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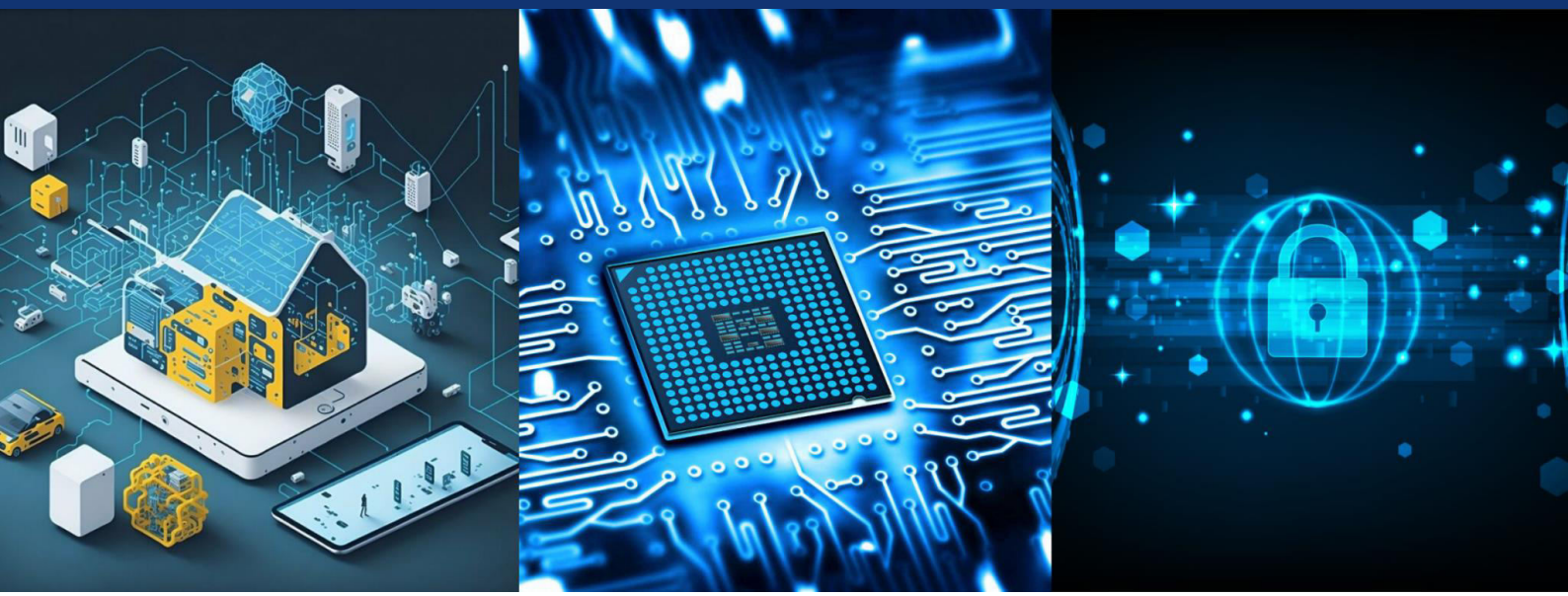

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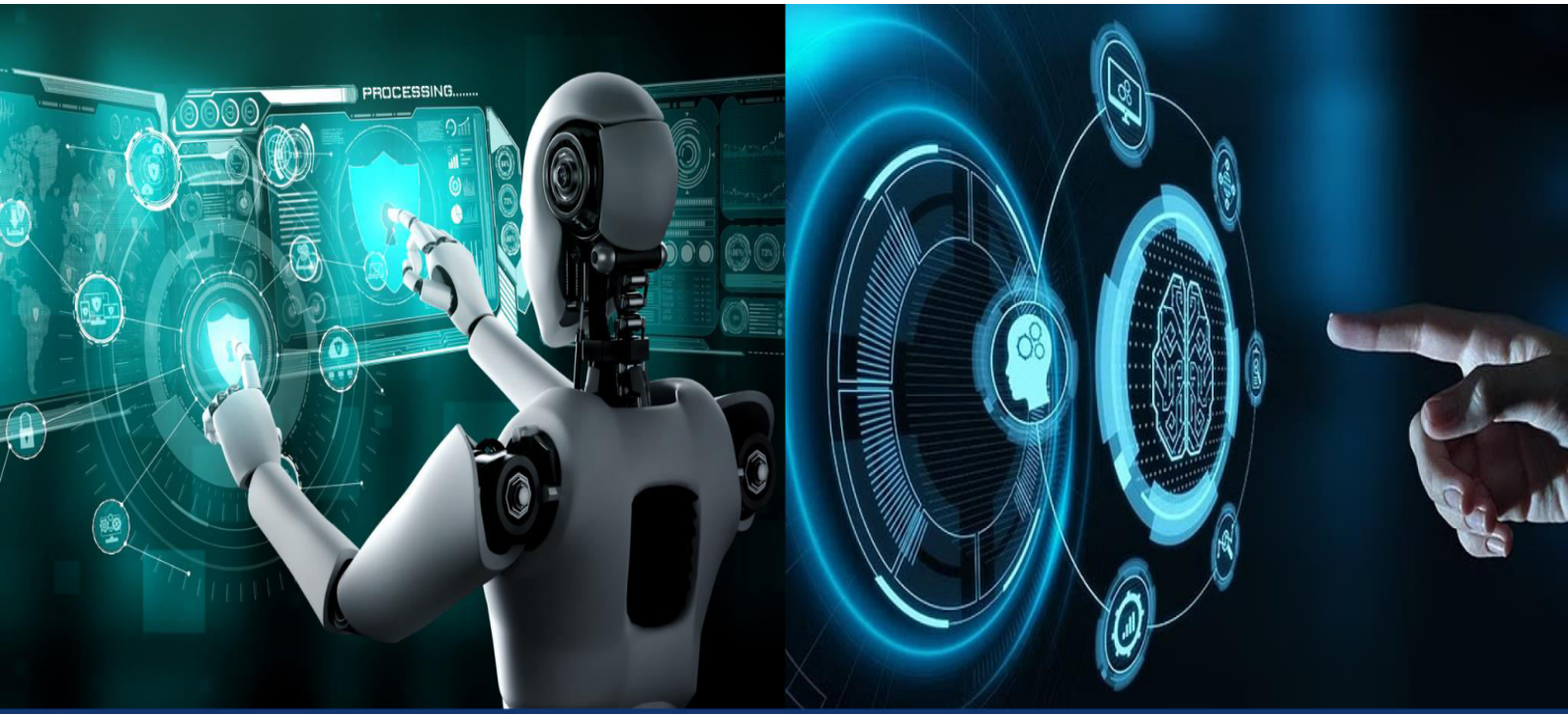

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AI-Integrated Application for Direct Market Access for Farmers

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ABSTRACT: The proposed Smart Direct Market Platform for Farmers aims to improve transparency, efficiency, and fairness in agricultural trading through an intelligent automated system that facilitates the sale of vegetables directly to consumers. The platform incorporates machine learning-based image grading and dynamic market-driven pricing, enabling farmers to upload produce images that are automatically classified into Grade 1, 2, 3, 4, or 5 based on visual quality. This automated grading mechanism replaces manual inspection and ensures reliable, consistent, and accurate assessment. Alongside grading, the system utilizes dynamic pricing informed by live market data or simulated price generation. By associating grade with price (100% for Grade 1, 80% for Grade 2, and 60% for Grade 3), the platform delivers fair and transparent valuation for farmers. A user-friendly interface allows farmers to register, upload produce, and publish listings, while consumers browse vegetables, view grades, and place direct orders. By integrating machine learning with a digital marketplace, the platform supports economic empowerment, reduces reliance on intermediaries, and strengthens trust between producers and consumers. The solution is lightweight, intuitive, and employs technologies like PyTorch for training and SQLite3 for data management, promoting accessibility for users with varying digital skills. Ultimately, this project presents a proactive response to limitations in agricultural markets, promoting transparency, fairness, and economic independence while creating a community-focused digital ecosystem connecting farmers and consumers directly. This enhances usability, scalability, adoption, sustainability, inclusivity, resilience, affordability, accountability, and long-term reliability for rural communities nationwide.

KEYWORDS: Direct Market Access; Machine Learning; Automated Grading; Dynamic Pricing; Agriculture; Farmer Empowerment

I. INTRODUCTION

Agricultural trading in traditional markets is often characterized by the involvement of multiple intermediaries, inconsistent pricing, and subjective quality assessment. These challenges restrict farmers from earning fair compensation and create dependency on manual systems that lack transparency. Due to the absence of standardized grading techniques and reliable pricing mechanisms, farmers face difficulties in determining the true value of their produce, leading to reduced profit margins and limited market access.

To address these issues, the proposed AI-Integrated Direct Market Platform introduces an automated and intelligent solution aimed at transforming agricultural marketing practices. The platform incorporates machine learning–based image grading to categorize vegetables into quality levels and applies dynamic pricing based on market trends. By enabling farmers to upload produce images and receive instant grading and valuation, the system ensures accuracy, consistency, and fairness compared to manual methods.

The primary objective of this platform is to empower farmers economically, eliminate intermediary influence, and enhance transparency in agricultural trading. The system offers a user-friendly interface for farmers and consumers, facilitating direct transactions and fostering a trustworthy digital marketplace. By integrating modern technologies such as PyTorch for model training and SQLite3 for backend management, the platform supports efficient data handling, accessibility, and scalability—making it a practical approach to modernizing agricultural operations and promoting sustainable digital agriculture.

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II. RELATED WORK

Researchers have explored several methods to improve transparency, pricing fairness, and automated quality assessment in agricultural markets through digital technologies and AI-driven systems. Traditional trading mechanisms rely heavily on manual grading and negotiation, which often introduce subjectivity and inconsistencies in produce valuation. Studies in [1] emphasize the potential of machine learning and computer vision for automating fruit and vegetable grading, where image-based classification significantly reduces human bias and enhances accuracy. Convolutional neural networks and deep learning models have been used to classify produce based on texture, shape, and color, demonstrating reliable performance in quality detection. Research in [2] focuses on dynamic pricing systems that align commodity prices with real-time market demand rather than fixed price charts, benefiting farmers by reflecting actual market conditions. Digital marketplace solutions in [3] attempt to eliminate intermediaries by enabling direct transactions between farmers and consumers but often lack integrated automated grading or standardized pricing. Blockchain-based frameworks in [4] introduce secure and transparent transaction tracking in agricultural supply chains, although complexity and deployment costs hinder widespread adoption. Mobile applications using AI for crop disease detection and yield prediction presented in [5] illustrate the effectiveness of machine learning in agriculture, yet these solutions primarily target production rather than market transparency. Smartphone-based grading tools developed in [6] employ deep learning to provide portable quality assessment; however, many rely on stable internet and advanced devices, limiting usability in rural areas. Predictive analytics for agricultural pricing in [7] use historical trends and seasonal factors but generally do not account for real-time quality variations. The proposed AI-Integrated Direct Market Platform builds upon these contributions by combining automated image-based grading and dynamic pricing within a unified digital marketplace, addressing limitations found in earlier research. Unlike prior works that isolated grading or pricing individually, this system integrates both processes to enhance fairness and transparency. By leveraging machine learning for quality classification and assigning price percentages based on grade, the platform ensures accurate valuation and minimizes intermediary influence. Its direct farmer-to-consumer model promotes trust, increases profitability, and supports accessibility through lightweight interfaces suitable for varied digital literacy levels. Consequently, this work advances existing methodologies by providing a comprehensive, scalable, and practical approach to modernizing agricultural trading and establishing equitable, technology-driven market ecosystems.

III. PROPOSED ALGORITHM

A. *Design Considerations:*

Vegetable images captured by farmers serve as input for automated grading. Each uploaded image is preprocessed to enhance clarity and remove noise. The machine learning model is trained using labeled datasets of vegetables categorized into quality grades. The algorithm extracts key visual features such as color, texture, and shape. SQLite3 is used for storing user profiles, produce listings, and pricing details. Dynamic pricing is linked to the grade classification with percentages assigned to each grade. The interface supports direct interaction between farmers and consumers. Network constraints like bandwidth or device type are not considered since the solution is designed to be lightweight and compatible with basic systems. Image resolution beyond a threshold is not required for grading. The time taken for classification and price assignment determines responsiveness.

B. *Description of the Proposed Algorithm:*

The aim of the proposed algorithm is to automate produce grading and price assignment by combining machine learning with digital marketplace operations, providing direct access to consumers. The algorithm consists of three main stages.

Step 1: Image Acquisition and Preprocessing:

Farmers upload vegetable images through the application. The system validates input format and performs preprocessing steps such as resizing, background removal, and normalization. Feature extraction is performed to detect relevant attributes, and the image is passed to the trained model. The model predicts the grade of the produce based on visual features. Grades are mapped as Grade 1, Grade 2, Grade 3, Grade 4, or Grade 5.

Step 2: Pricing Criteria:

Once grading is complete, the system assigns pricing based on predefined grade percentages linked to market value. For example, Grade 1 receives full price, Grade 2 receives 80%, and Grade 3 receives 60%. Grade 4 and Grade 5 receive lower percentages depending on quality. If the model's confidence score falls below a threshold, the image is

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flagged for re-evaluation. The assigned price is automatically calculated and displayed. Farmers may review the grade and price, and listings are published for consumers. Repeated submission of identical images is restricted to prevent misuse. Dynamic pricing adjusts when new market values change. The application maintains fairness by ensuring consistency.

Step 3: Marketplace Integration and Listing:
After price assignment, the produce record is stored in SQLite3 with metadata including farmer ID, crop type, grade, and price. The listing is displayed in the marketplace for consumers. Orders placed by consumers reduce stock and trigger purchase confirmation. Feedback data is stored to improve future decisions. The system logic ensures smooth transitions between grading, pricing, and listing. If produce is unavailable, the listing is removed.

IV. PSEUDO CODE

Step 1: Capture and upload vegetable image.
Step 2: Preprocess and normalize image.
Step 3: Extract features using ML model.
Step 4: Predict grade and verify confidence threshold.
Step 5: Assign price using dynamic grade mapping.
Step 6: Publish listing to marketplace.
Step 7: Enable consumer purchase and confirmation.
Step 8: Update database and end process.
The algorithm improves transparency and fairness in produce valuation, reduces dependency on intermediaries, and supports economic empowerment.

V. METHODOLOGY

The methodology followed in this project consists of a structured sequence of stages designed to implement an intelligent, automated, and transparent agricultural marketplace. The first stage involves the collection of a vegetable image dataset, where multiple samples of produce in varying quality levels are gathered and labeled according to Grade 1, Grade 2, Grade 3, Grade 4, and Grade 5 categories. These images are preprocessed to ensure consistency by resizing them to standard dimensions, normalizing pixel values, and reducing noise or background distractions. This dataset is then used for training a machine learning model implemented in PyTorch, where convolutional neural networks are applied to identify distinguishing visual characteristics such as texture, color uniformity, shape, and visible defects.

The second stage focuses on model training and validation. The collected dataset is partitioned into training and testing subsets, and the model is subjected to iterative training cycles. During this process, loss functions and accuracy metrics are monitored to adjust model parameters until the grading performance is satisfactory. Once trained, the model is integrated into the system to classify images uploaded by farmers and generate grade predictions in real time.

The third stage involves implementing dynamic pricing, where each grade is mapped to a percentage of the market value: Grade 1 corresponds to full price, Grade 2 to 80%, Grade 3 to 60%, and progressively lower for Grades 4 and 5. The pricing module retrieves market value either through live market feeds or simulated pricing logic. The calculated price, along with the assigned grade, is automatically updated in the listing interface.

The fourth stage focuses on database and interface development. SQLite3 is used to store farmer profiles, produce listings, grade results, pricing, and transaction data. The user interface is developed to enable simple registration and login, image upload, listing management, and consumer browsing.

Finally, the evaluation phase assesses system performance based on grading accuracy, price fairness, usability, and response time. User feedback and test cases are used to validate reliability and accessibility. The methodology ensures a complete cycle—from data acquisition and model training to pricing and marketplace integration—resulting in a functional and scalable digital solution for direct agricultural trading.

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VI. EXPERIMENTAL RESULTS

The experimental evaluation of the AI-Integrated Direct Market Platform was conducted to analyze the performance of automated grading, dynamic pricing, order management, and administrative analytics. The system was tested using multiple vegetable images uploaded by farmers, and the trained machine learning model successfully classified the produce into appropriate quality categories. For instance, as shown in the interface, a bell pepper image was evaluated and assigned Grade_2, and the price was automatically calculated as ₹39.60 based on the dynamic pricing criteria. This demonstrates that the prediction module correctly identifies visual characteristics and links them to grade-based valuation. The platform further validated the pricing mechanism through user-side ordering. When multiple listings were displayed, consumers were able to view price-per-kilogram, assigned grade, and farmer details before placing orders. In one test case, a user purchased items totaling ₹567.00, and the system generated a confirmation message, indicating successful transaction handling. This verifies that the system can integrate grading, pricing, and order management seamlessly, ensuring end-to-end workflow completion.

To assess marketplace monitoring, the admin dashboard was tested with recorded sales data. The line chart visualized trends between quantity and total price, demonstrating variations in produce demand. The analytics revealed patterns such as peak pricing and low-quantity transactions, showcasing the system's capability to support decision-making for both farmers and administrators. Additionally, the dashboard allowed verification of uploaded listings and order details, confirming the effectiveness of monitoring tools within the platform.

Overall, the experiments confirmed that the platform provides accurate grading, transparent pricing, and complete transaction support. The automated workflow—from image upload and grade prediction to user ordering and admin visualization—validates that the system functions as an efficient, AI-powered marketplace, capable of improving trust, transparency, and usability for both farmers and consumers.

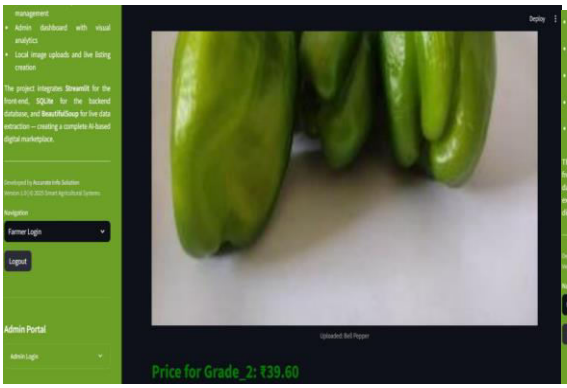

Fig 1. Vegetable price prediction

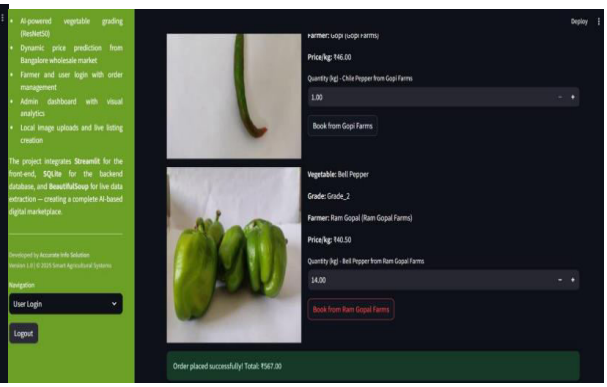

Fig 2 Order booking details

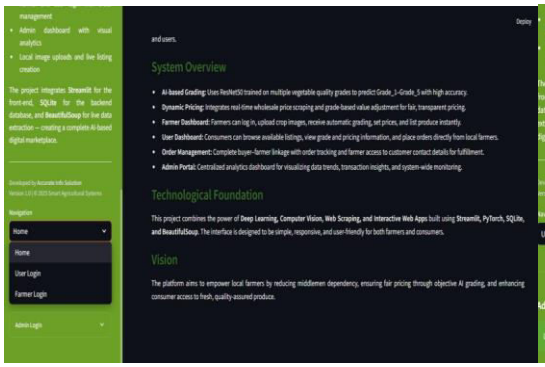

Fig 3 Login page

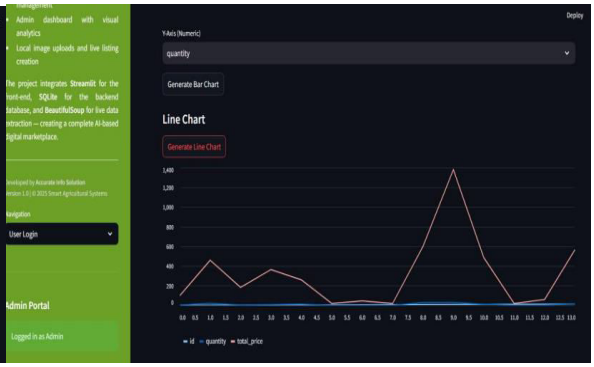

Fig 4 Line chart

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VII. CONCLUSION AND FUTURE WORK

The Smart Direct Market Platform for Farmers represents a transformative approach to modern agricultural marketing by integrating automated grading, dynamic pricing, and direct farmer consumer interactions into a unified digital system. Through the use of machine learning, the platform provides objective and consistent grading of vegetables, reducing the long-standing dependence on manual inspection and subjective evaluation. Dynamic pricing further ensures that farmers receive fair compensation aligned with market trends and quality standards. By eliminating intermediaries and offering a simple digital interface, the system strengthens transparency, improves farmer income, and enhances consumer trust in the agricultural supply chain. Despite its strong capabilities, the system leaves room for additional improvements that can increase its scalability, reliability, and real-world impact. Future enhancements may include integrating live market APIs to fetch real-time prices more accurately, expanding the ML model to support a larger variety of fruits and vegetables, and incorporating multi-language support to reach farmers across diverse regions. Developing a dedicated mobile application, improving offline functionality for areas with poor connectivity, and adding advanced AI-driven analytics— such as yield prediction or demand forecasting—can significantly elevate the platform's usefulness. Collaboration with government bodies, local markets, and farmer cooperatives can also help strengthen adoption and bring smart digital agriculture solutions to a wider community. Overall, the platform demonstrates a promising step toward digitalizing agriculture, empowering farmers economically, and creating a more transparent, efficient, and inclusive market ecosystem.

REFERENCES

[1] Abishek S, Aswinraaj S V, Manojkumar M , IJCRT ,2022 Web Based Application for Direct Market Access for Farmers

[2] Mrs. K. Sughasini, D.S Abinav,R. Abinesh, D. Akash, IJCRT ,2024, Mobile App for Direct Market Access for Farmers

[3] Ms. Archana, Basireddy, IJCART, 2022, Online Shopping Android Application for Agriculture Requirements for Farmers

[4] Prof. Usha Kosarker, IJTSRD ,2019, Digital Marketplace Transforming Agricultural Supply Chain and Enhancing Farmer Profitability

[5] Arshad P Muhammed, Shon C J, IJTSRD ,2020, An Advanced Android Application for Farmers

[6] Sheikh Haniah, R Priyanka, Mrs. Ranjana Thakuria, Preethi S Palled, IJIRT ,2025 Web Based Application for Direct Market Access for Farmers

[7] Aniket Chauhan, Kalpana K Harish, Utkarsh Kumar, Raunak, IJRPR ,2025, Mobile App for Direct Market Access for Farmers

[8] Dr.S.L.V.V.D. Sarma, K. Thrushitha, CH. Hari Krishna Reddy, G. Rajesh, IRJMETS, 2025, Mobile App for Direct Market Access for Farmers

[9] Eranti Sai Kishan, Eranti Sai Dinesh, Lakki Reddy Varshitha, Pavani M, IJIRT,2025, Mobile App for Direct Market Access for Farmers

[10] Prof. Manali Thakre, Disha Lanjewar, Darshan Latwe, Kunal Dakhole, IRJMETS,2025, Direct farmer-to-consumer e-commerce platform

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