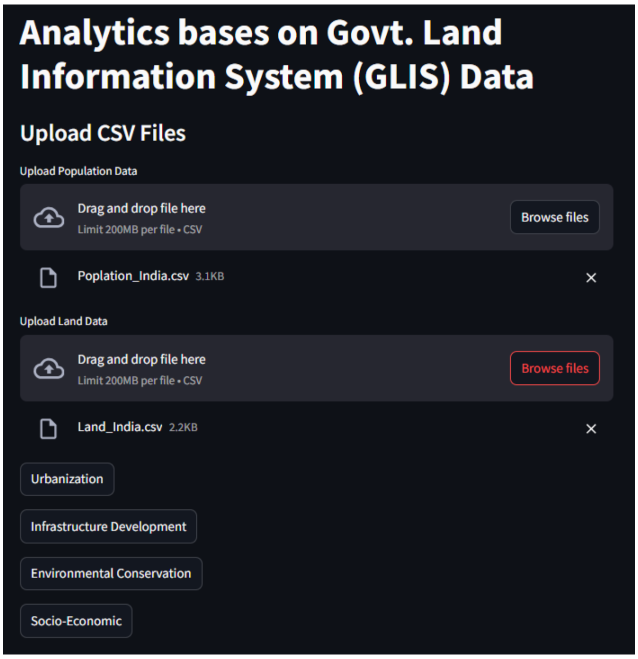
The proposed system will rely on several key tools and libraries for development and implementation. Python will be used as the primary programming language, with various machine learning libraries such as Scikit-learn for regression and classical models, and TensorFlow for more advanced deep learning applications. For data manipulation and preprocessing, Pandas and NumPy will be employed, while Matplotlib and Seaborn will be used for creating visualizations. Feature scaling will be handled using StandardScaler from Scikit-learn, and Random Forest will be utilized for evaluating feature importance. Streamlit for user-interface for up;oading and viewing.

7 PROJECT SPECIFICATION

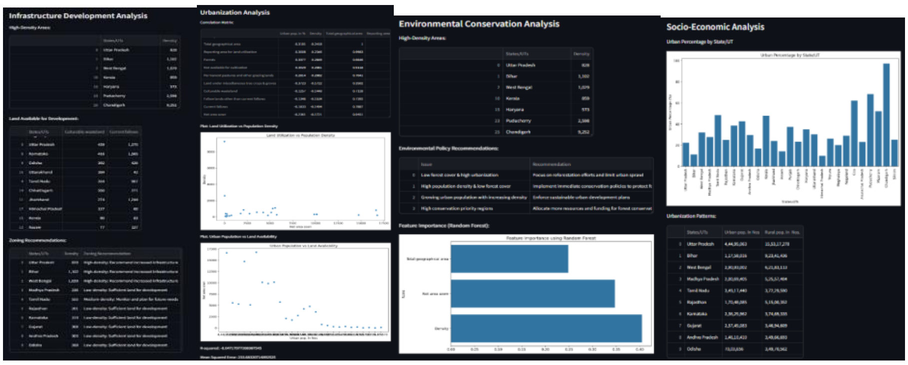
Category	Details
Urban Expansion and Infrastructure Development	The system aims to identify optimal areas for urban expansion based on land availability and population density. By analyzing these factors, the system can provide insights into regions that are underutilized or face population pressures. The goal is to develop data-driven strategies for efficient zoning, planning, and resource allocation to support sustainable urbanization.
Infrastructure Investment and Urban-Rural Distribution	The proposed system will analyze trends in population growth and urban-rural distribution to highlight areas requiring infrastructure investment. This analysis will help pinpoint regions with rapid population growth but inadequate infrastructure, enabling targeted development efforts in sectors like transportation, healthcare, and education to support urban expansion.
Sustainable Land Use and Conservation Efforts	The system will assess the environmental impact of land use changes, such as urban sprawl or agricultural expansion,

	and prioritize conservation efforts in high-risk areas. By analyzing the relationship between land use patterns and environmental sustainability, the system can recommend policies to protect sensitive ecosystems and promote sustainable land management practices.
Economic Development and Social Welfare	This module will explore the relationships between land use patterns, rural dependence on agriculture, and socio-economic conditions. It will provide insights into how land distribution influences factors like income inequality, access to services, and community well-being, guiding the development of policies for balanced economic growth and improved quality of life across regions.
Streamlit-UserInterface	• The project utilizes Streamlit for user interaction, enabling intuitive and dynamic web interfaces for data visualization and user input.

8 RESULTS



Results are presented through a series of visualizations, including charts, predictive model graphs. These images illustrate key insights, such as land use distributions, population density patterns, and predictions for urban growth areas. Model results, like feature importance for influencing factors, are visualized to emphasize crucial urban planning and conservation needs.



Additionally, graphs show prioritized zones for infrastructure development and conservation, providing a geographic context for policy recommendations. Together, these visuals help communicate the data-driven findings and support actionable strategies for sustainable land management.

9 CONCLUSION

In conclusion, this integrated system offers a comprehensive approach to sustainable land management, tackling key areas such as urban planning, infrastructure development, environmental preservation, and socio-economic analysis. By combining diverse datasets and utilizing advanced data analytics and predictive modeling techniques, the system provides valuable insights to inform resource allocation, zoning decisions, and conservation efforts. This data-driven framework empowers policymakers to strike a balance between urban growth and environmental and social sustainability, laying the foundation for adaptive, long-term land management strategies that can respond to evolving population dynamics and environmental challenges.

REFERENCES

1. Murthy, G., and R. Shankar. "Composite Fermions." (1998): 254-306.
2. Mahalakshmi, A., Goud, N. S., & Murthy, G. V. (2018). A survey on phishing and it’s detection techniques based on support vector method (Svm) and software defined networking (sdn). *International Journal of Engineering and Advanced Technology*, *8*(2), 498-503.
3. Murthy, G., & Shankar, R. (2002). Semiconductors II-Surfaces, interfaces, microstructures, and related topics-Hamiltonian theory of the fractional quantum Hall effect: Effect of Landau level mixing. *Physical Review-Section B-Condensed Matter*, *65*(24), 245309-245309.
4. Murthy, G. V. K., Sivanagaraju, S., Satyanarayana, S., & Rao, B. H. (2014). Optimal placement of DG in distribution system to mitigate power quality disturbances. *International Journal of Electrical and Computer Engineering*, *7*(2), 266-271.
5. Muraleedharan, K., Raghavan, R., Murthy, G. V. K., Murthy, V. S. S., Swamy, K. G., & Prasanna, T. (1989). An investigation on the outbreaks of pox in buffaloes in Karnataka.
6. Murthy, G. V. K., Sivanagaraju, S., Satyanarayana, S., & Rao, B. H. (2012). Reliability improvement of radial distribution system with distributed generation. *International Journal of Engineering Science and Technology (IJEST)*, *4*(09), 4003-4011.
7. Gowda, B. M. V., Murthy, G. V. K., Upadhye, A. S., & Raghavan, R. (1996). Serotypes of Escherichia coli from pathological conditions in poultry and their antibiogram.
8. Balasubbareddy, M., Murthy, G. V. K., & Kumar, K. S. (2021). Performance evaluation of different structures of power system stabilizers. *International Journal of Electrical and Computer Engineering (IJECE)*, *11*(1), 114-123.
9. Murthy, G. V. K., & Sivanagaraju, S. (2012). S. Satyana rayana, B. Hanumantha Rao," Voltage stability index of radial distribution networks with distributed generation,". *Int. J. Electr. Eng*, *5*(6), 791-803.
10. Anuja, P. S., Kiran, V. U., Kalavathi, C., Murthy, G. N., & Kumari, G. S. (2015). Design of elliptical patch antenna with single & double U-slot for wireless applications: a comparative approach. *International Journal of Computer Science and Network Security (IJCSNS)*, *15*(2), 60.
11. Siva Prasad, B. V. V., Mandapati, S., Kumar Ramasamy, L., Boddu, R., Reddy, P., & Suresh Kumar, B. (2023). Ensemble-based cryptography for soldiers’ health monitoring using mobile ad hoc networks. *Automatika: časopis za automatiku, mjerenje, elektroniku, računarstvo i komunikacije*, *64*(3), 658-671.
12. Siva Prasad, B. V. V., Sucharitha, G., Venkatesan, K. G. S., Patnala, T. R., Murari, T., & Karanam, S. R. (2022). Optimisation of the execution time using hadoop-based parallel machine learning on computing clusters. In *Computer Networks, Big Data and IoT: Proceedings of ICCBI 2021* (pp. 233-244). Singapore: Springer Nature Singapore.
13. Prasad, B. V., & Ali, S. S. (2017). Software–defined networking based secure rout-ing in mobile ad hoc network. *International Journal of Engineering & Technology*, *7*(1.2), 229.
14. Elechi, P., & Onu, K. E. (2022). Unmanned Aerial Vehicle Cellular Communication Operating in Non-terrestrial Networks. In *Unmanned Aerial Vehicle Cellular Communications* (pp. 225-251). Cham: Springer International Publishing.
15. Prasad, B. V. V. S., Mandapati, S., Haritha, B., & Begum, M. J. (2020, August). Enhanced Security for the authentication of Digital Signature from the key generated by the CSTRNG method. In *2020 Third International Conference on Smart Systems and Inventive Technology (ICSSIT)* (pp. 1088-1093). IEEE.
16. 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.
17. 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.
18. Mukiri, R. R., Kumar, B. S., & Prasad, B. V. V. (2019, February). Effective Data Collaborative Strain Using RecTree Algorithm. In *Proceedings of International Conference on Sustainable Computing in Science, Technology and Management (SUSCOM), Amity University Rajasthan, Jaipur-India*.

19. Rao, B. T., Prasad, B. V. V. S., & Peram, S. R. (2019). Elegant Energy Competent Lighting in Green Buildings Based on Energetic Power Control Using IoT Design. In *Smart Intelligent Computing and Applications: Proceedings of the Second International Conference on SCI 2018, Volume 1* (pp. 247-257). Springer Singapore.
20. Someswar, G. M., & Prasad, B. V. V. S. (2017, October). USVGM protocol with two layer architecture for efficient network management in MANET'S. In *2017 2nd International Conference on Communication and Electronics Systems (ICCES)* (pp. 738-741). IEEE.
21. Hnamte, V., & Balram, G. (2022). Implementation of Naive Bayes Classifier for Reducing DDoS Attacks in IoT Networks. *Journal of Algebraic Statistics*, *13*(2), 2749-2757.
22. Balram, G., Poornachandrarao, N., Ganesh, D., Nagesh, B., Basi, R. A., & Kumar, M. S. (2024, September). Application of Machine Learning Techniques for Heavy Rainfall Prediction using Satellite Data. In *2024 5th International Conference on Smart Electronics and Communication (ICOSEC)* (pp. 1081-1087). IEEE.
23. Subrahmanyam, V., Sagar, M., Balram, G., Ramana, J. V., Tejaswi, S., & Mohammad, H. P. (2024, May). An Efficient Reliable Data Communication For Unmanned Air Vehicles (UAV) Enabled Industry Internet of Things (IIoT). In *2024 3rd International Conference on Artificial Intelligence For Internet of Things (AIIoT)* (pp. 1-4). IEEE.
24. KATIKA, R., & BALRAM, G. (2013). Video Multicasting Framework for Extended Wireless Mesh Networks Environment. *pp-427-434, IJSRET*, *2*(7).
25. Prasad, P. S., & Rao, S. K. M. (2017). HIASA: Hybrid improved artificial bee colony and simulated annealing based attack detection algorithm in mobile ad-hoc networks (MANETs). *Bonfring International Journal of Industrial Engineering and Management Science*, *7*(2), 01-12.
26. Prasad, P. S., & Rao, S. K. M. (2017). A Survey on Performance Analysis of ManetsUnder Security Attacks. *network*, *6*(7).
27. Reddy, P. R. S., & Ravindranath, K. (2024). Enhancing Secure and Reliable Data Transfer through Robust Integrity. *Journal of Electrical Systems*, *20*(1s), 900-910.
28. REDDY, P. R. S., & RAVINDRANATH, K. (2022). A HYBRID VERIFIED RE-ENCRYPTION INVOLVED PROXY SERVER TO ORGANIZE THE GROUP DYNAMICS: SHARING AND REVOCATION. *Journal of Theoretical and Applied Information Technology*, *100*(13).
29. Reddy, P. R. S., Ram, V. S. S., Greshma, V., & Kumar, K. S. Prediction of Heart Healthiness.
30. Reddy, P. R. S., Reddy, A. M., & Ujwala, B. IDENTITY PRESERVING IN DYNAMIC GROUPS FOR DATA SHARING AND AUDITING IN CLOUD.
31. Madhuri, K., Viswanath, N. K., & Gayatri, P. U. (2016, November). Performance evaluation of AODV under Black hole attack in MANET using NS2. In *2016 international conference on ICT in Business Industry & Government (ICTBIG)* (pp. 1-3). IEEE.
32. Kovoor, M., Durairaj, M., Karyakarte, M. S., Hussain, M. Z., Ashraf, M., & Maguluri, L. P. (2024). Sensor-enhanced wearables and automated analytics for injury prevention in sports. *Measurement: Sensors*, *32*, 101054.
33. Rao, N. R., Kovoor, M., Kishor Kumar, G. N., & Parameswari, D. V. L. (2023). Security and privacy in smart farming: challenges and opportunities. *International Journal on Recent and Innovation Trends in Computing and Communication*, *11*(7 S).
34. Madhuri, K. (2023). Security Threats and Detection Mechanisms in Machine Learning. *Handbook of Artificial Intelligence*, 255.
35. DASTAGIRAIAH, D. (2024). A SYSTEM FOR ANALYSING CALL DROP DYNAMICS IN THE TELECOM INDUSTRY USING MACHINE LEARNING AND FEATURE SELECTION. *Journal of Theoretical and Applied Information Technology*, *102*(22).
36. Sukhavasi, V., Kulkarni, S., Raghavendran, V., Dastagiraiah, C., Apat, S. K., & Reddy, P. C. S. (2024). Malignancy Detection in Lung and Colon Histopathology Images by Transfer Learning with Class Selective Image Processing.
37. Sudhakar, R. V., Dastagiraiah, C., Pattem, S., & Bhukya, S. (2024). Multi-Objective Reinforcement Learning Based Algorithm for Dynamic Workflow Scheduling in Cloud Computing. *Indonesian Journal of Electrical Engineering and Informatics (IJEEI)*, *12*(3), 640-649.
38. PushpaRani, K., Roja, G., Anusha, R., Dastagiraiah, C., Srilatha, B., & Manjusha, B. (2024, June). Geological Information Extraction from Satellite Imagery Using Deep Learning. In *2024 15th International Conference on Computing Communication and Networking Technologies (ICCCNT)* (pp. 1-7). IEEE.
39. Sravan, K., Rao, L. G., Ramineni, K., Rachapalli, A., & Mohmmad, S. (2024). Analyze the Quality of Wine Based on Machine Learning Approach Check for updates. *Data Science and Applications: Proceedings of ICDSA 2023, Volume 3*, *820*, 351.
40. Chandhar, K., Ramineni, K., Ramakrishna, E., Ramana, T. V., Sandeep, A., & Kalyan, K. (2023, December). Enhancing Crop Yield Prediction in India: A Comparative Analysis of Machine Learning Models. In *2023 3rd International Conference on Smart Generation Computing, Communication and Networking (SMART GENCON)* (pp. 1-4). IEEE.
41. Ramineni, K., Shankar, K., Shabana, Mahender, A., & Mohmmad, S. (2023, June). Detecting of Tree Cutting Sound in the Forest by Machine Learning Intelligence. In *International Conference on Power Engineering and Intelligent Systems (PEIS)* (pp. 303-314). Singapore: Springer Nature Singapore.

42. Ashok, J., RAMINENI, K., & Rajan, E. G. (2010). BEYOND INFORMATION RETRIEVAL: A SURVEY. *Journal of Theoretical & Applied Information Technology*, *15*.
43. Sekhar, P. R., & Sujatha, B. (2020, July). A literature review on feature selection using evolutionary algorithms. In *2020 7th International Conference on Smart Structures and Systems (ICSSS)* (pp. 1-8). IEEE.
44. Sekhar, P. R., & Sujatha, B. (2023). Feature extraction and independent subset generation using genetic algorithm for improved classification. *Int. J. Intell. Syst. Appl. Eng*, *11*, 503-512.
45. Sekhar, P. R., & Goud, S. (2024). Collaborative Learning Techniques in Python Programming: A Case Study with CSE Students at Anurag University. *Journal of Engineering Education Transformations*, *38*(Special Issue 1).
46. Pesaramelli, R. S., & Sujatha, B. (2024, March). Principle correlated feature extraction using differential evolution for improved classification. In *AIP Conference Proceedings* (Vol. 2919, No. 1). AIP Publishing.
47. Amarnadh, V., & Moparthi, N. R. (2023). Comprehensive review of different artificial intelligence-based methods for credit risk assessment in data science. *Intelligent Decision Technologies*, *17*(4), 1265-1282.
48. Amarnadh, V., & Moparthi, N. R. (2024). Prediction and assessment of credit risk using an adaptive Binarized spiking marine predators' neural network in financial sector. *Multimedia Tools and Applications*, *83*(16), 48761-48797.
49. Amarnadh, V., & Moparthi, N. R. (2024). Range control-based class imbalance and optimized granular elastic net regression feature selection for credit risk assessment. *Knowledge and Information Systems*, 1-30.
50. Amarnadh, V., & Akhila, M. (2019, May). RETRACTED: Big Data Analytics in E-Commerce User Interest Patterns. In *Journal of Physics: Conference Series* (Vol. 1228, No. 1, p. 012052). IOP Publishing.
51. Selvan, M. Arul, and S. Miruna Joe Amali. "RAINFALL DETECTION USING DEEP LEARNING TECHNIQUE." (2024).
52. Selvan, M. Arul. "Fire Management System For Indutrial Safety Applications." (2023).
53. Selvan, M. A. (2023). A PBL REPORT FOR CONTAINMENT ZONE ALERTING APPLICATION.
54. Selvan, M. A. (2023). CONTAINMENT ZONE ALERTING APPLICATION A PROJECT BASED LEARNING REPORT.
55. Selvan, M. A. (2021). Robust Cyber Attack Detection with Support Vector Machines: Tackling Both Established and Novel Threats.
56. Selvan, M. A. (2023). INDUSTRY-SPECIFIC INTELLIGENT FIRE MANAGEMENT SYSTEM.
57. Selvan, M. Arul. "PHISHING CONTENT CLASSIFICATION USING DYNAMIC WEIGHTING AND GENETIC RANKING OPTIMIZATION ALGORITHM." (2024).
58. Selvan, M. Arul. "Innovative Approaches in Cardiovascular Disease Prediction Through Machine Learning Optimization." (2024).
59. Lokhande, M., Kalpanadevi, D., Kate, V., Tripathi, A. K., & Bethapudi, P. (2023). Study of Computer Vision Applications in Healthcare Industry 4.0. In *Healthcare Industry 4.0* (pp. 151-166). CRC Press.
60. Tripathi, A. K., Soni, R., & Verma, S. (2022). A review on ethnopharmacological applications, pharmacological activities, and bioactive compounds of Mimosa pudica (linn.). *Research Journal of Pharmacy and Technology*, *15*(9), 4293-4299.
61. Mishra, S., Grewal, J., Wal, P., Bhivshet, G. U., Tripathi, A. K., & Walia, V. (2024). Therapeutic potential of vasopressin in the treatment of neurological disorders. *Peptides*, *174*, 171166.
62. Koliqi, R., Fathima, A., Tripathi, A. K., Sohi, N., Jesudasan, R. E., & Mahapatra, C. (2023). Innovative and Effective Machine Learning-Based Method to Analyze Alcoholic Brain Activity with Nonlinear Dynamics and Electroencephalography Data. *SN Computer Science*, *5*(1), 113.
63. Biswas, D., Sharma, G., Pandey, A., Tripathi, A. K., Pandey, A., & Sahu, P. & Chauhan, P.(2022). Magnetic Nanosphere: Promising approach to deliver the drug to the site of action. *NeuroQuantology*, *20*(11), 4038.
64. Tripathi, A. K., Diwedi, P., Kumar, N., Yadav, B. K., & Rathod, D. (2022). Trigonella Foenum Grecum L. Seed (Fenugreek) Pharmacological Effects on Cardiovascular and Stress Associated Disease. *NeuroQuantology*, *20*(8), 4599.
65. Tripathi, A. K., Dwivedi, C. P., Bansal, P., Pradhan, D. K., Parganiha, R., & Sahu, D. An Ethnoveterinary Important Plant Terminalia Arjuna. *International Journal of Health Sciences*, (II), 10601-10607.
66. Babbar, R., Kaur, A., Vanya, Arora, R., Gupta, J. K., Wal, P., ... & Behl, T. (2024). Impact of Bioactive Compounds in the Management of Various Inflammatory Diseases. Current Pharmaceutical Design, 30(24), 1880-1893.
67. Sahu, A., Mishra, S., Wal, P., Debnath, B., Chouhan, D., Gunjal, S. D., & Tripathi, A. K. (2024). Novel Quinoline-Based RAF Inhibitors: A Comprehensive Review on Synthesis, SAR and Molecular Docking Studies. *ChemistrySelect*, *9*(23), e202400347.
68. Vaishnav, Y., Banjare, L., Verma, S., Sharma, G., Biswas, D., Tripathi, A., ... & Manjunath, K. (2022). Computational Method on Hydroxychloroquine and Azithromycin for SARS-CoV-2: Binding Affinity Studies. *Research Journal of Pharmacy and Technology*, *15*(12), 5467-5472.
69. Ramya, S., Devi, R. S., Pandian, P. S., Suguna, G., Suganya, R., & Manimozhi, N. (2023). Analyzing Big Data challenges and security issues in data privacy. *International Research Journal of Modernization in Engineering Technology and Science*, *5*(2023), 421-428.
70. Pandian, P. S., & Srinivasan, S. (2016). A Unified Model for Preprocessing and Clustering Technique for Web Usage Mining. *Journal of Multiple-Valued Logic & Soft Computing*, *26*.

71. Thamma, S. R. T. S. R. (2025). Transforming E-Commerce with Pragmatic Advertising Using Machine Learning Techniques.
72. Thamma, S. R. T. S. R. (2024). Optimization of Generative AI Costs in Multi-Agent and Multi-Cloud Systems.
73. Thamma, S. R. T. S. R. (2024). Revolutionizing Healthcare: Spatial Computing Meets Generative AI.
74. Thamma, S. R. T. S. R. (2024). Cardiovascular image analysis: AI can analyze heart images to assess cardiovascular health and identify potential risks.
75. Thamma, S. R. T. S. R. (2024). Generative AI in Graph-Based Spatial Computing: Techniques and Use Cases.
76. NAVANEETHA, N., & KALYANI, S. (2012). Efficient Association Rule Mining using Indexing Support.
77. Thirumoorthi, P., Deepika, S., & Yadaiah, N. (2014, March). Solar energy based dynamic sag compensator. In *2014 International Conference on Green Computing Communication and Electrical Engineering (ICGCCEE)* (pp. 1-6). IEEE.
78. Nair, R., Zafrullah, S. N., Vinayasree, P., Singh, P., Zahra, M. M. A., Sharma, T., & Ahmadi, F. (2022). Blockchain-Based Decentralized Cloud Solutions for Data Transfer. *Computational Intelligence and Neuroscience*, *2022*(1), 8209854.
79. Vinayasree, P., & Reddy, A. M. (2023). Blockchain-Enabled Hyperledger Fabric to Secure Data Transfer Mechanism for Medical Cyber-Physical System: Overview, Issues, and Challenges. *EAI Endorsed Transactions on Pervasive Health and Technology*, *9*.
80. Vinayasree, P., & Reddy, A. M. (2025). A Reliable and Secure Permissioned Blockchain-Assisted Data Transfer Mechanism in Healthcare-Based Cyber-Physical Systems. *Concurrency and Computation: Practice and Experience*, *37*(3), e8378.
81. VINAYASREE[1], P., & REDDY, A. M. (2024). A SCALABLE AND SECURE BLOCKCHAIN-BASED HEALTHCARE SYSTEM: OPTIMIZING PERFORMANCE, SECURITY, AND PRIVACY WITH ADAPTIVE TECHNOLOGIES. *Journal of Theoretical and Applied Information Technology*, *102*(22).
82. Sahoo, P. K., & Jeripothula, P. (2020). Heart failure prediction using machine learning techniques. *Available at SSRN 3759562*.
83. Sahoo, P. K., Chottray, R. K., & Pattnaiak, S. (2012). Research issues on windows event log. *International Journal of Computer Applications*, *41*(19).
84. Sahoo, P. K. (2018, March). Data mining a way to solve Phishing Attacks. In *2018 International Conference on Current Trends towards Converging Technologies (ICCTCT)* (pp. 1-5). IEEE.
85. Sahoo, P. K., Chhotray, R. K., Jena, G., & Pattnaik, S. (2013). An implementation of elliptic curve cryptography. *Int. J. Eng. Res. Technol.(IJERT)*, *2*(1), 2278-0181.
86. Nagesh, O., Kumar, T., & Venkateswararao, V. (2017). A Survey on Security Aspects of Server Virtualization in Cloud Computing. *International Journal of Electrical & Computer Engineering (2088-8708)*, *7*(3).
87. Budaraju, R. R., & Nagesh, O. S. (2023, June). Multi-Level Image Thresholding Using Improvised Cuckoo Search Optimization Algorithm. In *2023 3rd International Conference on Intelligent Technologies (CONIT)* (pp. 1-7). IEEE.
88. Nagesh, O. S., Budaraju, R. R., Kulkarni, S. S., Vinay, M., Ajibade, S. S. M., Chopra, M., ... & Kaliyaperumal, K. (2024). Boosting enabled efficient machine learning technique for accurate prediction of crop yield towards precision agriculture. *Discover Sustainability*, *5*(1), 78.
89. Jyothi, A., & Indira, B. (2018). A Two Way Validation Framework for Cloud Storage Security. *International Journal of Engineering & Technology*, *7*(2.20), 236-242.
90. Rekha, S. B., & Rao, M. V. (2017, September). Methodical activity recognition and monitoring of a person through smart phone and wireless sensors. In *2017 IEEE International Conference on Power, Control, Signals and Instrumentation Engineering (ICPCSI)* (pp. 1456-1459). IEEE.
91. Sangisetti, B. R., Pabboju, S., & Racha, S. (2019, June). Smart call forwarding and conditional signal monitoring in duos mobile. In *Proceedings of the Third International Conference on Advanced Informatics for Computing Research* (pp. 1-11).
92. Sangisetti, B. R., & Pabboju, S. (2021). Analysis on human activity recognition using machine learning algorithm and personal activity correlation. *Psychol Educ J*, *58*(2), 5754-5760.
93. Kumar, T. V. (2018). Project Risk Management System Development Based on Industry 4.0 Technology and its Practical Implications.
94. Tambi, V. K., & Singh, N. (2015). Potential Evaluation of REST Web Service Descriptions for Graph-Based Service Discovery with a Hypermedia Focus.
95. Kumar, T. V. (2024). A Comparison of SQL and NO-SQL Database Management Systems for Unstructured Data.
96. Kumar, T. V. (2024). A Comprehensive Empirical Study Determining Practitioners' Views on Docker Development Difficulties: Stack Overflow Analysis.
97. Kumar, T. V. (2024). Developments and Uses of Generative Artificial Intelligence and Present Experimental Data on the Impact on Productivity Applying Artificial Intelligence that is Generative.
98. Kumar, T. V. (2024). A New Framework and Performance Assessment Method for Distributed Deep Neural NetworkBased Middleware for Cyberattack Detection in the Smart IoT Ecosystem.
99. Sharma, S., & Dutta, N. (2016). Analysing Anomaly Process Detection using Classification Methods and Negative Selection Algorithms.

100. Sharma, S., & Dutta, N. (2024). Examining ChatGPT's and Other Models' Potential to Improve the Security Environment using Generative AI for Cybersecurity.
101. Sakshi, S. (2023). Development of a Project Risk Management System based on Industry 4.0 Technology and its Practical Implications.
102. Arora, P., & Bhardwaj, S. Mitigating the Security Issues and Challenges in the Internet of Things (IOT) Framework for Enhanced Security.
103. Sakshi, S. (2024). A Large-Scale Empirical Study Identifying Practitioners' Perspectives on Challenges in Docker Development: Analysis using Stack Overflow.
104. Sakshi, S. (2023). Advancements and Applications of Generative Artificial Intelligence and show the Experimental Evidence on the Productivity Effects using Generative Artificial Intelligence.
105. Sakshi, S. (2023). Assessment of Web Services based on SOAP and REST Principles using Different Metrics for Mobile Environment and Multimedia Conference.
106. Sakshi, S. (2022). Design and Implementation of a Pattern-based J2EE Application Development Environment.
107. Sharma, S., & Dutta, N. (2018). Development of New Smart City Applications using Blockchain Technology and Cybersecurity Utilisation. Development, 7(11).
108. Sharma, S., & Dutta, N. (2017). Development of Attractive Protection through Cyberattack Moderation and Traffic Impact Analysis for Connected Automated Vehicles. Development, 4(2).
109. Sharma, S., & Dutta, N. (2015). Evaluation of REST Web Service Descriptions for Graph-based Service Discovery with a Hypermedia Focus. Evaluation, 2(5).
110. Sharma, S., & Dutta, N. (2024). Examining ChatGPT's and Other Models' Potential to Improve the Security Environment using Generative AI for Cybersecurity.
111. Sharma, S., & Dutta, N. (2015). Cybersecurity Vulnerability Management using Novel Artificial Intelligence and Machine Learning Techniques. Sakshi, S. (2023). Development of a Project Risk Management System based on Industry 4.0 Technology and its Practical Implications.
112. Sharma, S., & Dutta, N. (2017). Classification and Feature Extraction in Artificial Intelligence-based Threat Detection using Analysing Methods.
113. Sharma, S., & Dutta, N. (2016). Analysing Anomaly Process Detection using Classification Methods and Negative Selection Algorithms.
114. Sharma, S., & Dutta, N. (2015). Distributed DNN-based Middleware for Cyberattack Detection in the Smart IOT Ecosystem: A Novel Framework and Performance Evaluation Technique.
115. Bhat, S. (2015). Technology for Chemical Industry Mixing and Processing. Technology, 2(2).
116. Bhat, S. (2024). Building Thermal Comforts with Various HVAC Systems and Optimum Conditions.
117. Bhat, S. (2020). Enhancing Data Centre Energy Efficiency with Modelling and Optimisation of End-To-End Cooling.
118. Bhat, S. (2016). Improving Data Centre Energy Efficiency with End-To-End Cooling Modelling and Optimisation.
119. Bhat, S. (2015). Deep Reinforcement Learning for Energy-Saving Thermal Comfort Management in Intelligent Structures.
120. Bhat, S. (2015). Design and Function of a Gas Turbine Range Extender for Hybrid Vehicles.
121. Bhat, S. (2023). Discovering the Attractiveness of Hydrogen-Fuelled Gas Turbines in Future Energy Systems.
122. Bhat, S. (2019). Data Centre Cooling Technology's Effect on Turbo-Mode Efficiency.
123. Bhat, S. (2018). The Impact of Data Centre Cooling Technology on Turbo-Mode Efficiency.
124. Archana, B., & Sreedaran, S. (2023). Synthesis, characterization, DNA binding and cleavage studies, in-vitro antimicrobial, cytotoxicity assay of new manganese (III) complexes of N-functionalized macrocyclic cyclam based Schiff base ligands. Polyhedron, 231, 116269.
125. Archana, B., & Sreedaran, S. (2022). New cyclam based Zn (II) complexes: effect of flexibility and para substitution on DNA binding, in vitro cytotoxic studies and antimicrobial activities. Journal of Chemical Sciences, 134(4), 102.
126. Archana, B., & Sreedaran, S. (2021). POTENTIALLY ACTIVE TRANSITION METAL COMPLEXES SYNTHESIZED AS SELECTIVE DNA BINDING AND ANTIMICROBIAL AGENTS. European Journal of Molecular and Clinical Medicine, 8(1), 1962-1971.
127. Rasappan, A. S., Palanisamy, R., Thangamuthu, V., Dharmalingam, V. P., Natarajan, M., Archana, B., ... & Kim, J. (2024). Battery-type WS2 decorated WO3 nanorods for high-performance supercapacitors. Materials Letters, 357, 135640.
128. Arora, P., & Bhardwaj, S. (2017). Investigation and Evaluation of Strategic Approaches Critically before Approving Cloud Computing Service Frameworks.
129. Arora, P., & Bhardwaj, S. (2017). Enhancing Security using Knowledge Discovery and Data Mining Methods in Cloud Computing.
130. Arora, P., & Bhardwaj, S. (2017). Combining Internet of Things and Wireless Sensor Networks: A Security-based and Hierarchical Approach.
131. Arora, P., & Bhardwaj, S. (2019). Safe and Dependable Intrusion Detection Method Designs Created with Artificial Intelligence Techniques. machine learning, 8(7).
132. Arora, P., & Bhardwaj, S. (2017). A Very Safe and Effective Way to Protect Privacy in Cloud Data Storage Configurations.

133. Arora, P., & Bhardwaj, S. (2019). The Suitability of Different Cybersecurity Services to Stop Smart Home Attacks.
134. Arora, P., & Bhardwaj, S. (2020). Research on Cybersecurity Issues and Solutions for Intelligent Transportation Systems.
135. Arora, P., & Bhardwaj, S. (2021). Methods for Threat and Risk Assessment and Mitigation to Improve Security in the Automotive Sector. Methods, 8(2).