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

# Crime Data Analysis Using Machine Learning And Django

[1]G.Rohini Phaneedra Kumari, Assistant Professor,Department of IT, Vignan's Nirula Institute of Technology and Science for Women, peda palakaluru,Guntur.
[2]K. Baranitharan,Associate Professor,Department of IT
[3]Yadlapalli Sai Priya, [4]Mundru Sowjanya, [5]Kusam Lakshmi Pujitha, [6]Gaddhe Keerthi,
[3456]B.TECH, Department of IT, Vignan's Nirula Institute ofTechnology and Science for Women,Peda Palakaluru, Guntur.

**ABSTRACT**
The paper aims to explore the application of machine learning in analysing crime data and developing predictive models to better understand and address crime in urban environments. The abstract emphasizes crime as a socio-economical problem affecting life quality and economic growth, with factors like education, poverty, employment, and climate influencing crime rates. The paper aims to contribute to the field of crime analysis through the integration of machine learning and data analysis methodologies. Crime data analysis is crucial for understanding crime patterns, predicting future trends and informing law enforcement strategies. This project integrates machine learning algorithms and Django framework to develop a predicative crime analytics.

**Keywords-**Crime rates, machine learning, and data analysis**.**

## 1. INTRODUCTION

[1]**Crime** is a socio-economical problem affecting life quality and economic growth . The specifics of how crime is conducted changes depending on [2-3]the type of society and community.[4-5]Crime data analysis is critical for several reasons, [6-11]as it provides valuable insights that can significantly impact public safety, law enforcement strategies, and policy-m[12-15]aking. Crime data analysis is a powerful tool that offers numerous benefits for public safety, law enforcement, policymaking, community engagement, judicial processes, academic research, and economic well-being. By leveraging data[16-18] to understand and predict crime patterns, stakeholders can make informed decisions, optimize resources, and implement effective strategies to reduce[19-22] crime and enhance the quality of life in communities.

**Machine learning and Django** [23-27]

can be utilized together to create powerful applications for crime data analysis, providing predictive insights and making them accessible through a user-friendly web interface. [28-30]By leveraging the capabilities of machine learning and Django, you can develop a robust and user-friendly crime data analysis application. [31-36]Machine learning models can provide valuable predictive insights, while Django facilitates the creation of a web-bases. interface for easy access and interaction with the data. This integration allows for effective crime prevention strategies.

## 2. LITERATURE SURVEY

For crime data analysis, this section should cover key studies, tools, and techniques that have been used in the field, highlighting their contributions, limitations, and how your work builds upon or differs from them. Here's how you might structure the [37-41]"Related Work" section for crime data analysis using machine learning and Django.22

**Predictive Modelling in Crime Analysis**

Spatial and Temporal Patterns in CrimeStudy by Wang et al. (2013):

Objective: Analysed spatial and temporal crime patterns to develop predictive models for urban crime hotspots.

Methodology: Used logistic regression on historical crime data to identify significant predictors.

Findings: Demonstrated that logistic regression could reasonably predict crime hotspots, though accuracy depended heavily on data quality.

Contribution:Highlighted the potential for logistic regression in crime prediction[46] but also emphasized the importance of comprehensive data preprocessing.[47-49]

Limitations: Limited by the quality and granularity of the input data.

NeuralNetworks for Crime Classification

Study by Alves et al. (2018):

Objective: Investigated neural[50-53] networks for classifying crime types from incident reports.

Methodology:Trained ]neural networks on a large dataset of crime reports, including both textual and numerical inputs.

Findings:Neural networks achieved high accuracy in crime classification but required significant computational resources and data preprocessing.

Contribution:Demonstrated the potential of deep learning in extracting complex patterns from crime data, especially unstructured text.

Limitations: High computational costs and the need for large, well-labelled datasets.

Decision Trees and Random Forests

Objective:Used random forests to predict crime occurrences based on various features.

Methodology:Applied random forest algorithms on datasets with features such as socio-economic indicators and past crime records.

Findings:Random forests outperformed traditional models in terms of accuracy and robustness.

Contribution:Demonstrated the effectiveness of ensemble learning methods in handling high-dimensional crime data.

Limitations: Highlighted the need for extensive feature engineering and preprocessing.

The related work on networks for crime data analysis highlights the diverse range of machine learning models and neural network architectures applied to the field decision trees and random forests to advanced neural networks like LSTM and CNN, each approach offers unique strengths in handling various aspects of crime data, such as spatial and temporal patterns. Hybrid models, which combine multiple techniques, have also shown promise in enhancing predictive accuracy and robustness. This research aims to build upon these existing methodologies by developing a comprehensive crime prediction model using a combination of neural network architectures and integrating it into a user-friendly web application built with Django. This approach seeks to address the limitations identified in previous studies, such as computational requirements and the need for extensive data preprocessing, while providing actionable insights for law enforcement and policymakers.

The "Related Work" section of a research paper on crime analysis using Django should cover various studies and projects that have utilized web frameworks, particularly Django, to analyse and visualize crime data. This section will highlight how Django has been used to build robust, scalable applications for crime data analysis, mapping, and prediction, emphasizing the advantages and limitations of these approaches.

**Machine Learning Integration in Django Applications**

Predictive Models for Crime Forecasting

Objective: Integrated machine learning models with Django to predict crime hotspots.

Methodology: Trained machine learning models on historical crime data and deployed them in a Django application for real-time predictions.

Findings: The application provided users with predictions of future crime hotspots, allowing for proactive measures.

Contribution: Highlighted the synergy between machine learning and Django in building intelligent crime analysis systems.

Limitations: The accuracy of predictions depended on the quality and granularity of the training data. The related work on crime offer significant benefits, they also face challenges such as data quality, real-time performance, and ethical considerations. This research aims to build upon these findings by developing a comprehensive crime analysis system using Django, addressing some of the limitations identified in previous studies, and providing actionable insights for crime prevention and policy-making.

## 3. PROPOSED METHODOLOGY

Data analysis of crime data using machine learning and Django involves several steps, from data collection and preprocessing to model training and deployment in a web application.**Data Sources:**

**Police Reports**: Official crime data from police departments,**Open Data Portals**: Government and municipal open data platforms,**Social Media**: User-generated reports and sentiment analysis,**Geospatial Data**: GIS data for mapping and spatial analysis.

**Data Gathering Techniques**

**APIs**: Using APIs to fetch real-time crime data.

**Web Scraping**: Extracting data from websites and public records.

**Databases**: Accessing crime records from databases.

**Handling Missing Values**: Imputation or removal of missing data.

**Outlier Detection**: Identifying and treating outliers.

**Data Standardization**: Normalizing data for consistency.

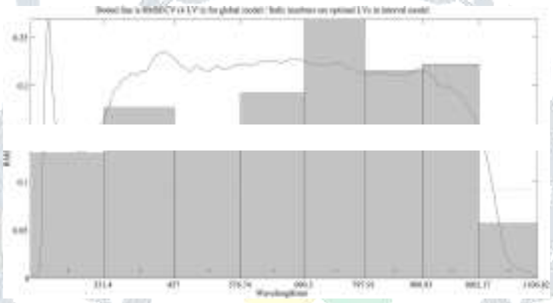


Fig1: Data Standardization

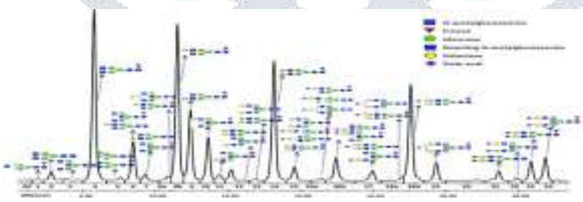


Fig2: Data analysis in half an hour

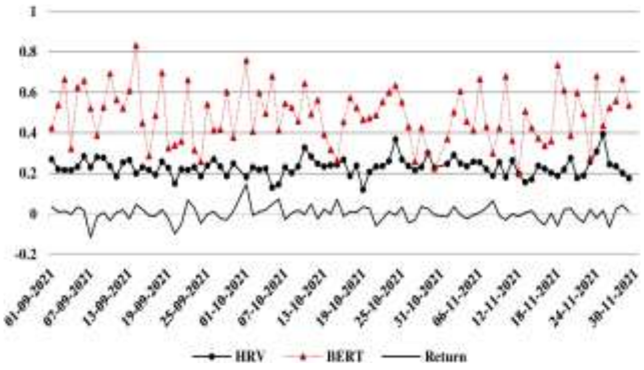
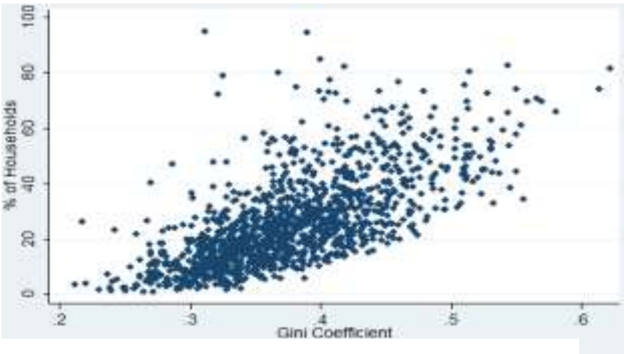



Fig3: Data analysis in 2021

**Data Transformation**
**Encoding Categorical Variables**: Converting categorical data to numerical format.
**Scaling Features**: Scaling features for model compatibility.
**Socio-Economic Features**: Integrating socio-economic indicators.
**Text Processing**: Cleaning and tokenizing textual data from crime reports.
**4.Statistical Analysis**
**Time Series Analysis**
Time series analysis involves analysing data points collected or recorded at specific time intervals.
**Trend Analysis:**
Identifies long-term upward or downward movements in crime data. **Seasonal Analysis**:
Detects regular patterns or cycles in crime data that repeat over a specific period, such as daily, monthly, or yearly. A sophisticated time series forecasting method that models different aspects of the time series, including autoregression, differencing, and moving averages.


Fig4: Data Seasonal Analysis




,

Fig5: Statistical data Analysis

researchers and law enforcement agencies can gain valuable insights into crime dynamics, which can inform prevention strategies and policy decisions. Integrating these analyses into a Django application can provide a powerful tool for real-time crime data exploration and decision-making. Smooth out short-term fluctuations to highlight longer-term trends or cycles. Spatial analysis examines the geographical distribution of crime incidents. Identifies long-term upward or downward movements in crime data.**Cluster Analysis:**Cluster analysis groups similar data points into clusters.**K-Means Clustering**:Groups crime incidents into k clusters based on their attributes.**Hierarchical Clustering**:Builds a tree of clusters to identify nested groups of crime incidents.

**Statistical data analysis** is crucial in crime data analysis as it helps in understanding patterns, trends, and relationships within the data. **Cluster analysis** is a powerful technique in crime data analysis used to identify patterns and group similar crime incidents or areas based on their characteristics. This method helps in understanding crime hotspots, the types of crimes that frequently occur together and other spatial or temporal patterns. Cluster analysis is a vital tool in crime data analysis, enabling the identification of crime hotspots and patterns. By applying clustering techniques like K-means, hierarchical clustering, and DBSCAN, researchers and law enforcement agencies can gain deeper insights into crime dynamics, allowing for more effective resource allocation and preventive measures. Integrating these clustering methods into a Django-based web application can further enhance real-time crime analysis and decision-making-capabilities.

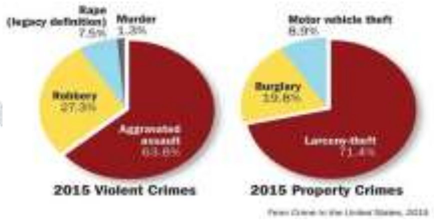



Fig6: pie charts of Data analysis

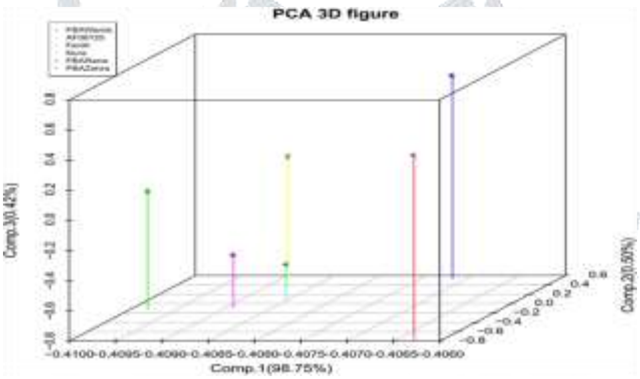



Fig7:PCA 3D figure

**Integration with Django**

**Django Setup**: Describe the setup of the Django project and the creation of necessary apps.

**Model Serialization**: Explain how the trained models were saved and loaded using job lib or pickle.

**API Development:** Discuss the creation of APIs using Django REST framework for model predictions.

**Frontend Development**: Explain how the frontend was built using Django templates to enable user interaction.

Integrating Django into crime data analysis involves creating a web application that can manage, analyse, and visualize crime data effectively. This integration typically combines Django's robust web framework capabilities with various data analysis techniques and machine learning models to provide interactive and actionable insights. Integrating Django with crime data analysis involves setting up a Django project, defining data models, performing data analysis, and creating a web interface for visualization and interaction. By leveraging Django's robust web framework capabilities and combining them with statistical and machine learning techniques, you can build a powerful application for crime data analysis that helps in understanding crime patterns, predicting hotspots, and making informed decisions. This work attempts to predict the types of crime in a particular location.

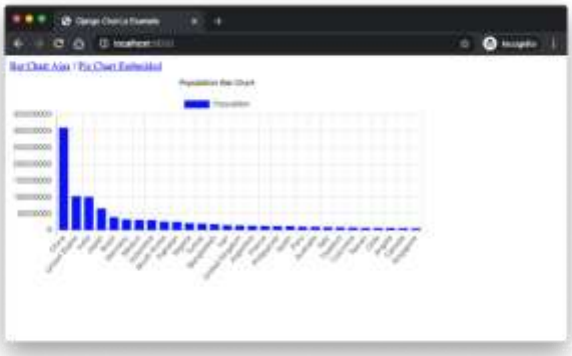


Fig8:Analysis

## 4.RESULT

Integrating machine learning with Django for crime data analysis can yield significant insights and practical applications for law enforcement and policymakers. **Crime Hotspot Identification Description**: Identifying areas with high concentrations of crime incidents using clustering techniques like K-Means or DBSCAN.


Fig9:Result

**Crime Trend Analysis**

**Description**: Analysing temporal patterns in crime data to identify trends over time using time series analysis..

**Visualization**: Line charts showing crime rates over time, **Insight**: Identification of trends such as increases or decreases in certain types of crimes over specific periods. Conclusion: Crime data analysis using machine learning and Django provides powerful tools for understanding, predicting, and responding to criminal activity. This integration leverages the strengths technologies to offer comprehensive insights and practical applications. Integrating machine learning with Django for crime data analysis presents a comprehensive approach to tackling crime. By combining Django's robust web framework with the predictive power of machine learning, this approach enhances the ability to manage, analyse, and visualize crime data effectively. The results not only provide valuable insights for law enforcement and policymakers but also contribute to safer communities by enabling data-driven decision-making and proactive crime prevention strategies. Graphical representations are crucial in crime data analysis for illustrating findings and communicating results effectively. By combining Django's robust web framework with the predictive power of machine learning, this approach enhances the ability to manage, analyse, and visualize crime data effectively.

## 5.CONCLUSION

Machine learning is the part of artificial intelligence which deals with statistical methods and gives computers the ability to learn from past experiences [28]. Machine learning can be divided into categories such as supervised, unsupervised, and reinforcement learning. This study uses supervised learning dueto the nature of required input data and output targets.Supervised learning can be categorized into classificationand regression. Classification is predicting a discrete class label,while regression is the task of predicting a continuous quantity.

This work attempts to predict the types of crime in a particularlocation. Therefore, the objective of this study is the classification of crime. There are many algorithms that can be used for the classification such as K-Nearest Neighbour (KNN),Support Vector Machine (SVM), Naïve disadvantage in terms of complexity, accuracy, and training time and can provide different results from a single dataset.

## 6.REFERENCES


1. Sarada, K., Narayana, V. L., Gopi, P., & Pavani, V. (2020). An iterative group based anomaly detection method for secure data communication in networks. Journal of Critical Reviews, 7(6), 208-212
2. Kotamraju, S. K., Arepalli, P. G., Vejendla, L. N., & Kanumalli, S. S. (2021). WITHDRAWN: Implementation patterns of secured internet of things environment using advanced blockchain technologies.
3. Narayana, V. L., Gopi, A. P., Anveshini, D., & Lakshmi, G. V. (2020). Enhanced path finding process and reduction of packet droppings in mobile ad-hoc networks. International Journal of Wireless and Mobile Computing, 18(4), 391-397.
4. Patibandla, R. S. M. L., Rao, B. T., Narayana, V. L., & Srinivas, V. S. (2021). An overview of ontology-based artificial intelligence services in health care systems. In Proceedings of the International Conference on Health Care Systems (pp. 47–63).
5. Maddumala, V. R., Maha Lakshmi, K., Anusha, P., & Lakshman Narayana, V. (2020). Enhanced morphological operations for improving the pixel intensity level. Journal of Computational and Theoretical Nanoscience, 29(3), 9191–9201.
6. Narayana, V. L., Malleswari, K. S. N., Divyanjali, M., Nandini, S., & Purnima, G. (2023). Video frame based prompt compression model with steganography for secure data transmission. In Proceedings of the International Conference on Advanced Intelligent Systems (pp. 373–377). https://doi.org/10.1109/ICAIS56108.2023.10073883
7. Naresh, A., Pavani, V., Meghana Chowdary, M., & Lakshman Narayana, V. (2020). Energy consumption reduction in cloud environment by balancing cloud user load. Journal of Critical Reviews, 7(7), 1003–1010. https://doi.org/10.31838/jcr.07.07.184
8. Patibandla, R. S. M. L., & Vejendla, L. N. (2022). Significance of blockchain technologies in industry. In Advances in Blockchain Technologies (pp. 19–31). https://doi.org/10.1007/978-3-030-70501-5_2
9. Pasala, S., Pavani, V., Lakshmi, G. V., & Narayana, V. L. (2020). Identification of attackers using blockchain transactions using cryptography methods. Journal of Critical Reviews, 7(6), 368–375. https://doi.org/10.31838/jcr.07.06.65
10. Mounika, B., Anusha, P., Narayana, V. L., & Lakshmi, G. V. (2020). Use of blockchain technology in providing security during data sharing. Journal of Critical Reviews, 7(6), 338–343. https://doi.org/10.31838/jcr.07.06.59
11. Narayana, V. L., Vinayaki, K. V., Swetha, P. A., Sri, K. D., & Chaithanya, G. (2024). Superior attribute weighted set for object skeleton detection using ResNet50 with edge-based segmentation model. In Proceedings of the International Conference on Smart Computing and Systems (pp. 1132–1139). IEEE. https://doi.org/10.1109/ICSCSS60660.2024.10624879
12. Gopi, A. P., & Naik, K. J. (2022). An IoT model for fish breeding analysis with water quality data of pond using modified multilayer perceptron model. 2022 International Conference on Data

Analytics for Business and Industry (ICDABI), 448-453. https://doi.org/10.1109/ICDABI56818.2022.10041617

13. Arepalli, P. G., & Naik, K. J. (2024). A deep learning-enabled IoT framework for early hypoxia detection in aqua water using lightweight spatially shared attention-LSTM network. Journal of Supercomputing, 80(2), 2718-2747. https://doi.org/10.1007/s11227-023-05580-x
14. Arepalli, P. G., & Naik, K. J. (2023). An IoT-based water contamination analysis for aquaculture using lightweight multi-headed GRU model. Environmental Monitoring and Assessment, 195(12), Article 1516. https://doi.org/10.1007/s10661-023-12126-4
15. Gopi, A. P., Gowthami, M., Srujana, T., Gnana Padmini, S., & Durga Malleswari, M. (2023). Classification of denial-of-service attacks in IoT networks using AlexNet. In Smart Innovation, Systems and Technologies (Vol. 316, pp. 349-357). https://doi.org/10.1007/978-981-19-5403-0_30
16. Bikku, T., Gopi, A. P., & Prasanna, R. L. (2019). Swarming the high-dimensional datasets using ensemble classification algorithm. In Advances in Intelligent Systems and Computing (Vol. 815, pp. 583-591). https://doi.org/10.1007/978-981-13-1580-0_56
17. Arepalli, P. G., & Khetavath, J. N. (2024). Water quality classification using multi-cell RNN in aquaculture ponds for Catla fish. In Lecture Notes in Networks and Systems (Vol. 897, pp. 363-370). https://doi.org/10.1007/978-981-99-9704-6_34
18. Arepalli, P. G., & Naik, K. J. (2024). Water contamination analysis in IoT-enabled aquaculture using deep learning-based AODEGRU. Ecological Informatics, 79, Article 102405. https://doi.org/10.1016/j.ecoinf.2023.102405
19. Arepalli, P. G., & Naik, K. J. (2024). An IoT-based smart water quality assessment framework for aqua-ponds management using Dilated Spatial-temporal Convolution Neural Network (DSTCNN). Aquacultural Engineering, 104, Article 102373. https://doi.org/10.1016/j.aquaeng.2023.102373
20. Gopi, A. P., Narayana, V. L., & Kumar, N. A. (2018). Dynamic load balancing for client-server assignment in distributed systems using genetic algorithm. Ingenierie des Systemes d'Information, 23(6), 87-98. https://doi.org/10.3166/ISI.23.6.87-98
21. Sarada, K., Narayana, V. L., Gopi, A. P., & Pavani, V. (2020). An iterative group based anomaly detection method for secure data communication in networks. Journal of Critical Reviews, 7(6), 208-212. https://doi.org/10.31838/jcr.07.06.39
22. Narayana, V. L., Gopi, A. P., & Chaitanya, K. (2019). Avoiding interoperability and delay in healthcare monitoring system using blockchain technology. Revue d'Intelligence Artificielle, 33(1), 45-48. https://doi.org/10.18280/ria.330108
23. Gopi, A. P., Jyothi, R. N. S., Narayana, V. L., & Sandeep, K. S. (2023). Classification of tweets data based on polarity using improved RBF kernel of SVM. International Journal of Information Technology, 15(2), 965-980. https://doi.org/10.1007/s41870-019-00409-4
24. Narayana, V. L., Gopi, A. P., Khadherbhi, S. R., & Pavani, V. (2020). Accurate identification and detection of outliers in networks using group random forest methodology. Journal of Critical Reviews, 7(6), 381-384. https://doi.org/10.31838/jcr.07.06.67
25. Rao, B. T., Patibandla, R. S. M. L., Narayana, V. L., & Gopi, A. P. (2021). Medical data supervised learning ontologies for accurate data analysis. In Semantic Web for Effective Healthcare Systems (pp. 249-267). https://doi.org/10.1002/9781119764175.ch1
26. Patibandla, R. S. M. L., Gopi, A. P., Narayana, V. L., & Rao, B. T. (2023). Decentralized smart healthcare systems using blockchain and AI. In Blockchain applications in healthcare: Innovations and practices (Vol. 1, pp. 139-154). DOI: 10.1002/9781394229512.ch8
27. Lakshman Narayana, V., & Gopi, A. P. (2020). Enterotoxigenic Escherichia coli detection using the design of a biosensor. Journal of New Materials for Electrochemical Systems, 23(3), 164-166. DOI: 10.14447/jnmes.v23i3.a02
28. Rani, B. M. S., Majety, V. D., Pittala, C. S., Vijay, V., Sandeep, K. S., & Kiran, S. (2021). Road Identification Through Efficient Edge Segmentation Based on Morphological Operations. Traitement du Signal, 38(5).

29. .Kanumalli, S. S., Ch, A., & Murty, P. S. R. C. (2020). Secure V2V Communication in IOV using IBE and PKI based Hybrid Approach. International Journal of Advanced Computer Science and Applications, 11(1).
30. 3.Kiran, S., Kanumalli, S. S., Krishna, K. V. S. S. R., & Chandra, N. (2021). WITHDRAWN: internet of things integrated smart agriculture for weather predictions and preventive mechanism.
31. Chaitanya, Kosaraju, and Sankara Narayanan. "Security and Privacy in Wireless Sensor Networks Using Intrusion Detection Models to Detect DDOS and Drdos Attacks: A Survey." 2023 IEEE International Students' Conference on Electrical, Electronics and Computer Science (SCEECS). IEEE, 2023.
32. Krishna, Komanduri Venkata Sesha Sai Rama, et al. "Classification of Glaucoma Optical Coherence Tomography (OCT) Images Based on Blood Vessel Identification Using .CNN and Firefly Optimization." Traitement du Signal 38.1 (2021).
33. Chaitanya, Kosaraju, et al. "Predicting the Spread of Covid Disease Based on Chest X-Ray Images Using Convolutional Neural Network with Improved Accuracy." 2023 6th International Conference on Advances in Science and Technology (ICAST). IEEE, 2023.
34. Ekkurthi, A., Sujatha, V., Kumar, K.V.,"Effective Moving Object Tracking Using Adaptive Background Subtraction with Advanced Probability Evolutionary Algorithm",International Journal on Recent and Innovation Trends in Computing and Communication, 2023, 11, pp. 1–3
35. Sujatha, V., Yaddala, M., Kollipara, V., Shaik, K., Burri, R.K(23),"Movie reviews data classification using convolution neural networks",AIP Conference Proceedings. 2023, 2724, 030009
36. Godavarthi, B., Majety, V. D., Mrudula, Y., & Nalajala, P. (2019). Fault identification in power lines using GSM and IoT technology. Advances in Intelligent Systems and Computing, 815, 647–655. https://doi.org/10.1007/978-3-319-91117-2_70
37. Majety, V. D., & Murali, G. (2018). A remote epileptic patient supervising system. Advances in Modelling and Analysis B, 61(4), 207–210. https://doi.org/10.18280/ama_b.610402
38. Naresh, A., TSLP, H., Ch, G., & Kumari, G. R. P. (2023, July). Early Prophecy of Low-Birth-Weight Babies Using BM Error Rate Classifier. In 2023 14th International Conference on Computing Communication and Networking Technologies (ICCCNT) (pp. 1-6). IEEE.
39. Kumari, G. R. P., Reddy, A. H., Lakshmi, K., Abhinaya, B., Sanjana, S., & Naresh, A. (2024, March). Time-Frame-Based Drowsiness Detection System Using CNN. In 2024 2nd International Conference on Disruptive Technologies (ICDT) (pp. 711-716). IEEE.
40. V. Pavani, K. Divya, V. V. Likhitha, G. S. Mounika and K. S. Harshitha, "Image Segmentation based Imperative Feature Subset Model for Detection of Vehicle Number Plate using K Nearest Neighbor Model," 2023 Third International Conference on Artificial Intelligence and Smart Energy (ICAIS), Coimbatore, India, 2023, pp. 704-709, doi: 10.1109/ICAIS56108.2023.10073848.
41. V. Pavani, M. N. Swetha, Y. Prasanthi, K. Kavya and M. Pavithra, "Drowsy Driver Monitoring Using Machine Learning and Visible Actions," 2022 International Conference on Electronics and Renewable Systems (ICEARS), Tuticorin, India, 2022, pp. 1269-1279, doi: 10.1109/ICEARS53579.2022.9751890.
42. Sri, Kurra Santhi, et al. "Advanced system control with traffic handling for secure communication in IoT routing protocol." Journal Européen des Systèmes Automatisés 54.2 (2021): 229-233.
43. Arumugham, Vinothini, et al. "An explainable deep learning model for prediction of early-stage chronic kidney disease." Computational Intelligence 39.6 (2023): 1022-1038.
44. Majety, Vasumathi Devi, et al. "Enhanced secure communication AODV routing protocol using SVM in MANETS." AIP Conference Proceedings. Vol. 2724. No. 1. AIP Publishing, 2023.
45. Krisha, P.S., Peram, S.R. (2023). CT image precise denoising model with edge based segmentation with labeled pixel extraction using CNN based feature extraction for oral cancer detection. Traitement du Signal, Vol. 40, No. 3, pp. 1297-1304. https://doi.org/10.18280/ts.400349

46. P. S. Krishna, V. R. Aparna, V. Priyanka, P. T. Niharika and T. Shivangi, "Convolution Neural Network Model with Feature Linked Vector for Oral Cancer Detection," 2023 IEEE 12th International Conference on Communication Systems and Network Technologies (CSNT), Bhopal, India, 2023, pp. 304-308, doi: 10.1109/CSNT57126.2023.10134660.
47. Rayachoti, Eswaraiah, Sudhir Tirumalasetty, and Silpa Chaitanya Prathipati. "SLT based watermarking system for secure telemedicine." Cluster Computing 23.4 (2020): 3175-3184.
48. Eswaraiah, Rayachoti, Tirumalasetty Sudhir, and Prathipati Silpa Chaitanya. "Curvelet transform based watermarking for telemedicine." Wireless Personal Communications 122.1 (2022): 309-329.
49. Varshini, Y., Mounika, T., Kumari, G. R. P., Sirisha, G., & Deepthi, Y. (2023, March). Crop Yield Forecast Using Machine Learning. In 2023 9th International Conference on Advanced Computing and Communication Systems (ICACCS) (Vol. 1, pp. 2310-2315). IEEE.
50. B. Aruna Kumari “Time Series Data Classification for Precise Stock Market Price Prediction using ML” ICICACS International Conference on Integrated Circuits and Communication Systems, Scopus indexed, ISBN:979-8-3503-1755-8/ https://ieeexplore.ieee.org/document/10498248,18 April 2024
51. B.Aruna Kumari “HumanvAction Recognition From Video Frames Using Recurrent Neural Networks” ICDT 2nd International Conference on Disruptive Technologies (ICDT),Scopis indexed , ISBN:979-8-3503-7105-5/ https://ieeexplore.ieee.org/document/10489658, 11 April 2024
52. Narayana, V. L., Gopi, A. P., & Patibandla, R. S. M. (2021). An efficient methodology for avoiding threats in smart homes with low power consumption in iot environment using blockchain technology. In Blockchain Applications in IoT Ecosystem (pp. 239-256). Cham: Springer International Publishing.
53. Pavani, V., Krishna, P. S., Gopi, A. P., & Narayana, V. L. (2020). WITHDRAWN: Secure data storage and accessing in cloud computing using enhanced group based cryptography mechanism.