Agropeddle: An Android Application to Buy and Sell Agri-products with Freshness Detection

Prof. A.V. Deshpande[1], Priti Dnyanoba Khatape[2], Rucha Vinod Sheth[3] Veda Vilas Kunijr[4], Meghana Subhash Shinde[5]

[1,2,3,4,5]*Department of Information Technology, Jaywantrao Sawant College of Engineering Pune, India*

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Abstract - *Agriculture is the main occupation in India as it has major contribution in Indian economy as well as it is a primary source of livelihood of common masses. Farming contributes around 18% of the India's GDP and half of the population depends on it . Farmers are the backbone of the Indian economy, still they suffer from poverty, poor agricultural marketing, and many other problems. Our aim is to introduce the concept of digital marketing in the field of agriculture. We are trying to eliminate the role of middlemen from agricultural marketing in order to insure fair price to farmers. Though farmers try to sell their products on online platforms, due to quality and freshness issue many consumers did not buy them. Our proposed system will overcome both the problems of farmers as well as consumers.*

Key Words: Android Application, Consumer, Digital Marketing, Deep Learning, Farmer, Graphical User Interface, Image Processing, Middlemen, Object Detection, Quality Detection.

1. INTRODUCTION

India is a global agricultural powerhouse. Agricultural marketing in India still continues to be in a very bad shape in rural area. There is also the corruption that is increasing now a day. Farmers didn't get proper marketing facilities so, they have to depend upon local traders and middlemen for the disposal of their farm produce which is sold at very low price. The Rural Credit Survey Report stated that, the producers or farmers sell agriproducts at an unfavorable place and at an unfavorable time and get unfavorable terms. To carry on distress sale of their produce , these farmers are forced under economic conditions. The earning of the services provided by the middlemen increases the load on the consumer, although the farmers doesn't get fair price. By promoting agricultural marketing, we can provide many opportunities to farmers. The facilities that can be provided are:

1) e-farming is one of the way which will help the farmers to perform the agro-marketing.

2) Detecting freshness of fruit and vegetables using images captured with a video camera attached to the system.

3) Provides privilege for both farmers and consumers to buy and sell the required farm products without the involvement of a middleman at its right profitable price.

4) To enhance the share of farmers in the ultimate price of his agriproducts.

In order to avoid this, there has to be direct relationship and communication between farmers and consumers. Because of great technology revolution, smart phones become the essential part of life even in rural areas. Farming community also realize the importance of digital marketing in field of agriculture. Implementing new technologies will help to reduce pre and post-harvest losses through appropriate methods and encourage value addition.

2. Proposed Model And Experimental Analysis:

The supply chain of agriculture is worked as follows:

Farmers→ Small Traders→ Larger Trader→ Commission agent→ Wholesaler→ Retailer→ Consumer

There is a huge difference in the profit margin when this application is used and when not as shown in Fig 1. Through this application we achieve our main objective, which is to increase the profit margin of the farmers and make sure they get the right price for their efforts. In the absence of a direct link with the consumers, the farmers are at the mercy of the middlemen who occupy the entire space between the production and the ultimate sale of the produce. This makes farmers often find themselves at a disadvantage despite being the producers.

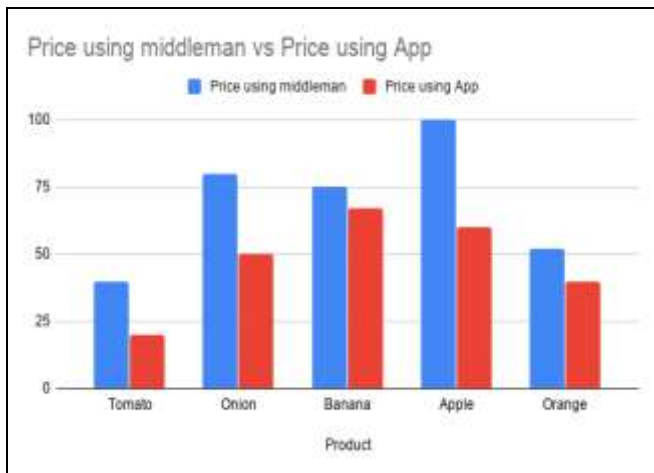The following graph clearly indicates difference in prices through middlemen and application.

Chart -1: Price using middleman and Price using App

The proposed android application will be useful to society. The ultimate aim is to connect farmer directly to consumer by eliminating middlemen from the process. Basically this model will work as following:

1) Getting the image and details of products from farmers/consumers.

2) Detect the class of clicked image to check whether the image is of Fruit or Vegetable Class.

3) Detect freshness of product using proficiency of Deep Learning.

4) Analyze the products added, considering the various criteria of examination required for it to meet the quality expectation of consumer.

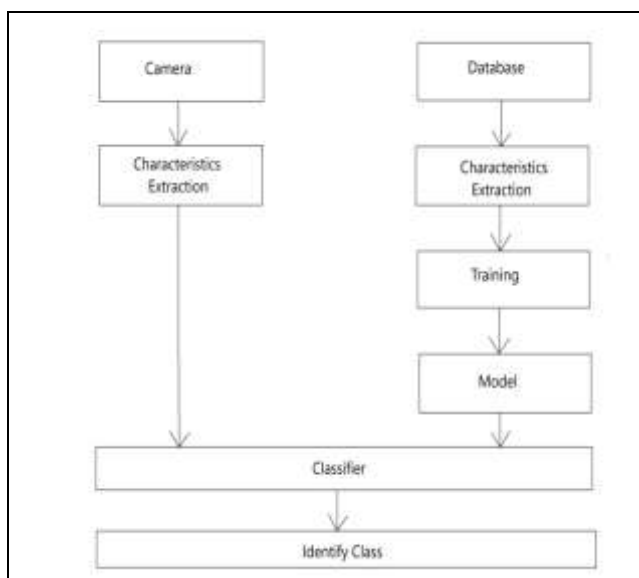5) Get the fair price of the verified product and uploading it in the application for selling.

Fig -1: Process of Object and Quality Detection

The details of the products as given by the farmer should be proper. Depending on the quality, prices are decided for particular product. The products are estimated based on its quality, quantity and price following certain criteria. Due to this system, there is no need to send products to agricultural experts for quality checking.

3. METHODOLOGY

Though farmers try to sell their products on online platforms, due to quality and freshness issue many consumers did not buy them. Proposed system will try to overcome this problem by adding a facility of checking freshness of product before buying.

The product will undergo two phases before being added for selling. The Object Detection Phase will detect the image to check whether the image belong to Fruit or Vegetable class or not. If it belong to particular class, freshness of that product will be checked in Freshness Detection Phase. The product is uploaded for selling on the portal only if its freshness is greater than threshold.

We used a method with combination of R-CNN in order to increase the accuracy of fruit quality detection by using some features like its colour, shape, size, etc. Proposed method grades and classifies fruit images based on obtained feature value by using algorithm. The proposed system starts the process by capturing the product's image. Then, the image is transmitted to the processing level where its features are extracted. After that by using R-CNN images are going through training and testing. With the combination of features, the results obtained and are used to decide quality of product

4. Region-Based Convolutional Neural Network (R-CNN):

RCNN uses selective search to extract these boxes from an image (these boxes are called regions).The entire process of object detection using RCNN has three steps:
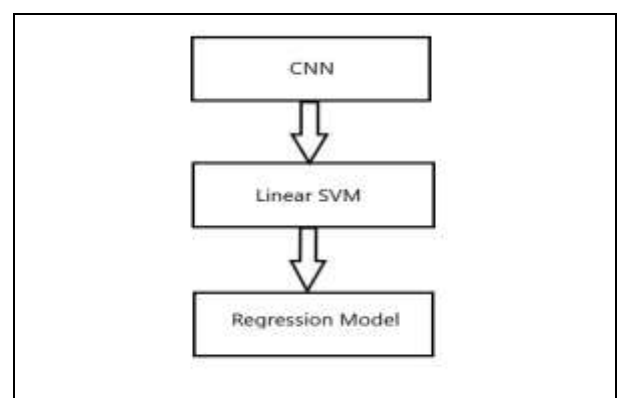

Fig -2: Steps of R-CNN

Step-1) We first take a pre-trained convolutional neural network.

Step-2) Then, this model is retrained. We train the last layer of the network based on the number of classes that need to be detected.

Step-3) The third step is to get the Region of Interest for each image. We then reshape all these regions so that they can match the CNN input size.

Step-4) After getting the regions, we train SVM to classify objects and background. For each class, we train one binary SVM

5. RESULTS:

This section represents some experiments and object detection of fruit samples. Here are some screenshots of application in which we tried to classify fruits by extracting some features and with the help of machine learning algorithm.
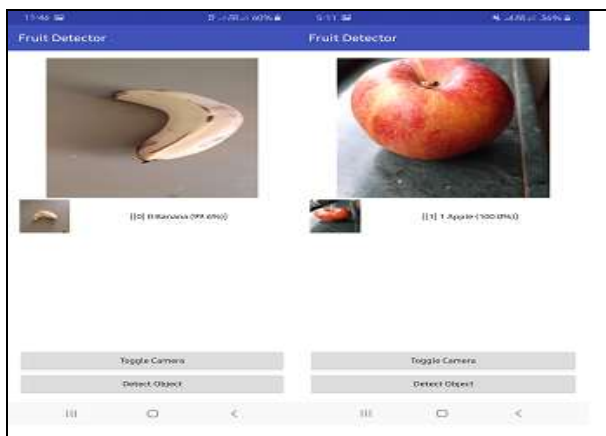

Fig -3: Results

6. CONCLUSION

The paper represents an easily accessible and user-friendly portal for farmers and consumers to sell and buy agricultural produce. This will also help farmers to sell their products directly to consumers and ensure fair price to the farming community. Facility of checking quality before buying is also provided to consumers so that they get good quality products .To maintain transparency in marketing of agriproducts, system only allows farmers to capture and upload real time images of product on the portal having freshness greater than threshold. R-CNN algorithm is used to this purpose as it provides results with around 73% accuracy.

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