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FORMAT FOR STUDENT PROJECT PROPOSAL FOR THE 46th SERIES OF STUDENT PROJECT PROGRAMME

PROJECT REFERENCE NUMBER: **46S_BE_1180**

TITLE OF THE PROJECT: **CLASSIFICATION AND GRADING OF ARECANUTS USING IOT AND MACHINE LEARNING APPROACHES.**

DEPARTMENT & COLLEGE NAME: **COMPUTER SCIENCE AND ENGINEERING, VIVEKANANDA COLLEGE OF ENGINEERING & TECHNOLOGY, PUTTUR.**

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INTRODUCTION

Technological advancements can have powerful impact on the economic growth of agriculture in India. Arecanut farming is one such terrain of agriculture where investment in technology and automation can elevate the proceeds from farming by bringing down production cost. Areca is the major crop of Karnataka having roots in fifteen different districts. The grading and sorting of arecanuts is an important step in the production of arecanuts and is traditionally done by man power. People are trained to identify good and bad arecanuts, but the time taken for sorting arecanuts is more and it is not feasible for a large quantity of arecanuts. In order to minimize the time consumed, a project is designed to classify the arecanuts into four different grades based on their quality using IOT-Machine learning approaches.

PROBLEM STATEMENT AND OBJECTIVE

Karnataka has a significant contribution to the production of areca-nuts in India. The traditional method of sorting areca nuts is using man power. The labour cost and sorting time always impacts the income of farmers. The classification of arecanuts takes about two days using only manpower. Hence, there is a requirement of automated and cost-effective agricultural technology to reduce the burden of the farmers.

This project aims to develop a system which will identify arecanuts by Machine Learning and sorting based on the type of arecanut using IoT. The system classifies arecanuts based on their quality and separates them into their respective bins. Another aspect of this project to present an idea of serving farmers by developing a system which is easy to use, portable, and compact.

The objectives are as follows,

- To determine the quality of the arecanuts using their image.
- To classify the areca nut based on its quality.
- To feed real-time images to the system which determines the quality and classifies the arecanuts.

METHODOLOGY

Material Used: USB camera, Servo Motor, ESP8266, Gear Motor, IR Sensor, Conveyor Belt, Laptop.
There was no existing dataset available for areca nuts. So we created the dataset by capturing the images of different areca nuts from different angles. In the dataset, each grade consists of 500+ images. We used

Convolutional Neural Network Algorithm. In this project, we apply a convolutional neural network (CNN) to the tasks of detecting and recognizing Arecanut images. Because of the wide diversity of types of images, recognition of Arecanuts is generally very difficult. However, deep learning has been shown recently to be a very powerful image recognition technique, and CNN is a state-of-the-art approach to deep learning. We applied CNN for the classification of Arecanut and the detection of the Arecanut grade. Our model will classify areca nuts into four grades they are Grade 1, Grade 2, Grade 3, and Grade 4 respectively. In these grades the Grade 1 is the best quality areca nut and the grade 4 is of least quality. The dataset is trained using feature extraction. An .h5 model is generated which stores the features of the trained images. The trained images are then tested using a sample image and the arecanut is classified using CNN classifier. When the IR sensor detects the arecanut, the USB camera capture an image. This image is then processed by the processor and classifies it into its respective grade based on the quality. The arecanut falls into its respective bin.

Figure 1: System Architecture

RESULT

An image is captured using a USB camera. The image captured is pre-processed and the features are extracted. The hardware setup consists of a conveyor belt which is connected to two gear motors and is controlled by the microcontroller. The infrared sensors on the conveyor belt will detect the areca nut and signal the USB camera through the microcontroller to capture the image. The captured image is then pre-processed by the processor. The grade of the areca nut is determined and it falls into its respective bin as the servo motor rotates at a particular angle depending on the grade of the arecanut. The model is reliable for its output because it provides the output with the accuracy of 95%.

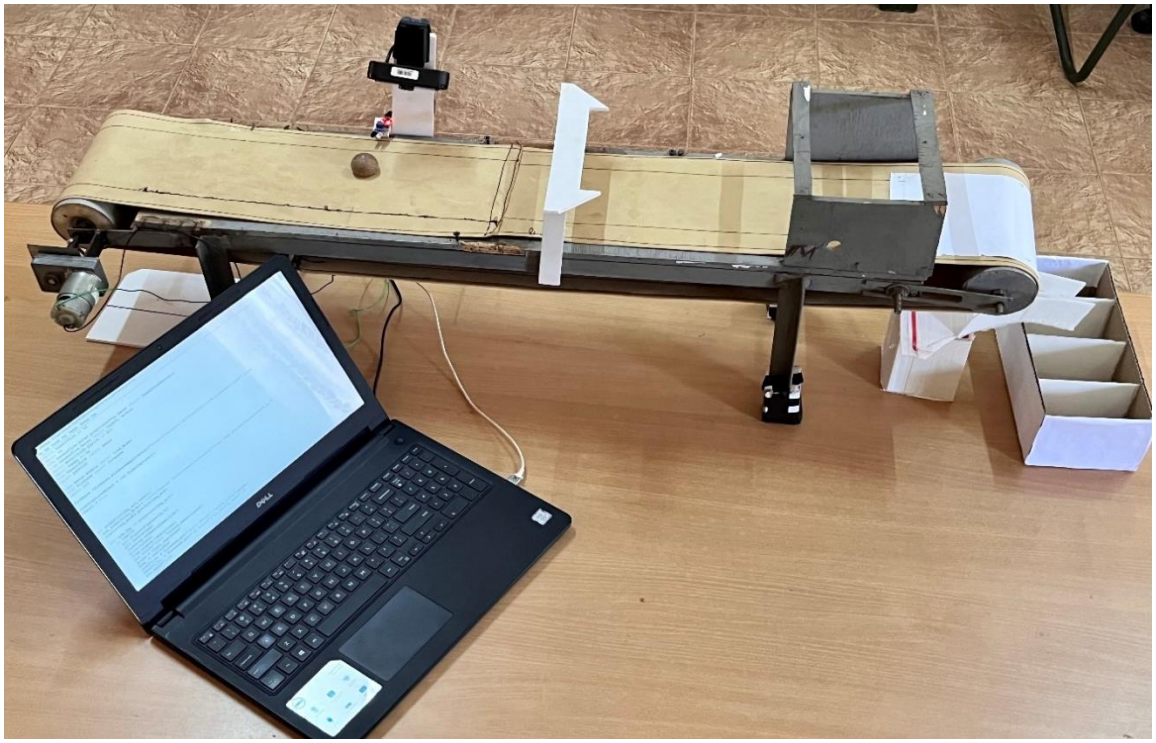

Figure 3: Hardware Setup

CONCLUSION

Sorting arecanuts is a time-consuming and laborious process. Human sorters can only sort a few arecanuts per minute, which means that it can take hours to sort a small batch of arecanuts. In contrast, a real-time sorting unit can sort arecanuts much faster than a human, which means that it can help the farmer sort arecanuts in no time at all. In addition, a real-time sorting unit can sort arecanuts with higher accuracy than a human, which means that the farmer can save time and money by using a real-time sorting unit instead of human sorters.

SCOPE FOR FUTURE WORK

There is always a scope for improvement in the performance of a machine as well as for the processing unit. The proposed method is very useful for real-time applications. The future work is to detect and extract the moving overlay text to extend the algorithm for more advanced and intelligent applications. The system could be extended to capture the images of a heap of arecanuts at a time and process them at once and subsequently classify them, thus reducing processing time. A better resolution camera can be used to improve the quality of the images.

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