

AI And Cloud-Enabled Smart E-Commerce Platform for Empowering Rural Artisans

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Abstract— Rural artisans play a significant role in preserving cultural heritage and contributing to the economy, especially in developing countries like India. However, they face challenges such as limited market access, lack of digital knowledge, and dependence on intermediaries. This paper proposes an AI and cloud-enabled smart e-commerce platform designed to empower rural artisans by providing direct access to customers. The system integrates Artificial Intelligence techniques such as image recognition, demand forecasting, dynamic pricing, and recommendation systems to improve business efficiency. Cloud computing ensures scalability, secure storage, and accessibility even in remote areas. The platform includes artisan, customer, and admin modules, enabling seamless interaction and efficient management. This solution aims to increase artisans' income, reduce dependency on middlemen, and promote sustainable economic growth.

Index Terms— Artificial Intelligence, Cloud Computing, E-Commerce, Rural Artisans, Recommendation System

I. INTRODUCTION

In the modern digital era, e-commerce has become one of the most powerful platforms for buying and selling goods and services. With the rapid growth of internet connectivity and smartphone usage, online marketplaces have expanded significantly, enabling businesses to reach customers across geographical boundaries. Large-scale platforms provide features such as secure payments, fast delivery, and personalized recommendations, which enhance the overall shopping experience.

However, despite these advancements, rural artisans and small-scale producers continue to face numerous challenges in accessing digital marketplaces. These artisans play a crucial role in preserving traditional crafts, cultural heritage, and local economies. Yet, their products are often limited to local markets due to lack of awareness, insufficient digital infrastructure, and dependency on intermediaries. Middlemen frequently purchase products at low prices and sell them at higher margins, resulting in reduced profits for artisans.

Another major challenge is the lack of technical knowledge among rural artisans. Many artisans are not familiar with digital tools, online product listing, or marketing strategies. Existing e-commerce platforms are often complex and competitive, making it difficult for small sellers to gain visibility. Additionally, manual processes such as product categorization, pricing decisions, and inventory management create inefficiencies and reduce productivity.

To overcome these limitations, there is a growing need for an intelligent and user-friendly digital platform that specifically addresses the requirements of rural artisans. Recent advancements in technologies such as Artificial Intelligence (AI) and Cloud Computing provide promising solutions to these challenges. AI can automate tasks like product classification, recommendation generation, and demand prediction, thereby reducing manual effort and improving accuracy. Cloud computing enables scalable

infrastructure, secure data storage, and remote accessibility, making it suitable for large-scale deployment.

In this context, the proposed system introduces an AI and Cloud-Enabled Smart E-Commerce Platform designed to empower rural artisans by providing direct access to customers. The platform integrates intelligent features such as image-based product categorization, personalized recommendation systems, demand forecasting, and dynamic pricing strategies. These features help artisans make informed decisions regarding product management and marketing. Furthermore, the system aims to eliminate the role of intermediaries by establishing a direct connection between artisans and customers. This not only improves profit margins for artisans but also enhances transparency and trust in transactions. Customers benefit from access to unique handmade products along with personalized shopping experiences.

The proposed platform is developed using modern web technologies and deployed on cloud infrastructure to ensure scalability, reliability, and security. It supports multiple users simultaneously and provides a simple interface that can be easily used even by individuals with limited technical knowledge.

Overall, this research focuses on bridging the gap between traditional craftsmanship and modern digital commerce. By leveraging AI and cloud technologies, the system aims to promote digital inclusion, support rural entrepreneurship, and contribute to sustainable economic development.

II. LITERATURE SURVEY

AI-Based Smart E-Commerce Platforms

Rao et al. [1] proposed a smart e-commerce platform designed to connect rural producers with customers through a digital marketplace. The system provides basic functionalities such as product listing, order management, and payment integration. It helps improve accessibility for

artisans and enables them to reach a wider audience. However, the system lacks advanced AI-based features such as recommendation systems and demand forecasting, which limits its ability to support intelligent decision-making and personalized user experience.

Demand Forecasting Using Machine Learning

Banerjee and Roy [2] proposed an AI-driven demand forecasting model using machine learning techniques. Their system analyzes historical sales data and predicts future product demand, which helps in better inventory management and reduces stock shortages. Although the model improves operational efficiency, it mainly focuses on structured retail environments and does not address challenges faced by rural artisans such as limited data availability and digital awareness.

Cloud-Based E-Commerce Systems

Kumar and Iyer [3] explored the integration of Artificial Intelligence with cloud computing in e-commerce platforms. Their system emphasizes scalable cloud infrastructure, real-time analytics, and dynamic pricing strategies. Cloud deployment ensures high availability and flexibility in handling large datasets. However, the proposed system does not focus on providing a user-friendly interface suitable for non-technical users, especially in rural areas.

Digital Platforms for Rural Artisans

Sathiyapriya et al. [4] developed a digital platform aimed at empowering rural artisans by connecting them directly with customers. The system reduces dependency on intermediaries and improves transparency in transactions. It also provides basic recommendation features and data analytics tools. However, it lacks advanced AI implementation and scalability mechanisms required for large-scale deployment.

III. PROPOSED METHOD

The proposed system introduces an AI and cloud-enabled smart e-commerce platform designed to provide a unified digital marketplace for rural artisans. The system enables artisans to directly connect with customers, eliminating intermediaries and improving profit margins. It supports various functionalities such as product listing, browsing, ordering, and secure transactions. The integration of Artificial Intelligence enhances system intelligence by providing automated product categorization, personalized recommendations, and demand forecasting. Cloud computing is used to ensure scalability, reliability, and secure data management. The overall architecture of the system is designed to handle multiple users efficiently and support real-time processing of data. The platform is developed using modern web technologies for user interaction, while backend processing is handled through server-side scripting and database management systems. The AI modules are integrated to analyze user behavior and product data, which improves decision-making and enhances user experience. The system architecture is illustrated in Fig.

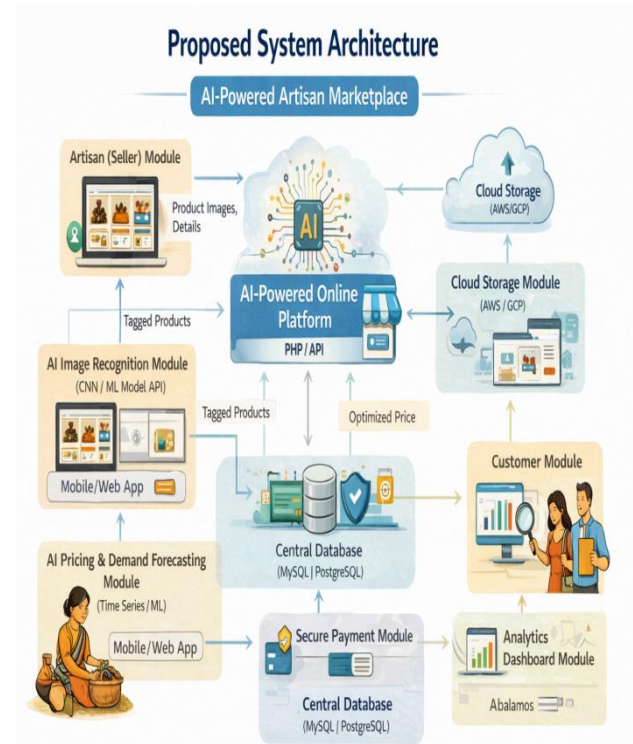


Figure 1: System architecture

A. Presentation Layer

The presentation layer acts as the interface between the users and the system, providing all necessary functionalities in an easy-to-use format. It is developed using front-end technologies such as HTML, CSS, and JavaScript to ensure responsiveness and user-friendliness. This layer allows artisans to register, log in, upload product details including images and descriptions, and manage their product listings effectively. Customers can browse products, apply search filters, view product details, and place orders through a simple and interactive interface. The design focuses on simplicity and accessibility so that even users with minimal technical knowledge, especially rural artisans, can easily operate the platform without facing difficulties.

B. Application Layer

The application layer is responsible for handling the core logic and operations of the system. It processes user requests, manages communication between the presentation layer and the data layer, and ensures smooth execution of system functionalities. This layer is implemented using backend technologies such as PHP and integrates Artificial Intelligence modules developed using Python. The AI components include a recommendation system that analyzes user behavior and purchase patterns to suggest relevant products, and an image recognition system that automatically classifies products into categories. Additionally, this layer manages order processing, user authentication, and system control functions. It plays a crucial role in maintaining system efficiency and ensuring that all processes are executed accurately and quickly.

C. Data Layer

The data layer is responsible for storing, retrieving, and managing all the information required for the system. It includes user data, product details, transaction records, and system logs. A MySQL database is used to store structured data efficiently, while cloud storage is utilized to handle large volumes of data and provide scalability. This layer ensures data security, consistency, and reliability by implementing proper data management techniques. It also supports backup and recovery mechanisms to prevent data loss. By using cloud-based storage, the system can handle increasing numbers of users and transactions without affecting performance, making it suitable for large-scale deployment.

IV. PROPOSED ALGORITHM

The proposed algorithm defines the complete workflow of the AI and cloud-enabled smart e-commerce platform. It integrates user interaction, Artificial Intelligence techniques, and cloud-based data management to provide an efficient and intelligent system for rural artisans. The algorithm focuses on automating product categorization, generating personalized recommendations, forecasting demand, and processing transactions in a structured manner.

Initially, the system starts with user registration and authentication. Users are categorized into three roles: artisan, customer, and administrator. Each user logs into the system using secure credentials, and access is provided based on their role. Once authenticated, artisans can upload product details including product name, category, description, price, and images. The uploaded product images are processed by an image recognition module, which uses machine learning techniques to automatically classify products into appropriate categories. This reduces manual work and ensures consistency in product organization.

On the customer side, users interact with the system by browsing and searching for products using various filters such as category, price, and popularity. The recommendation system continuously analyzes user behavior, including browsing history, search patterns, and previous purchases. Based on this analysis, the system generates personalized product recommendations to improve user engagement and satisfaction. Additionally, the system applies demand forecasting techniques on historical sales data to identify trending products and predict future demand, which helps artisans optimize their production and pricing strategies.

When a customer selects a product, it is added to the cart, and the user proceeds to place an order. The system verifies product availability and processes the transaction securely. After successful payment, the order details are stored in the cloud database, and the artisan is notified about the purchase. The system updates inventory levels automatically and maintains transaction records for future reference.

The administrator plays a crucial role in monitoring and managing the overall system. The admin oversees user activities, verifies product listings, manages disputes, and ensures the smooth functioning of the platform. The cloud infrastructure supports scalability by handling multiple

users simultaneously and provides secure storage with backup and recovery mechanisms.

Overall, the proposed algorithm ensures efficient coordination between different modules of the system while improving performance, accuracy, and user experience through the integration of Artificial Intelligence and cloud technologies.

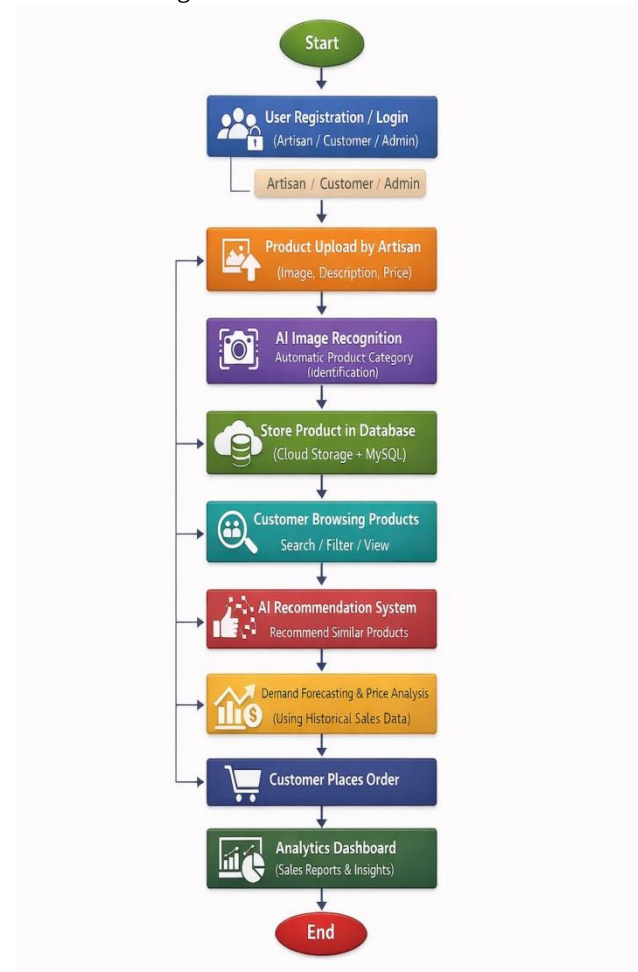


Figure 2: proposed algorithm

Algorithm Steps

1. Start
2. Initialize system and database connection
3. User registers and logs into the system
4. Identify user role (Artisan / Customer / Admin)
5. If user is Artisan:
 - Enter product details (name, price, description)
 - Upload product image
 - Apply image preprocessing
 - Use AI model for product classification
 - Store product data in cloud database
6. If user is Customer:
 - Browse and search products
 - Apply filters (category, price, popularity)
 - Track user behavior (clicks, views, purchases)
 - Generate personalized recommendations
 - Display recommended products
7. Apply Demand Forecasting:

- Analyze historical sales data
 - Predict future demand trends
 - Suggest pricing strategies
8. Customer selects product and adds to cart
 9. Verify product availability
 10. Process payment transaction securely
 11. Store order details in database
 12. Update product inventory
 13. Notify artisan about the order
 14. Admin monitors system activities and manages users
 15. End

V. RESULT AND DISCUSSION

The proposed AI and cloud-enabled smart e-commerce platform was tested to evaluate its performance, efficiency, and usability. The system was implemented using web technologies such as HTML, CSS, and JavaScript for the front end, PHP for backend processing, and MySQL for database management. Artificial Intelligence modules were developed using Python, and cloud services were used to ensure scalable data storage and system accessibility.

The simulation was carried out by creating multiple user accounts, including artisans, customers, and administrators. Artisans uploaded various products with images and descriptions, which were automatically categorized using the image recognition module. The classification results showed good accuracy, reducing manual effort in organizing products. Customers were able to browse products, apply filters, and receive personalized recommendations based on their behavior and preferences.

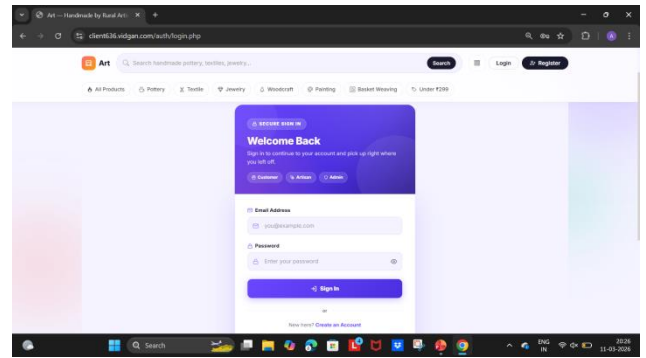


Figure 5: Artisan & Customer login page

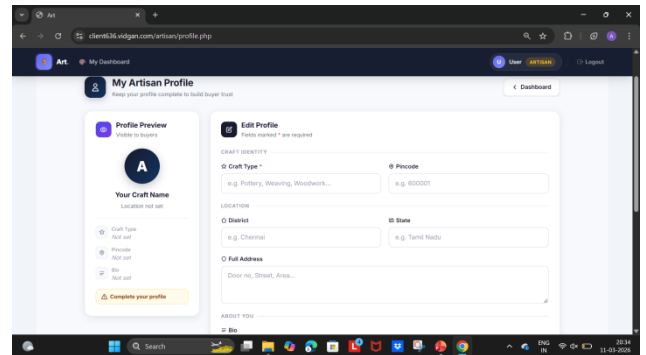


Figure 6: Artisan profile page

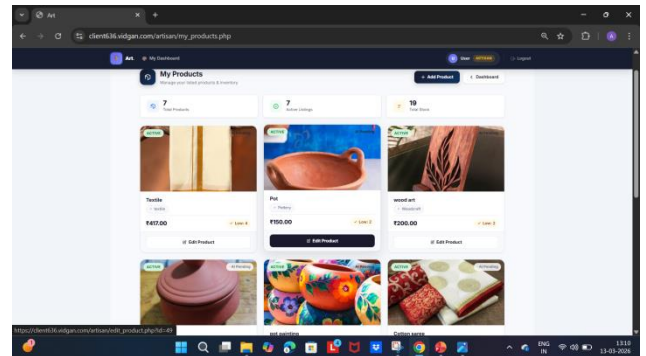


Figure 7: Products management interface

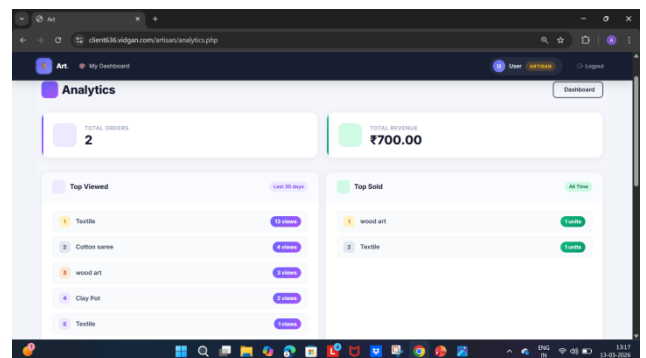


Figure 8: Artisan analytics dashboard

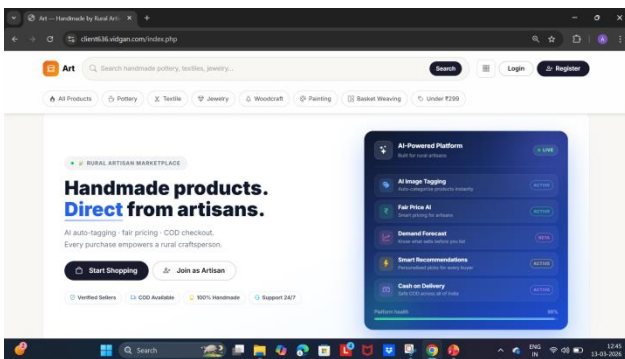


Figure 3: System home page

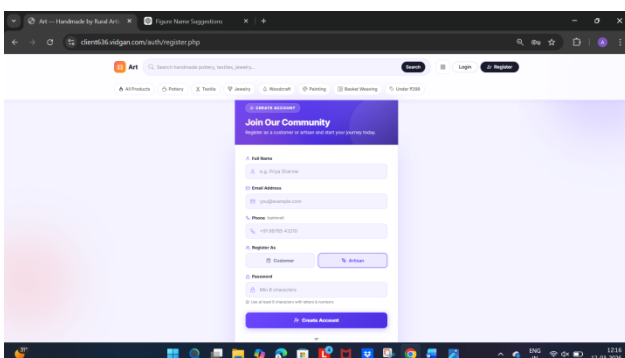


Figure 4: Artisan and Customer registration page

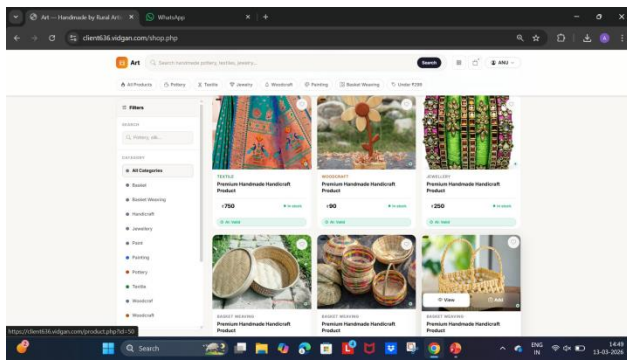


Figure 9: Products online marketplace interface for customers

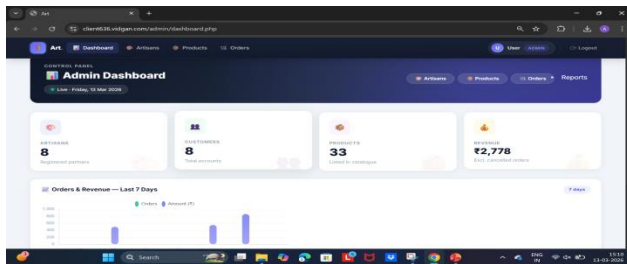


Figure 10: Admin Dashboard

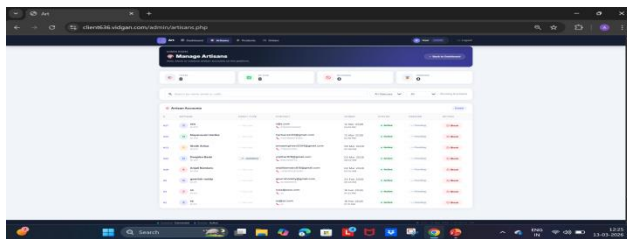


Figure 11: List of Artisans registered in Admin Dashboard

The recommendation system was tested by analyzing user activity such as search history and previous purchases. The results indicated that the system successfully suggested relevant products, improving user engagement and satisfaction. Demand forecasting was also evaluated using historical data, and the system was able to predict trending products, helping artisans plan their production and pricing strategies more effectively.

The system performance was analyzed based on response time, data retrieval speed, and scalability. The cloud-based infrastructure ensured that the system handled multiple users simultaneously without significant delays. Data storage and retrieval operations were performed efficiently, and the system maintained consistency and reliability even under increased load conditions.

The simulation results demonstrate that the proposed system effectively improves product visibility, enhances customer experience, and supports rural artisans in accessing digital markets. The integration of Artificial Intelligence and cloud computing significantly increases system efficiency and reliability. Overall, the platform provides a scalable and intelligent solution for modern e-commerce applications.

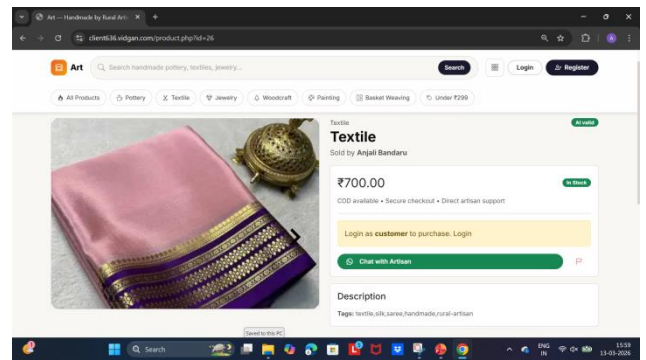


Figure 12: Automatic Description given to products after publishing

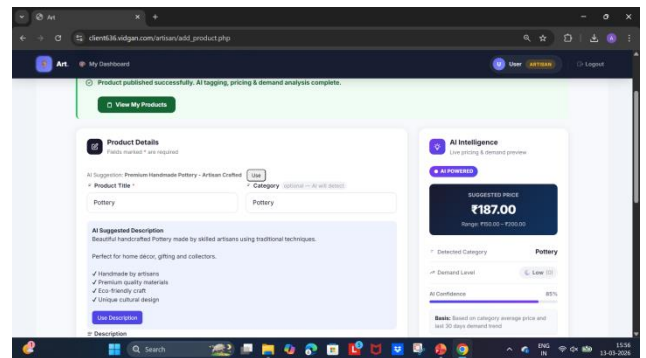


Figure 13: Fair Price Predication for Product

VI. CONCLUSION

The proposed e-commerce platform effectively integrated all its modules to create a functional and intelligent system for rural artisans. The artisan module allowed artisans to register, upload products, and set base prices, while the AI image recognition module automatically identified product types and key features. The AI recommendation engine suggested relevant products to customers, and the pricing & demand forecasting module recommended fair prices and predicted demand to help artisans plan production. The AI powered online platform connected artisans, AI modules, and customers, ensuring smooth communication. The customer module offered an easy-to-use shopping interface with multi-language support, and the analytics dashboard helped administrators monitor sales and customer behavior. The Cloud storage module securely stored all data, enabling access from anywhere with internet connectivity. By eliminating middlemen, artisans can earn higher profits while customers can pay fair prices, promoting traditional crafts, reducing rural unemployment, and supporting sustainable livelihoods. Overall, the platform demonstrates how modern technologies such as AI, cloud computing, and web development can be integrated to create a scalable and intelligent digital marketplace. By bridging the digital gap between rural artisans and global consumers, the paper contributes to digital empowerment, economic growth, and sustainable development. The platform proves that AI-driven cloud solutions can transform traditional markets into efficient, data-driven ecosystems.

REFERENCE

- [1] Dr. K. Venkateswara Rao, V. Hemalatha, Y. Harshitha, D. Hari Priya, "AGROCRAFT: A Smart E-Commerce Platform for Farmers & Artisans," International Journal of Advanced Research in Computer and Communication Engineering, ISSN (O) 22781021, Vol. 14, Issue 3, pp.401-407, 2025.
- [2] Dr. A. Banerjee, Dr. S. Roy, Dr. P. Singh, Dr. N. Gupta, "AI-Driven Sales Forecasting Models Using Advanced Time-Series Algorithms for E-Commerce Demand Prediction," International Journal of Advanced Computer Science and Applications, ISSN (O) 2158-5574, Vol. 16, Issue 2, pp. 112-125, 2025.
- [3] Gundu, Srinivasa Rao, et al. "Emerging Computational Challenges in Cloud Computing and RTEAH Algorithm Based Solution." Journal of Ambient Intelligence and Humanized Computing, vol. 13, no. 9, Sept. 2022, pp. 4249–63.
- [4] Dr. V. Sathiyapriya, Dr. R. Kumar, Dr. S. Devi, Dr. P. Rajan, "Empowering Rural Craftsmanship Through AI-Enabled Market Linkage," International Journal of Computer Applications, ISSN (O) 0975-8887, Vol. 182, Issue 45, pp. 23-30, 2024.
- [5] Gundu, Srinivasa Rao, et al. "Robotic Technology-Based Cloud Computing for Improved Services." SN Computer Science, vol. 1, no. 4, July 2020, p. 190.
- [6] Dr. M. Ahmed, Dr. F. Khan, Dr. A. Ali, Dr. S. Rahman, "Microservices-Based Cloud Architecture for Scalable Digital Marketplaces," IEEE Transactions on Cloud Computing, ISSN (O) 2329-6096, Vol. 12, Issue 2, pp. 301-315, 2024.
- [7] Dr. D. Gaikwad, Dr. S. Pawar, Dr. R. Jadhav, Dr. N. More, "Integration of Artificial Intelligence in Modern E-Commerce Platforms," International Journal of Engineering Research & Technology, ISSN (O) 2278-0181, Vol. 12, Issue 5, pp. 789-798, 2023.
- [8] Dr. R. Sharma, Dr. V. Gupta, Dr. A. Singh, Dr. P. Jain, "AI-Based Recommendation Systems Using Collaborative Filtering for Digital Retail Platforms," Expert Systems with Applications, ISSN (O) 0957-4174, Vol. 215, Art. 119345, pp. 1-15, 2023.
- [9] Dr. Y. Li, Dr. H. Chen, Dr. J. Wang, Dr. L. Zhang, "Application of Computer Vision Techniques for Automated Product Classification in E-Commerce Platforms," Neural Computing and Applications, ISSN (O) 0941-0643, Vol. 35, Issue 12, pp. 8923-8937, 2023.
- [10] Dr. S. Ghosh, Dr. R. Das, Dr. P. Sen, Dr. A. Mukherjee, "Impact of Digital Platforms on Rural Artisan Livelihoods: A Direct-to-Customer Market Access Study," Journal of Rural Studies, ISSN (O) 0743-0167, Vol. 98, pp. 145-156, 2022.
- [11] Dr. G. Xie, Dr. J. Abdelhamid, Dr. L. Zhao, Dr. K. Wu, "Cloud farming: A potential innovative model for rural e-commerce," Journal of Social Systems and Policy Analysis, ISSN (O) 2811-347X, Vol. 2, No. 2, pp. 91-93, doi:10.62762/JSSPA.2025.117344, 2025.
- [12] Dr. A. Shaikh, Dr. M. Khan, Dr. R. Patel, "E-commerce and rural India: Challenges and opportunities for market inclusion," Young Researcher, ISSN (O) 2349-5228, Vol. 14, No. 1C, pp. 274-279, doi:10.5281/zenodo.14936612, 2025.
- [13] Gundu, Srinivasa Rao, et al. "High-Performance Computing-Based Scalable 'Cloud Forensics-as-a-Service' Readiness Framework Factors—A Review." Cyber Security and Network Security, edited by Sabyasachi Pramanik et al., 1st ed., Wiley, 2022, pp. 27–45.
- [14] Dr. M. Nawaz, Dr. M. I. K. Babar, Dr. S. Ahmed, Dr. F. Iqbal, "IoT and AI for smart agriculture in resource-constrained environments: Challenges, opportunities and solutions," Discovery Internet of Things, ISSN (O) 2730-7182, Vol. 5, Art. 24, doi:10.1007/s43926-025-00119-3, 2025.
- [15] Dr. R. Arora, Dr. S. Verma, Dr. P. Joshi, "AI and sustainability in e-commerce: An integrated approach," Journal of Artificial Intelligence & Cloud Computing, ISSN (O) 2834-439X, Vol. 4, Issue 1, pp. 56-67, 2024.