



# Advanced Marketplace Suggestion System For Farm Produces Using AIML

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**Abstract:** This paper presents an Advanced Marketplace Suggestion System for Farm Producers designed to enhance decision-making in agricultural trade through Artificial Intelligence (AI) integration. Traditional agricultural market systems often fail to differentiate produce based on quality, resulting in inefficient distribution and reduced profitability for farmers. The proposed system addresses this challenge by incorporating AI-based crop quality classification to categorize agricultural produce into four levels: Premium, Best, Good, and Bad. Based on the identified quality, the system intelligently recommends appropriate marketplaces such as exporters, processing industries, or local markets.

**Keywords:** Artificial Intelligence, Crop Quality Classification, Marketplace Recommendation System, Machine Learning, Smart Farming.

## I. INTRODUCTION

Agriculture is the backbone of the Indian economy, but farmers still face major problems after harvesting their crops. One of the biggest challenges is deciding where to sell the produce. Even if the crop quality is good, farmers often sell in the wrong market and do not get the right price.

Most existing agricultural systems focus on only one part, such as:

- Detecting crop quality using images
- Predicting crop prices
- Suggesting crops based on soil and weather

However, these systems do not connect crop quality with real marketplaces like exporters, processing industries, or local markets. Because of this gap, farmers cannot fully benefit from modern AI technologies.

With the advancement of Artificial Intelligence, Machine Learning, and Industry 4.0 technologies, it is now possible to analyze crop quality automatically using images and make intelligent decisions based on that quality.

This project proposes an Advanced Marketplace Suggestion System for Farm Producers using AI-ML. The system uses a two-layer architecture. In the first layer, a CNN-based AI model classifies crop images into quality categories such as Premium, Best, Good, and Bad. In the second layer, an intelligent backend system automatically routes the produce to the most suitable marketplace, such as exporters, processing industries, or local markets, based on the predicted quality and geographic location.

Unlike existing systems, this project not only detects crop quality but also bridges the gap between AI-based quality analysis and real-world agricultural marketplaces. The proposed system helps farmers make better selling decisions, reduces wastage of perishable produce, improves supply chain efficiency, and supports sustainable agricultural practices.

## II. LITERATURE REVIEW

### 2.1 Existing Research on Quality-Based Agricultural Systems

Existing research in agriculture widely uses image processing and machine learning, especially Convolutional Neural Networks (CNNs), for automatic crop quality assessment. These systems analyze visual features such as colour, texture, and surface defects to classify perishable products like fruits and vegetables into quality categories.



Some studies further apply quality information to supply chain optimization, helping in decisions related to pricing, storage, transportation, and sustainability. Industry 4.0-based approaches integrate AI and automation to reduce post-harvest losses and improve efficiency.

However, these studies mainly focus on quality detection and conceptual supply chain improvements, rather than direct marketplace decision-making for farmers.

## 2.2 Limitations of Existing Research

Despite progress, existing research shows the following key limitations:

1. Lack of marketplace integration:

Most systems stop at quality classification or internal supply chain decisions and do not connect AI outputs to actual buyers such as exporters, processing industries, or local markets.

2. Absence of intelligent backend routing:

Existing models lack a backend-driven decision engine that converts quality predictions into real-time, location-aware marketplace recommendations using buyer databases.

## 2.3 Research Gap Identified

From the reviewed literature, it is evident that there is no integrated system that combines:

- AI-based crop quality classification
- Intelligent backend routing logic
- Real buyer requirement mapping
- Location-aware marketplace recommendation

Therefore, the research gap lies in the absence of a quality-driven agricultural marketplace routing framework that bridges AI-based crop analysis with real-world market linkage. The proposed system addresses this gap by transforming crop quality predictions into actionable, location-specific marketplace suggestions for farmers.

# III. PROPOSED METHOD

## 3.1 System Architecture

The proposed system is designed as an intelligent pipeline that integrates crop quality assessment with marketplace recommendation. The process begins when a user uploads an image of agricultural produce through the web interface. The uploaded image serves as the primary input for the quality analysis module.

The system employs a deep learning-based image classification model built using a pre-trained MobileNetV2 architecture. The model analyzes visual characteristics such as color, texture, and surface condition to categorize the produce into one of four predefined quality levels: Premium, Best, Good, Bad

After classification, a decision-mapping mechanism is triggered. Each quality category is associated with a specific type of marketplace. Premium-grade produce is recommended for exporters, Best-grade produce is directed toward industrial buyers, and Good-grade produce is suggested for local marketplaces. If the produce is classified as Bad quality, the system generates an advisory response instead of recommending a market.

This structured architecture ensures a smooth data flow from image input to intelligent marketplace recommendation.

## 3.2 Methodology

The methodology of the proposed system is centered on quality-driven decision mapping supported by deep learning. When a user submits an image, the system first performs preprocessing, including resizing and normalization, to prepare the image for model evaluation.

A transfer learning approach is used, where a pre-trained MobileNetV2 model is adapted for crop quality classification. The base layers of the model are retained for feature extraction, and additional classification layers are added to categorize the produce into four quality levels: Bad, Better, Good, and Premium. Data augmentation techniques such as rotation, zooming, and flipping are applied during training to improve model robustness and accuracy.

Once the classification result is obtained, a rule-based decision logic maps the predicted quality level to an appropriate market segment. Premium produce is routed to exporters, Better produce to industries, and Good produce to local markets. Produce classified as Bad is filtered out from commercial recommendation and an advisory response is generated.



By combining AI-based image classification with structured quality-to-market mapping, the methodology enables intelligent and practical agricultural marketplace suggestion.

### 3.3 Implementation Overview

The proposed system is implemented using a multi-layered technological framework. The user interface is developed using Angular to allow farmers to upload crop images and receive recommendations easily.

The crop quality classification model is implemented in Python using TensorFlow and Keras. A MobileNetV2-based transfer learning model is trained and saved for prediction purposes. The backend logic and marketplace routing are handled using Node.js, where the predicted quality category is mapped to corresponding buyer segments.

Marketplace data is stored and managed using a MySQL relational database, ensuring structured storage and efficient retrieval of exporter and industry information.

## IV. RESULTS & DISCUSSIONS

The proposed system was evaluated using a labeled dataset of agricultural commodity images categorized into four quality levels: Bad, Good, Best, and Premium. The dataset was divided into training, validation, and testing sets to ensure structured evaluation of the classification model.

Model performance was assessed using standard evaluation metrics including Accuracy, Precision, Recall, and F1-score. The classification module achieved an overall accuracy of 89.86%, with a precision of 90.02%, recall of 89.86%, and an F1-score of 89.88%. These results demonstrate consistent performance in distinguishing between the defined quality categories.

Confusion matrix analysis indicated stronger classification performance for the Premium and Best classes, which are particularly significant for higher-value marketplace routing decisions.

The marketplace recommendation logic was also examined through functional validation. Premium produce was mapped to exporter-level markets, Best produce to industrial buyers, and Good produce to local marketplaces based on predefined routing rules. For produce classified as Bad quality, the system generated advisory responses without providing market recommendations.

Overall, the experimental evaluation indicates that the integration of quality classification with structured decision mapping enables systematic and practical agricultural market suggestion.

## V. APPLICATIONS

The proposed Advanced Marketplace Suggestion System can be used in different areas of agriculture where crop quality and market selection are important.

### 5.1 Helping Farmers Choose the Right Market

The system helps farmers understand where to sell their produce based on its quality. Instead of guessing or depending only on middlemen, farmers can upload an image of their crop and receive a suggestion about the most suitable market. For example, high-quality produce can be recommended for exporters, while medium-quality produce can be suggested for industries or local markets.

### 5.2 Quality-Based Market Selection

The system supports market selection based on quality levels. By dividing produce into Premium, Best, Good, and Bad categories, the system ensures that each type of produce is directed toward an appropriate buyer group. This reduces the chance of sending high-quality produce to low-value markets or low-quality produce to high-standard buyers.

### 5.3 Reducing Wrong Selling Decisions

If the produce is classified as low quality, the system does not recommend selling it in premium markets. Instead, it gives an advisory message. This can help avoid rejection from buyers and reduce unnecessary transportation.

### 5.4 Supporting Digital Agriculture Platforms



The system can be integrated into agricultural websites or mobile applications. It can serve as a feature in digital farming platforms where farmers receive automatic quality evaluation and market suggestions.

## VI. CONCLUSION & FUTURE SCOPE

The proposed Advanced Marketplace Suggestion System for Farm Producers Using AI-ML presents an integrated approach that combines crop quality classification with structured marketplace recommendation. The system uses a deep learning-based image classification model to categorize agricultural produce into four quality levels: Premium, Best, Good, and Bad. Based on the predicted quality, a rule-based routing mechanism suggests appropriate market segments such as exporters, industrial buyers, or local markets. Produce classified as low quality is not recommended for commercial sale, ensuring responsible decision-making.

The experimental evaluation demonstrates consistent classification performance and validates the practical integration of quality assessment with marketplace mapping. By connecting AI-driven crop analysis with market-level suggestions, the system provides a structured framework for informed agricultural selling decisions.

For future enhancement, the system can be extended by incorporating larger and more diverse datasets to improve model generalization. Integration with real-time price prediction models and digital agricultural marketplaces can further enhance decision support. Additionally, the framework can be adapted for multiple crop types and expanded to include advanced analytics such as demand forecasting and dynamic market insights.

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