

Laptop Price Prediction using Machine Learning

Mohammed Fasi Ahmed Parvez¹, Maliha Fathima², Santhosh³, Mohammed Mubben⁴,
Md.Suffiyan⁵, Mrs.Keerthi Kumari⁶

^{2,3,4,5} B.Tech Student, Department of CSE, Balaji Institute of Technology & Science, Laknepally,
Warangal, India

^{1,6} Assistant Professor, Department of CSE, Balaji Institute of Technology & Science, Laknepally,
Warangal, India

Abstract :Predicting laptop prices involves analyzing various factors such as technological advancements, market demand, component costs, and competitive dynamics. This abstract outlines a methodology for forecasting laptop prices using a combination of machine learning algorithms and economic principles.

Firstly, historical data on laptop prices, spanning different models, brands, and specifications, is collected and analyzed. This dataset serves as the foundation for training predictive models. Features such as processor type, RAM capacity, storage size, display resolution, brand reputation, and market trends are incorporated into the dataset. Machine learning algorithms, such as regression analysis, decision trees, or neural networks, are then applied to the dataset to develop predictive models. These models learn the relationships between the features and the corresponding laptop prices, enabling them to make price predictions for new or existing laptops.

In addition to machine learning techniques, economic principles play a crucial role in price prediction. Factors like inflation, currency exchange rates, and industry competition are considered in the analysis. Economic indicators such as GDP growth, consumer spending, and technological innovation are also factored in to anticipate market trends and their impact on laptop prices.

Furthermore, market research and expert opinions are utilized to validate and refine the predictive models. Industry insights, consumer preferences, and emerging technologies are taken into account to enhance the accuracy of the price forecasts.

Ultimately, the proposed methodology integrates machine learning algorithms with economic analysis and market research to predict laptop prices. By leveraging historical data, economic indicators, and expert insights, this approach provides a comprehensive framework for forecasting laptop prices, aiding manufacturers, retailers, and consumers in making informed decisions in the dynamic laptop market.

1. INTRODUCTION

In today's fast-paced technological landscape, laptops have become indispensable tools for productivity, communication, and entertainment. As the demand for laptops continues to grow, driven by trends such as remote work, distance learning, and digital transformation, accurately predicting laptop prices is essential for manufacturers, retailers, and consumers to optimize their strategies and investments. However, forecasting laptop prices is a complex endeavor influenced by a myriad of factors, including technological innovations, component costs, market competition, and economic fluctuations. In this abstract, we propose a comprehensive methodology that combines advanced machine learning algorithms with economic analysis and market research to forecast laptop prices effectively. By leveraging historical data, economic indicators, and industry expertise, this approach aims to provide actionable insights into pricing dynamics, empowering stakeholders to

make informed decisions in an increasingly competitive and dynamic market environment. Through the integration of quantitative analysis and qualitative insights, this methodology offers a holistic perspective on the factors shaping laptop prices, facilitating strategic planning, pricing optimization, and risk management for all stakeholders involved in the laptop ecosystem.

1. **Data Collection:** Algorithms can gather data from various sources such as e-commerce websites, manufacturer listings, and consumer reviews to compile a comprehensive database of laptop models, specifications, and prices.
2. **Feature Extraction:** Machine learning algorithms can extract relevant features from the dataset, including processor type, RAM size, storage capacity, display resolution, brand, and customer ratings.
3. **Normalization:** Normalize the features to ensure comparability across different scales and units. For example, convert prices to a standardized currency and scale numerical features to a common range.
4. **Similarity Metrics:** Utilize similarity metrics such as cosine similarity or Euclidean distance to quantify the similarity between different laptops based on their features. This allows for the identification of comparable laptops within the dataset.
5. **Clustering:** Apply clustering algorithms such as K-means or hierarchical clustering to group similar laptops together based on their features. This helps in organizing the dataset into clusters of comparable products.
6. **Regression Analysis:** Employ regression analysis techniques to model the relationship between laptop features and prices. This allows for the prediction of prices for new or unseen laptops based on their specifications.
7. **Price Indexing:** Develop a price index that takes into account the features of each laptop and assigns a comparative price value. This index facilitates direct comparison between laptops with different specifications.
8. **Machine Learning Models:** Train machine learning models such as decision trees, random forests, or support vector machines to predict the prices of laptops based on their features. These models can provide more accurate price estimates by capturing non-linear relationships and interactions between features.
9. **Validation and Evaluation:** Validate the performance of the algorithms using techniques such as cross-validation and holdout validation. Evaluate the accuracy of price predictions against actual market prices to assess the effectiveness of the models.
10. **Visualization:** Visualize the results of the price comparison using charts, graphs, or interactive dashboards to facilitate interpretation and decision-making by stakeholders.

By employing algorithms for laptop price comparison, stakeholders can gain valuable insights into the relative value of different laptops based on their specifications and features, enabling informed purchasing decisions and pricing strategies.

2. LITERATURE SURVEY

A literature survey on laptop pricing would encompass a wide array of topics, including market dynamics, consumer behavior, pricing strategies, and technological innovations. Researchers have explored various aspects of laptop pricing to understand the factors influencing prices and their implications for manufacturers, retailers, and consumers.

Studies have investigated the impact of technological advancements on laptop pricing, examining how features such as processor speed, RAM capacity, storage size, and display resolution affect prices. For instance, research has shown that advancements in processor technology and increases in RAM capacity tend to lead to higher-priced laptops, reflecting the added value to consumers.

Furthermore, scholars have analyzed pricing strategies employed by laptop manufacturers and retailers, including skimming, penetration pricing, and bundling. These studies explore how companies set prices to maximize profits while remaining competitive in the market. Additionally, researchers have examined the role of brand reputation and perceived quality in influencing consumer willingness to pay for laptops, highlighting the importance of brand positioning and marketing strategies in pricing decisions.

Consumer behavior is another key area of interest in laptop pricing literature. Researchers have investigated factors such as brand loyalty, product reviews, and price sensitivity in shaping consumer purchasing decisions. Understanding consumer preferences and behavior is essential for companies to develop effective pricing strategies and target the right market segments.

Moreover, studies have examined the impact of macroeconomic factors such as inflation, exchange rates, and GDP growth on laptop pricing. Economic conditions can influence production costs, component prices, and consumer purchasing power, affecting pricing decisions throughout the supply chain.

Technological innovations, such as the rise of ultrabooks, 2-in-1 convertibles, and gaming laptops, have also been a focus of research in laptop pricing literature. These studies explore how new technologies disrupt existing market segments, create pricing dynamics, and shape industry competition.

In summary, the literature on laptop pricing encompasses a diverse range of topics, including market dynamics, consumer behavior, pricing strategies, and technological innovations. By examining these factors, researchers aim to provide insights that inform pricing decisions, enhance market competitiveness, and improve consumer welfare in the laptop market.

3. EXISTING SYSTEM

In the realm of laptop pricing, the existing system typically revolves around a combination of factors, including market demand, production costs, competitive landscape, and consumer preferences. Here's an overview of the existing system:

- 1. Market Analysis:** Laptop manufacturers and retailers conduct extensive market analysis to understand current trends, consumer preferences, and competitive dynamics. This analysis involves studying sales data, conducting market research, and monitoring industry trends to identify opportunities and challenges in the market.

2. **Cost Analysis:** Manufacturers analyze production costs, including the cost of components, labor, and overhead expenses, to determine the cost of manufacturing each laptop model. This cost analysis serves as the foundation for setting the initial price of the laptop.
3. **Competitive Pricing:** Companies also consider the pricing strategies of their competitors when setting prices for their laptops. They may adopt competitive pricing strategies such as price matching, price undercutting, or premium pricing to position their products in the market relative to competitors.
4. **Segmentation and Positioning:** Laptop manufacturers often segment the market based on factors such as demographics, usage patterns, and price sensitivity. They then position their laptop models differently within these segments to appeal to different consumer preferences and price points.
5. **Promotions and Discounts:** Manufacturers and retailers frequently offer promotions, discounts, and bundle deals to stimulate demand and attract customers. These promotional activities may include limited-time discounts, special financing offers, or free accessories with the purchase of a laptop.
6. **Online Retail Platforms:** The proliferation of online retail platforms has transformed the way laptops are priced and sold. E-commerce websites offer consumers access to a wide range of laptop models from various brands, often with competitive pricing and user reviews to aid in purchasing decisions.
7. **Dynamic Pricing:** Some retailers employ dynamic pricing algorithms that adjust prices in real-time based on factors such as demand, inventory levels, and competitor prices. This dynamic pricing strategy allows retailers to optimize revenue and maximize profits in a dynamic market environment.
8. **Customer Feedback and Reviews:** Customer feedback and reviews play a crucial role in the pricing of laptops. Positive reviews and word-of-mouth recommendations can drive demand and justify premium pricing for certain laptop models, while negative reviews may prompt price adjustments or product improvements.

Overall, the existing system for laptop pricing is complex and multifaceted, involving a combination of market analysis, cost considerations, competitive strategies, and consumer behavior. By understanding these factors and leveraging data-driven insights, manufacturers and retailers can effectively price their laptops to meet the needs and preferences of consumers while maximizing profitability in a competitive market landscape.

4. PROPOSED SYSTEM

In proposing an improved system for laptop pricing, several innovative approaches can enhance the effectiveness and efficiency of pricing strategies for manufacturers, retailers, and consumers. Here's an outline of a proposed system:

1. **Data-Driven Pricing Models:** Implement advanced data analytics and machine learning algorithms to develop predictive pricing models. By analyzing historical sales data, market trends, and consumer behavior, these models can forecast demand and optimize pricing strategies to maximize revenue and profitability.

2. **Real-Time Market Monitoring:** Utilize advanced monitoring tools and algorithms to track competitor prices, consumer sentiment, and market dynamics in real-time. This enables companies to quickly adjust prices and promotions in response to changing market conditions and competitive pressures.
3. **Dynamic Pricing Optimization:** Implement dynamic pricing algorithms that continuously adjust prices based on factors such as demand elasticity, inventory levels, and competitor pricing. By dynamically optimizing prices, companies can capture maximum value from each transaction while maintaining competitiveness in the market.
4. **Personalized Pricing Strategies:** Develop personalized pricing strategies based on individual consumer preferences, purchase history, and browsing behavior. By leveraging data analytics and machine learning, companies can tailor pricing and promotional offers to specific customer segments, increasing customer satisfaction and loyalty.
5. **Transparency and Fairness:** Enhance transparency in pricing by providing clear explanations of pricing factors, discounts, and promotions to consumers. Adopt fair pricing practices that prioritize consumer trust and satisfaction, thereby fostering long-term relationships and brand loyalty.
6. **Value-Based Pricing:** Shift towards value-based pricing strategies that emphasize the unique value proposition of each laptop model. Highlight features, performance metrics, and benefits that resonate with target customers, allowing companies to justify premium prices based on perceived value.
7. Incorporate sustainability considerations into pricing decisions by assessing the environmental and social impacts of production processes and materials. Implement pricing strategies that reflect a commitment to sustainability, transparency, and ethical business practices.
8. **Continuous Improvement and Innovation:** Foster a culture of continuous improvement and innovation in pricing strategies by investing in research, technology, and talent development. Stay abreast of emerging trends, technologies, and consumer preferences to remain competitive in the rapidly evolving laptop market.

By adopting these proposed enhancements to the existing pricing system, companies can achieve greater accuracy, efficiency, and fairness in pricing laptops. By leveraging data-driven insights, real-time monitoring, personalized strategies, and a commitment to sustainability and innovation, companies can optimize pricing decisions to maximize value for both businesses and consumers in the dynamic laptop market landscape.

5.PROBLEM STATEMENT

Certainly! Here are a few potential problem statements related to laptop pricing that could be addressed using machine learning algorithms such as linear regression:

1. **Predictive Pricing Model Development:** "Developing a predictive pricing model for laptops based on their specifications and market trends to assist manufacturers and retailers in setting competitive prices."

2. **Price Elasticity Analysis:** "Investigating the price elasticity of demand for laptops across different market segments and product categories to optimize pricing strategies and maximize revenue."
3. **Dynamic Pricing Optimization:** "Designing an algorithm for dynamic pricing optimization in the laptop market to adjust prices in real-time based on market conditions, competitor pricing, and consumer demand."
4. **Personalized Pricing Strategies:** "Exploring personalized pricing strategies for laptops tailored to individual consumer preferences and purchasing behavior to improve customer satisfaction and loyalty."
5. **Competitor Price Monitoring:** "Developing a system for monitoring competitor prices and market trends in the laptop market using machine learning algorithms to inform pricing decisions and maintain competitiveness."
6. **Fair Pricing Practices:** "Investigating fair pricing practices in the laptop market and developing algorithms to ensure transparency, equity, and consumer trust in pricing strategies."
7. **Sustainable Pricing Solutions:** "Proposing sustainable pricing solutions for laptops that consider environmental and social impacts while maintaining profitability and competitiveness in the market."
8. **Price Prediction for New Products:** "Predicting optimal launch prices for new laptop models based on their specifications, market positioning, and consumer demand forecasts to maximize market penetration and revenue."

These problem statements encompass various aspects of laptop pricing, from predictive modeling and dynamic pricing optimization to fairness, sustainability, and market competitiveness. Addressing these challenges using machine learning algorithms like linear regression can lead to more informed pricing decisions, improved market performance, and enhanced customer satisfaction in the laptop market.

Advantages Of Proposed System

The proposed system leveraging linear regression for laptop pricing offers several advantages:

1. **Accuracy:** Linear regression models can provide accurate predictions of laptop prices based on historical data and relevant features. By analyzing the linear relationship between features and prices, the model can make precise price estimations, aiding manufacturers and retailers in setting competitive prices.
2. **Interpretability:** Linear regression models are straightforward to interpret, making it easy to understand the factors driving pricing decisions. Stakeholders can easily identify which features have the most significant impact on laptop prices, enhancing transparency and facilitating informed decision-making.
3. **Efficiency:** Linear regression models are computationally efficient, allowing for quick training and prediction times. This efficiency is particularly beneficial for dynamic pricing

optimization, where prices need to be adjusted in real-time based on market conditions and consumer demand.

4. **Scalability:** The proposed system can be scaled to accommodate large datasets and complex pricing scenarios. Linear regression models can handle a wide range of features and market variables, making them suitable for analyzing the pricing dynamics of different laptop models and market segments.
5. **Flexibility:** Linear regression models can be easily adapted and extended to incorporate additional features or refine pricing strategies. As market conditions evolve and new data becomes available, the system can be updated to reflect changing trends and consumer preferences.
6. **Transparency:** The use of linear regression models enhances transparency in pricing decisions by providing clear insights into the factors influencing laptop prices. Stakeholders can trust the pricing recommendations generated by the model, leading to greater confidence in the pricing system.
7. **Cost-Effectiveness:** Implementing linear regression models for laptop pricing is cost-effective compared to more complex machine learning algorithms. Linear regression requires less computational resources and data preprocessing, making it a practical choice for organizations with limited resources.
8. **Continuous Improvement:** The proposed system facilitates continuous learning and improvement through feedback mechanisms and model updates. By analyzing model performance and incorporating new data, the system can iteratively refine pricing strategies to adapt to changing market dynamics and consumer preferences.

Overall, the proposed system leveraging linear regression for laptop pricing offers a robust, interpretable, and efficient solution for optimizing pricing decisions and maximizing revenue in the competitive laptop market.

6. EXPERIMENTAL ANALYSIS

In conducting an experimental analysis of the proposed system leveraging linear regression for laptop pricing, several key aspects can be evaluated to assess its effectiveness and performance. Here's how the experimental analysis could be structured:

1. **Data Collection:** Gather a diverse dataset comprising historical sales data, laptop specifications, market trends, competitor pricing, and consumer reviews. Ensure the dataset is representative of the target market and covers a wide range of laptop models and features.
2. **Data Preprocessing:** Preprocess the dataset by handling missing values, encoding categorical variables, and scaling numerical features. Split the dataset into training and testing sets to evaluate the performance of the linear regression model.
3. **Feature Selection:** Identify the most relevant features for predicting laptop prices using techniques such as correlation analysis, domain knowledge, and feature importance scores. Select a subset of features to be used in the linear regression model.

4. **Model Training:** Train the linear regression model using the training set of data. Utilize techniques such as cross-validation to optimize model hyperparameters and ensure robust performance.
5. **Model Evaluation:** Evaluate the performance of the trained linear regression model using the testing set of data. Calculate metrics such as mean squared error (MSE), mean absolute error (MAE), and R-squared (R^2) value to assess how well the model fits the data and predicts laptop prices accurately.
6. **Dynamic Pricing Simulation:** Simulate dynamic pricing scenarios using the trained linear regression model. Adjust prices in real-time based on simulated market conditions, competitor pricing, and consumer demand. Evaluate the effectiveness of dynamic pricing strategies in maximizing revenue and profitability.
7. **Price Elasticity Analysis:** Analyze price elasticity and demand sensitivity for different market segments and product categories using the linear regression model. Determine how changes in prices impact demand and revenue, and identify optimal pricing strategies to maximize profitability.
8. **Comparative Analysis:** Compare the performance of the linear regression model with alternative pricing approaches or machine learning algorithms. Assess factors such as accuracy, interpretability, computational efficiency, and scalability to determine the strengths and limitations of the proposed system.
9. **Sensitivity Analysis:** Conduct sensitivity analysis to evaluate the robustness of the linear regression model to changes in input variables and market conditions. Assess how variations in feature values impact price predictions and pricing strategies.
10. **Real-world Validation:** Validate the performance of the linear regression model in real-world settings by deploying it in a live environment or conducting pilot tests with actual pricing data. Monitor model performance and gather feedback from stakeholders to assess its practical utility and effectiveness.

By conducting a comprehensive experimental analysis of the proposed system leveraging linear regression for laptop pricing, we can gain insights into its accuracy, efficiency, and suitability for optimizing pricing decisions in the competitive laptop market. This analysis enables us to refine the system, improve its performance, and ensure its alignment with business objectives and stakeholder needs.

Disadvantages

While the proposed system leveraging linear regression for laptop pricing offers several advantages, it also has some potential disadvantages that should be considered:

1. **Assumption of Linearity:** Linear regression assumes a linear relationship between the independent variables (features) and the dependent variable (price). This assumption may not hold true for complex pricing dynamics or nonlinear relationships between features and prices, leading to suboptimal predictions.

2. **Limited Complexity:** Linear regression is limited in its ability to capture complex patterns and interactions between features. It may struggle to model nonlinear relationships, interactions, and higher-order effects in the data, resulting in less accurate price predictions, especially in scenarios with high-dimensional data or heterogeneous market dynamics.
3. **Sensitivity to Outliers:** Linear regression can be sensitive to outliers in the data, which can skew the model's predictions and compromise its accuracy. Outliers may disproportionately influence the regression coefficients, leading to biased estimates and suboptimal pricing decisions.
4. **Underfitting:** Linear regression may underfit the data if the relationship between features and prices is too complex to be adequately captured by a linear model. This can result in poor generalization performance and inaccurate price predictions, particularly in scenarios with highly variable or noisy data.
5. **Limited Interpretability:** While linear regression models are relatively easy to interpret, they may lack the flexibility to capture subtle nuances and interactions in the data. Complex pricing dynamics and market factors may not be fully captured by linear regression, limiting the model's interpretability and the insights it can provide into pricing decisions.
6. **Inability to Handle Non-Normal Data:** Linear regression assumes that the residuals (errors) of the model are normally distributed. If the data violates this assumption, such as when dealing with non-normal or heteroscedastic data, the model's predictions may be biased or unreliable.
7. **Limited Dynamic Adaptability:** Linear regression models may struggle to adapt to rapidly changing market conditions and dynamic pricing environments. While they can be used for dynamic pricing optimization, they may not capture short-term fluctuations or nonlinear trends effectively, leading to suboptimal pricing decisions in dynamic markets.
8. **Data Requirements:** Linear regression models require a sufficiently large and representative dataset to accurately estimate model parameters and make reliable predictions. Gathering and preprocessing high-quality data can be resource-intensive and time-consuming, particularly for large-scale datasets or those with missing or noisy data.

Overall, while linear regression can be a useful tool for laptop pricing, it is essential to be aware of its limitations and consider alternative modeling approaches or techniques to address complex pricing dynamics and optimize pricing decisions effectively.

7. CONCLUSION

In conclusion, the proposed system leveraging linear regression for laptop pricing presents a practical and interpretable approach to optimize pricing decisions in the competitive laptop market. While linear regression offers advantages such as accuracy, efficiency, and transparency, it also has limitations that should be carefully considered.

Linear regression provides a straightforward framework for modeling the relationship between laptop features and prices, enabling stakeholders to make informed pricing decisions based on historical data and market trends. Its simplicity and interpretability make it an attractive choice for organizations seeking transparent and easy-to-understand pricing strategies.

However, linear regression may struggle to capture complex pricing dynamics, nonlinear relationships, and interactions between features, leading to suboptimal predictions and pricing decisions. It is essential to be aware of these limitations and supplement linear regression with additional techniques or algorithms to address these challenges effectively.

In practice, the proposed system can serve as a valuable tool for manufacturers, retailers, and consumers to optimize pricing strategies, maximize revenue, and enhance customer satisfaction in the competitive laptop market. By leveraging linear regression alongside other approaches, stakeholders can gain insights into pricing dynamics, identify opportunities for improvement, and make data-driven decisions that align with business objectives and stakeholder needs.

Overall, while linear regression is a useful tool in the pricing toolkit, it should be used judiciously and in conjunction with other methods to address the complexities of the laptop market comprehensively. By doing so, organizations can unlock the full potential of data-driven pricing strategies and stay competitive in the ever-evolving landscape of laptop pricing.

REFERENCES

1. "Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die" by Eric Siegel
2. "Priceless: The Myth of Fair Value (and How to Take Advantage of It)" by William Poundstone
3. "Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking" by Foster Provost and Tom Fawcett
4. "Machine Learning: A Probabilistic Perspective" by Kevin P. Murphy
5. "Pattern Recognition and Machine Learning" by Christopher M. Bishop
6. "Introduction to Machine Learning with Python: A Guide for Data Scientists" by Andreas C. Müller and Sarah Guido
7. "Marketing Analytics: Data-Driven Techniques with Microsoft Excel" by Wayne L. Winston
8. "Practical Predictive Analytics: Understanding and Applying Effective Predictive Modeling" by Ralph Winters
9. "Forecasting: Principles and Practice" by Rob J Hyndman and George Athanasopoul.
10. Ramdas Vankdothu, Dr.Mohd Abdul Hameed "A Security Applicable with Deep Learning Algorithm for Big Data Analysis", Test Engineering & Management Journal, January-February 2020
11. Ramdas Vankdothu, G. Shyama Chandra Prasad "A Study on Privacy Applicable Deep Learning Schemes for Big Data" Complexity International Journal, Volume 23, Issue 2, July-August 2019
12. Ramdas Vankdothu, Dr.Mohd Abdul Hameed, Husnah Fatima "Brain Image Recognition using Internet of Medical Things based Support Value based Adaptive Deep Neural Network" The International journal of analytical and experimental modal analysis, Volume XII, Issue IV, April/2020
13. Ramdas Vankdothu, Dr.Mohd Abdul Hameed, Husnah Fatima" Adaptive Features Selection and EDNN based Brain Image Recognition In Internet Of Medical Things " Journal of Engineering Sciences, Vol 11, Issue 4 , April/ 2020(UGC Care Journal)
14. Ramdas Vankdothu, Dr.Mohd Abdul Hameed "Implementation of a Privacy based Deep Learning Algorithm for Big Data Analytics", Complexity International Journal , Volume 24, Issue 01, Jan 2020
15. Ramdas Vankdothu, G. Shyama Chandra Prasad" A Survey On Big Data Analytics: Challenges, Open Research Issues and Tools" International Journal For Innovative Engineering and Management Research, Vol 08 Issue 08, Aug 2019
16. Ramdas Vankdothu, Dr.Mohd Abdul Hameed, Husnah Fatima" A Brain Tumor Identification and Classification

- Using Deep Learning based on CNN-LSTM Method” Computers and Electrical Engineering , 101 (2022) 107960
17. Ramdas Vankdothu, Mohd Abdul Hameed “Adaptive features selection and EDNN based brain image recognition on the internet of medical things”, Computers and Electrical Engineering , 103 (2022) 108338.
 18. Ramdas Vankdothu, Mohd Abdul Hameed, Ayesha Ameen, Raheem, Unnisa “ Brain image identification and classification on Internet of Medical Things in healthcare system using support value based deep neural network” Computers and Electrical Engineering, 102(2022) 108196.
 19. Ramdas Vankdothu, Mohd Abdul Hameed” Brain tumor segmentation of MR images using SVM and fuzzy classifier in machine learning” Measurement: Sensors Journal, Volume 24, 2022, 100440
 20. Ramdas Vankdothu, Mohd Abdul Hameed” Brain tumor MRI images identification and classification based on the recurrent convolutional neural network” Measurement: Sensors Journal, Volume 24, 2022, 100412 .
 21. Bhukya Madhu, M. Venu Gopala Chari, Ramdas Vankdothu, Arun Kumar Silivery, Veerender Aerranagula ” Intrusion detection models for IOT networks via deep learning approaches ” Measurement: Sensors Journal, Volume 25, 2022, 10064
 22. Mohd Thousif Ahemad, Mohd Abdul Hameed, Ramdas Vankdothu” COVID-19 detection and classification for machine learning methods using human genomic data” Measurement: Sensors Journal, Volume 24, 2022, 100537
 23. S. Rakesh ^a, Nagaratna P. Hegde ^b, M. Venu Gopalachari ^c, D. Jayaram ^c, Bhukya Madhu ^d, Mohd Abdul Hameed ^a, Ramdas Vankdothu ^e, L.K. Suresh Kumar “Moving object detection using modified GMM based background subtraction” Measurement: Sensors, Journal, Volume 30, 2023, 100898
 24. Ramdas Vankdothu, Dr. Mohd Abdul Hameed, Husnah Fatima “Efficient Detection of Brain Tumor Using Unsupervised Modified Deep Belief Network in Big Data” Journal of Adv Research in Dynamical & Control Systems, Vol. 12, 2020.
 25. Ramdas Vankdothu, Dr. Mohd Abdul Hameed, Husnah Fatima “Internet of Medical Things of Brain Image Recognition Algorithm and High Performance Computing by Convolutional Neural Network” International Journal of Advanced Science and Technology, Vol. 29, No. 6, (2020), pp. 2875 – 2881

BIBLIOGRAPHY



I am Maliha Fathima from Department of Computer Science and Engineering. Currently, pursuing 4th year at Balaji Institute of Technology and Science. My research is done based on “LAPTOP PRICE COMPARISON USING MACHINE LEARNING”.



I am D. Santhosh from Department of Computer Science and Engineering. Currently, pursuing 4th year at Balaji Institute of Technology and Science. My research is done based on “LAPTOP PRICE COMPARISON USING MACHINE LEARNING”.



I am Mohammed Mubeen Sohel from Department of Computer Science and Engineering. Currently , pursuing 4th year at Balaji Institute of Technology and Science .My research is done based on “LAPTOP PRICE COMPARISION USING MACHINE LEARNING ”.



I am Mohammed Sufiyan UIHauqe from Department of Computer Science and Engineering. Currently , pursuing 4th year at Balaji Institute of Technology and Science .My research is done based on “LAPTOP PRICE COMPARISION USING MACHINE LEARNING ”.