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Fruit Grading Using Convolutional Neural Network

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ABSTRACT*:* Due to the wide variety of fruit types, it is generally very difficult to recognise the image of fruit products. The aim of this paper is to detect whether the fruit is healthy or not. In the processing of images, we applied CNN to tasks for fruit detection and recognition. We have developed and used Google to evaluate recognition performance a dataset of the most frequent items.. The train data and trial data are classified and results of the classified output are given. However, in recent times, deep learning has proven to be a powerful technique for recognising images and is a highly modern approach to deep study. This network has gained more precision than existing methods.

KEYWORDS: CNN (Convolutional Neural Networks), Deep learning, Dataset**.**

I. INTRODUCTION

India is one of the world's biggest agricultural exporters, as an agricultural country. The sorting and classification of such products is therefore of the utmost importance in order to maintain certain quality standards. All this is very simple for humans, while some obstacles occur when this process is automated. Nowadays, image processing and machine learning have grown renaissance in the food and agriculture industries. In the processing and processing, huge post-collection losses are observed, while increasing demand for high quality and safety food products requires accurately, quickly and objectively determining their quality[1].

But in industry, manual sorting is labor-intensive, slow and therefore imprecise. The turnover of employees is also relative large and still yields wrong results. Automation improves the quality characteristics of a process. Automated systems can be coordination-friendly and work together on their own compared to manual systems. In addition, automation is applied in areas where precision, increased profit and improved product standards are necessary. [1]Therefore, intelligent classification systems are widely used in quality control systems. However, due to the high operational and maintenance costs of such systems, certain major industries are about to closure.

Image classification is widely developed for a number of different purposes, using convolutionary neural networks (CNNs). In fixed class image recognition tasks CNNs show state-of-the-art performance using closed data sets such as Image Net. For instance smartphone applications, when classifications are used in real-life scenarios, the classes in a dataset do not correspond to every user. This causes a difference between the lab and real-world situations. The personalization of classification systems should be considered to bridge the gap between controlled scenarios and the real world. Previous studies demonstrated that personalization can improve the performance of image notation [4].

The World Health Organization has defined the excess weight and overuse of excess fat or overweight which can harm our health (WHO). Globally, 39% and 13% of adults aged over 18 in 2016, both weight-bearing and obese, were reported by the WHO. The obesity rates have more than doubled since 1980. The increasing tendency of obesity and excess weight is alarming because it has resulted in serious public health problems affecting a person's quality of life, longevity and high medication costs. Because unfair energy and energy consumption is the main cause of overweight and obesity, calorie tracking thus is a solution to problems [5].

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This main problem will be addressed in the proposed study. The development of sufficient data collection techniques, consolidation and low-cost computer hardware for high computer capacities has driven the use of machine learning techniques in nearly all computer sciences and applied computing applications. Fruit grading is a prime example of this problem. In order to minimise the manual classification and sortation work, we make use of picking processing and machine learning algorithms to improve grading quality [1].

In this paper, we have used analysed the new feature of deep learning toolbox introduced in MATLAB.

II. RELATED WORKS

The selection of the classification algorithm depends on the problem involved in Machine Learning applications. This document gives a comparison of the fruit intake detection performance of the Vector Support Machine (SVM) and the Neural Networks (ANN). The two classifier types were trained by combining time domain (TD) and frequency domain (FD) functions extracted from signal captured by a jaw motion sensor. Data have been gathered from 12 free-living subjects in unrestricted conditions for a 24-hour period. ANNs were trained using a onetime cross validation procedure, with a different number of hidden layer neurons and SVMs with different kernels [1].

A study is conducted here on the importance and application of the image processing in the field of computer vision. The input is an image and its result is an improved image of high quality in line with the techniques used. During an image processing operation. Image processing is usually called digital image processing, but it can also be optically and analogically handled. Our research offers a solid introduction to the processing of images along with dividing techniques, computer vision basics and applications worthy of the research community on images and vision [2].

The increase of people's awareness of their nutritional habits has attracted significant attention to the area of automated fruit analysis. Automatic fruits analysis is also highly interesting to speed up the service resolution of casserole bottlenecks produced in high-demand situations, not only to extract nutarian information from fruits selected by customers, but it is also of great value. The problem of automatic fruit table analysis, the prediction of several fruit on the image of a tray, is tackled in this paper [3].

[3] We are proposing a new fruit analysis approach, based on the neural networks of convolution. The term Semantic Fruit Detection is used for the fruit localization, recognition and segmentation within the same framework. We show that our method improves the state-of-the-art fruit detection by significant margin on the UNIMIB 2016 public data set, achieving around 90% on F measurement, thus making significant technological progress to automatic checking in the restaurant environment.

Because fruit diaries can develop healthy eating practices, recognition of the image of fruit is highly demanded in order to reduce fruit recording efforts. Previous studies have worked with datasets with fixed sample numbers and classes on this challenging field. In the real world, however, all the fruits cannot be included in the database because the number of fruit classes is large and is constantly increasing. Furthermore, intra-class similitude and diversity also make recognition difficult [4]. [4] We tried to resolve such problems with deep neural network characteristics in this paper to create a personalised classification system which increases the user's data and adapts to user eating. Through the personalization of 300 records per user, we have achieved the state of the art precision of recognition of the image of the fruit.

III. METHODOLOGY

The detection of fruit is applied for the processing of images and deep learning techniques. We use the CNN for data set training. We use 'Google' for the classification of 3 types of fruit datasets. The train data and test data are classified and classified output results can be obtained. It detects the objects (Fruits) in the input image during classification phases. Afterwards, the prices are assigned and the total costs of the fruit objects identified are measured.

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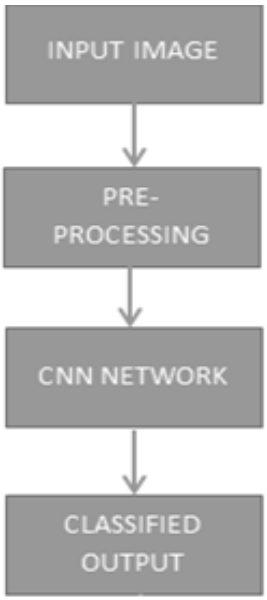

Figure 1 : Block diagram of proposed method

To indicate the proposed method block diagram above.

CNN (Convolutional Neural Network):

As far as machine learning is concerned, an artificial neural network really works well. In different classification tasks like image, audio, words, artificial neural networks are used. Various types of the Neural Networks are used to predict the sequence of words we use more accurately. We are using the Convolution Neural Network similarly for image classification. In this we will build a fundamental CNN building block. One or more convolutionary layers can be a convolutionary neural network. The number of convolutionary layers depends on how large and complex the data are.

Let's revisit certain concepts of the Neural Network before plunging into the Convolution Neural Network. There are three types of layers in a regular neural network:

(a) Input Layer: It's the layer we provide our model with input. The neurons in this layer are the total number of functions contained in our data (number of pixels in case of an image).

(b) Hidden Layer: The input is then fed to the hidden layer by the input layer. Depending on our model and data size, there can be many hidden layers. Each hidden layer can have different neuron numbers that usually exceed the number of characteristics. The output of the layer is calculated by matrix multiplying the output of the previous layer by learning weights of that layer. Then the network is not linear with the learning differences, followed by the activation function.

(c) Output Layer: The hidden layer output is then added to a logistic function, like sigmoid or softmax that turns each class' output into a probability score of each class.

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IV. RESULTS

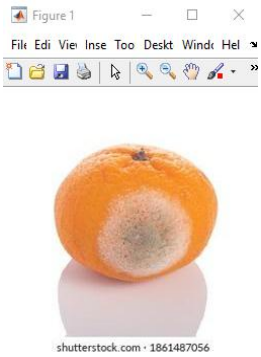

Figure 1: input image.

Figure2: Classified Output

Fig 3: Input image

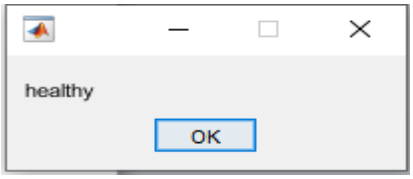

Fig 4: Classified output

V. CONCLUSION

This article concluded that, through image treatment and deep learning techniques, we can detect the fruit. By using the data set from Google the network is trained. Color and textural features can be used to process, test and recognise fruits and fruits. By using the Classification network, we have improved the functionality and flexibility of the recognition

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system. A large part of the data increase must be performed and the generalised pattern to identify and detect fruit products must be learned. The train data and test data are classified by the Network. The exacting of all conventional models is comparatively much higher.

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