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An Advanced Android Based Trained Fruit and Vegetable Identification Nutrition

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Abstract: This paper describes a process by using images taken by the video camera connected to the Device to identify fruit and vegetables to identify nutrition. The device assists customers to mark the desired fruit and vegetables with nutrients, such as calories, water content, proteins, carbohydrates, sugar, fibre and fat, and other information about fruits. It aims to limit the number of human machine interactions, speed up the identity and increase the usability, compared to current manual systems, of the graphical user interface. We achieved quicker deployment through android: business Android apps have a speedy, several-hour development period. The programming language provides a competitive aim Multiple platforms and makes it easy to port the software to multiple operating flexibility as well as scalability with the arrival of Android Studio. Different neural networks were tested and retrained for classification of an object. A heuristic assessment was conducted with multiple users to verify usability, concluding that the system introduced is easier to use than existing systems. The future extension of this project is voice assistance of fruits and vegetables nutrition.

1 Introduction

Fruit use in everyday nutrition plays a large part in the intake of human dietary supplements. Estimating the correct intake of nutrient by eating fruit has become more and more necessary in order to keep the wellbeing healthy. In this method the recommendations for the option of fruit consumed, which can be carried out with a specialised framework, have been critical. In this paper the focus is on developing strategies which can identify fruit and recommendations for the specifics of fruit's nutrition. In the field of automated object recognition and classification, the computer vision has its broad applications. The computer vision systems today aim at detecting the certain fruit type from the image of the same.However, due to their strong appreciation of the efficiency and reliability of the results obtained, the intensive computing procedures used in this process are currently replaced by profound learning procedures.

In recent years a multitude of applications in different fields has been made possible by the proliferation of machine learning techniques. This algorithms autonomously attempt to obtain real-world information by simulating learning experiences for people[7]. Thus, systems can generalise without manually coding [8], from concrete examples[9]. Thanks to this acteristic char-20, these algorithms can be used in different fields. There have been several recent studies in which the use of these techniques has been used in order to solve different problems in agriculture[10]. For example, several approaches to the classification of fruits were proposed through the use of deep learning techniques.Nonetheless, many current techniques take long training / testing time or have minimal exactness, which can inhibit the use in real time. In the circumstances, a suitable model for the classification of fruit must be sought.

Complex self-service systems that take time can encourage customers to choose a different foodstuffs shop. Since businesses survive as consumers, their loyalty is the key to the success of the company. The necessity of process time-cutting systems lies in the belief of customers that they can save time. The goal of this work is therefore to improve the process of identification of fruit and vegetables carried out in the retail sector through own service systems. In particular, the enhancement could include a smoother process and a more easy-to-use method.The purpose of the computer vision is to reduce the user burden and limit the collection of possible objects. In the process of recognising objects can also be streamlined by using computer vision for self-service systems by moving a person to a computer process. This will potentially speed up the process of product recognition and eliminate error by eliminating the human element. The paper's work is restricted to the basic concepts of the recognition method. In hardware, the fundamentals are a camera, a monitor, a scale-representing activation mechanism and a device processor (Figure 1).

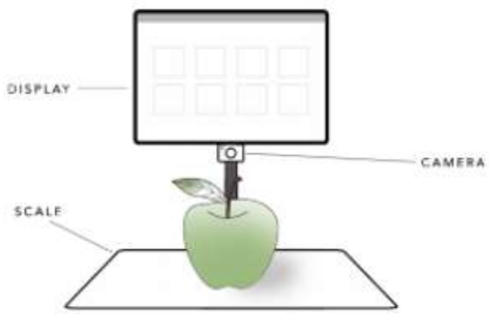

Fig. 1: Prototype of our system.

In order to identify photos of fruit and vegetables in the cameras, a classifier was trained and tested. We will discuss the architectures of CNNs, in view of the huge success shown in CNN's recent years in many object-recognition and classification tasks[1][2], for classification purposes. A user interface for controlling User Interaction via the display has been developed. The monitor will display an interface for the user to use a graphical user interface and to display the output of the classifier. The machine removes a label printer when simulating the process in the user interface.

2.RELATED WORK

With the assistance of a fruit detection algorithm, the robotic fruit collection system uses several structures of the same strength, colour, orientation and border of the fruit pictures. The efficiency of detection of different fruit elements is achieved up to 90 percent with the aid of an improved multiple feature dependent algorithm [1]. The expansion of the out-door image inspection of fresh bunches of the oily palm fruit (FFB) is necessary to investigate the FFB image. The software test generates the exact prototypical and relation portion from the occupied image element in the light intensity of kin to the FFB's value[2]. Online evaluation of fruit superiority is given to evaluate the efficacy of the methods with regard to next facets of superiority, size, colour, location of the stem and identification of external flaws[3].The key stages of the pipeline include the segmentation of artefacts from the context, colour extraction and Gaussian Bayes Classifier[4] classification.

A spherical fruit recognition system automatically improves considerably in the natural conditions that face challenging circumstances, such as shadows, shiny regions, occlusions and superlatedfruits[5] Convolutional neural networks, as did obsolete approaches by designed functions. We invent that colour structures are essential for recognition of nutrition images[6]. Full comment on the competent convolution kernels Established nutrition ID with a small dataset that is proposed as second hand in a food classification scheme based on the smartphone [7]. This distinguishes unhealthy foods starting with feeding cartridges and deviates from dietary calories[8,9].

1. Divya, R. Brunda, N. By-B Divya Shree. Shobha Rani 2019: This paper presents an effective and efficient tool for the identification of organic products and foresees the sustenance of natural products using deep Alex systems (DAN). The after-effects of the examination show that organic product identification using DAN can be correctly ordered in about 91% on solitary machines with 1 GPU, 8 GB RAM and octa-center processors in approximately 50 different groups.

2. Xiuhua Liang, Bin Yan, Deng of Guangming. Reception 10 July 2015; approved 21 August 2015; published 26 August 2015: With the aid of head section analysis (PCA), and community inquiry, this paper demonstrates the straightaway method of assessing their nutritional extravagance according to the score of their sustenance of leafy foods.

3. The Science and Electronics Institute of Technology, Maharashtra, Aurangabad, India, by-manpreetkourBasantsingh PG, Research student and telecommunication engineering. International Journal Of Engineering And Computer Science ISSN: 2319-7242 Volume 5 Issue 10 Octave 2016:The present paper proposes the measurement of organic product recognition and the estimates for calories based on shape, shading and surface alongside the histogram of angles. These highlights are encouraged to multi SVM classifier for exact characterization by means of dietary analysis in the table. The MATLAB programming assessment uses two databases to form a particular database of constant and phoney, organic plastic product database.The findings are remarkably similar to the natural product's genuine calories.

4. By Bhargava-Anuja, Atul Bansal. Article info::Received March 7, 2018, Revised May 1, 2018,

AcceptedJune3, 2013 This paper discusses comprehensive extraction of ground foods based on shading, surface area, scale, type and imperfections. This paper discusses the following issues. In the meantime, simple correlations have been completed between the various calculations provided by leafy food quality control specialists.

5. By Sophie Laura Holzmann, Katharina Pröll, Hans Hauner, Christina Holzapfel: There is a big determination of the sustenance of (applications) that are used to obey themselves and to teach a healthy diet. These applications deliver an unbelievable variety of capabilities from managing food journals to delivering balanced cement proposals. Not many perceived and institutionalised requirements for the evaluation of sustenance applications have been identified until now.At this moment, the applications analysed were restricted to the characterization of data capability and design.

3. METHODOLOGY

The project consists of the experimentation process and the implementation phase in two stages. The experimental process seeks to find the best network for this project. It lays the groundwork for the final success of the system. The implementation process seeks to characterise the incorporation of software and hardware into an identifying scheme.

Fig. 2: Setup of our prototype with the hardware employed.

A. Convolutional Neural Networks

In recent years, the CNN has been great in large-scale image recognition tasks. Because of massive public image databases such as ImageNet, large scale image recognition has been made possible. In this article, we use transfers, choosing some pre-trained architectures and adapting them to the type of pictures used in our application. It is costly or difficult to recapture the required training data and reconstruct models in many real-world applications. Transfer learning is also a way of generating new models with very limited data in comparison with initial training. Tensor flow offers network architectures and open source scripts. There are more architectures available for training than ever. It is a difficult task to compare all architectures.Instead the architecture of Inception and MobileNet has properties that make them important for this project. Inception v3 is a Google-generated open source architecture trained in 1,2 million images in thousands of categories. It is a Google LeNet module designed to work with strict memory and machine budget constraints.

B. Hardware

A Raspberry Pi has been selected to simulate a real-life scenario in which an automated device has low processing power and limited physical space. A Raspberry Pi works on a fraction of cost and size in a way that is similar to a standard machine. It's a great forum for prototyping and design creation. The Quad Core 1.2GHz CPU is based on a 64bit device and has 1 GB of RAM. The Raspberry Pi is also equipped with a CSI and DSI port for the connection to a module and a touch screen. The Raspberry Pi also has 40 pins for general purposes for linking different hardware. The processor has an internet connection with a wireless LAN. Furthermore the mini computer has been used by CNNs and other deep learning system[14].

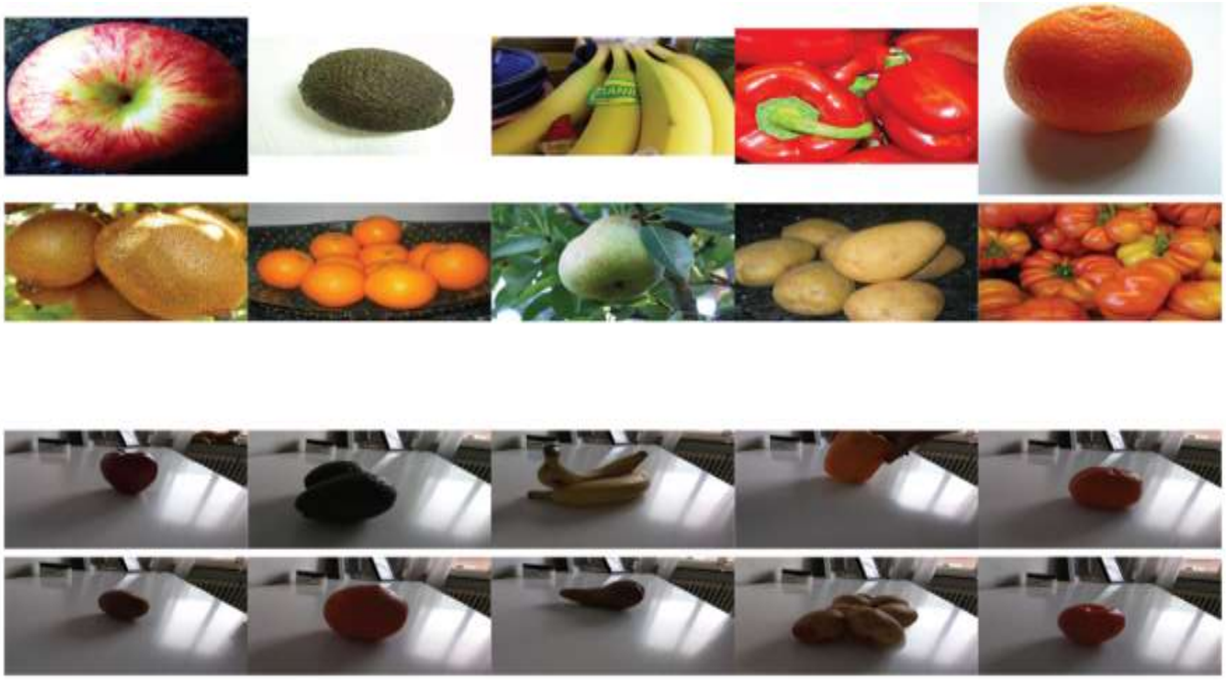

Fig. 3: Example images from each class. Top row: images from ImageNet. Bottom row: self-collected images.

C. Experimental analysis

This experiment is based on a TensorFlow[1] setup, based on a 2.4 GHz Intel i5 6-bit processor and an 8GB Ram 1700 MHz based on Windows 10 64-bit operating system, and the hardware platform for trainings is HP Pavilion 15AB522TX. The device was then packed as an APK and Android app with Android Studio. It was built. The testing unit for the experiments is the 4-GB RAM smartphone Sony Xperia X Plus, powered by a Snapdragon Octacore processor, running on the Android Naught OS. The next part of this section is the following: firstly, a basic introduction to the dataset; secondly, we present in detail the experiment process; then, we show the outcome of the experiment; lastly, by comparison experiment, we check the efficiency of this procedure.

Experimental Procedure

Preprocessing of images was used. Each species has 1000 images for the vegetable data set that we built and used[11]. If there are too few vegetable images for any species, we only need to mark the image in the dataset[2]. Therefore in addition to the image mark, some 200 images of the species must also be added to the dataset that contains a few images. Model-based learning transfer v3 [3]. The parameters for the last layer shall be retained and then the final layer shall be removed and the vegetable data set entered to retrain the last layer.The last layer of the model is the back propagation algorithm used for the weight parameter modifying the cross-entropy cost function by measuring the error between softmax layer output and the label vector of the specified sample class. The future extension of our project is voice assistant. The scanned fruits and vegetables will get the nutrients and the words that are found in the screen are converted to the speech through some software applications and this application will be excessively useful to those who are unable to see.

4. RESULTS AND DATASET

The dataset is generated by a white backdrop behind

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the fruit, which is done with the white sheet of paper. However the backdrop was not constant due to changes in the lighting conditions. In the 160*160 pixel image the fruits were up. In the future, it will be arranged to work with various systems and even larger images, as high-end processing units and multiprocessing architecture are needed for realistic simulation.

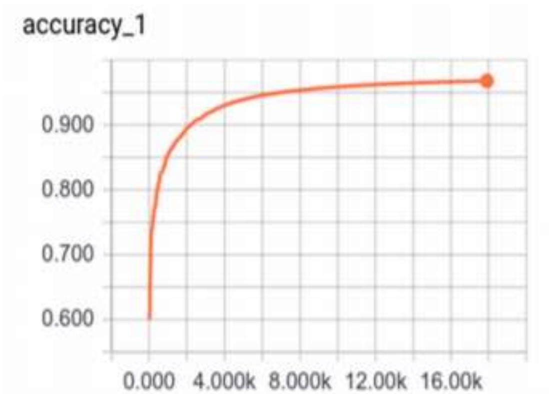

Figure 4. The variation of accuracy on the vegetable dataset.

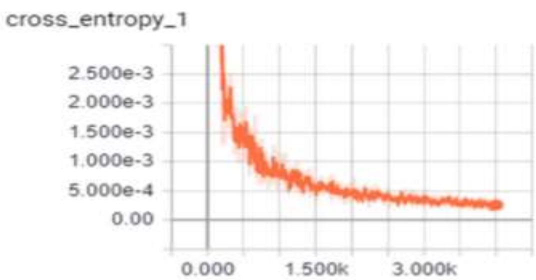

Figure 5. The variation of cross entropy on the vegetable dataset.

The accuracy and cross-entropy changes based on the vegetable data set are shown in Figure 4 and Figure 5. The orange line is the training set and the green line is the validation set[12].

In our research, we have 10 different classes. Apple, mango, banana, bell pepper, clémentine, kiwi, orange, potato and tomato are the classes of choice. The following are classes. These groups are chosen because some fruits and vegetables look identical and are mostly purchased on retail markets. Data set limitations were applied to prevent the project from being comprehensive. These restrictions are that all fruit or vegetable varieties are of the same type.Which means that for each fruit all types of apples are in the apples group and similar. ImageNet extracted a dataset of 400 images per class. In addition, the camera employed in this project was also used to capture 30 images per class. Images of fruit and greens without wrapping them in plastic bags have been taken for simplification. Figure 3 provides examples of images from each class.

Actual Class (columns) / Predicted Class (rows)

Inception	Apple	Avocado	Banana	Bell Pepper	Clementine	Kiwi	Orange	Pear	Potato	Tomato
Apple	9	0	0	0	0	0	0	1	0	0
Avocado	0	10	0	0	0	0	0	0	0	0
Banana	0	0	10	0	0	0	0	0	0	0
Bell Pepper	0	0	0	10	0	0	0	0	0	0
Clementine	0	0	0	0	2	0	4	0	0	0
Kiwi	0	0	0	0	0	0	0	0	0	0
Orange	0	0	0	0	0	0	6	0	0	0
Pear	1	0	0	0	0	1	0	9	0	0
Potato	0	0	0	0	0	7	0	0	10	0
Tomato	0	0	0	0	8	2	0	0	0	10

(a) Inception

Actual Class

Predicted Class

Mobilenet	Apple	Avocado	Banana	Bell Pepper	Clementine	Kiwi	Orange	Pear	Potato	Tomato
Apple	8	0	1	0	2	9	0	0	0	0
Avocado	0	10	0	0	0	0	0	0	0	0
Banana	0	0	7	0	0	0	0	0	0	0
Bell Pepper	0	0	0	10	0	0	0	0	0	0
Clementine	0	0	0	0	1	0	0	0	0	0
Kiwi	0	0	0	0	0	0	0	0	0	0
Orange	0	0	0	0	2	0	10	0	0	0
Pear	2	0	2	0	0	0	0	10	0	0
Potato	0	0	0	0	0	1	0	0	10	0
Tomato	0	0	0	0	5	0	0	0	0	10

(b) MobileNet

Fig. 6: Classification results: confusion matrix (top 1).

CONCLUSION

This project relies on many physical parameters by comparing the histograms of the image to find the best image. Our test results have shown that 99 percent of vegetable identification is correct, samples of images studied and images checked are demonstrated in this application. In agriculture and the food industry, a variety of computer vision and image processing techniques are used in vegetable and plant disease classification[13]. Most of the image processing work in this area consists of the three main steps (1) subtracting the context, (2) extractor and (3) training and classification. TensorFlow, a flexible model of programming focused on the data flow, along with a single machine and distributed implementations.To develop and improve this program, future work should be carried out the user-friendly interface offered and the application's selection of vegetables extended to improve the efficiency of the application. It would definitely increase the efficiency by adding several vegetables and increasing training data set.

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