Artificial Neural Network Based Approach for Food Recognition Using Various Filters

Upma Kumari [1], Praveen Gupta [2, *], Chaur Singh Rajpoot [3]

[1] Department of Computer Engineering, Poornima College of Engineering Jaipur, India
[2] Department of Computer Science and Engineering, GITAM School of Technology, GITAM (Deemed to be University), Visakhapatnam (Andhra Pradesh)-India
[3]Parul Institute of Technology, Parul University, Vadodara, Gujarat, India
Emails: upma2509.gaur@gmail.com; praveen2gupta@gmail.com
choursingh.rajpoot20976@paruluniversity.ac.in

* Correspondence: praveen2gupta@gmail.com

Abstract

Food image recognition system has various applications now a day. In this paper, we have used a machine learning supervised approach and Support Vector Machine to classify different food images. SVM has been classified to detect and recognize food images with the least modification. By applying various filters like a texture filter, a segmentation method, clustering, and a SVM approach we have achieved more accuracy than other machine learning approaches with manually extracting features. Sustenance is an indivisible piece of people groups lives. we tend to apply a convolution neural network (CNN) to the undertakings of analyst work and perceiving sustenance pictures. Clarification for the wide decent variety of styles of nourishment, and picture acknowledgment of sustenance things are typically unpleasant difficulties. Nevertheless, profound learning has been demonstrated starting late to be a genuinely extreme picture acknowledgment framework, and CNN could be a dynamic approach to managing profound learning. CNN showed on a very basic level higher precision than did old-fashioned help vector-machine-based courses with carefully assembled decisions. For sustenance picture disclosure, CNN likewise demonstrated fundamentally count higher precision than a standard technique. Generally higher precision than standard techniques.

Keywords: CNN; texture filter; k-mean clustering; segmentation

1. Introduction

In this research domain area, it concludes that a person will probably have health conditions, for example, hypertension, heart attacks, diabetes, high cholesterol, diseases, and circulatory damage. Legitimate sustenance enhances the soundness of individuals, particularly for individuals with extraordinary nourishment and nourishment needs. Individual well-being applications likewise require sustenance admission information to effectively avoid medical issues and enhance life quality. Our objective is to empower clients with an advantageous, CNN and an exact framework that causes them to wind up plainly mindful of their calorie consumption and furthermore end the individual supplement's content in the nourishment thing. To distinguish the nourishment in the framework, picture preparation, and division is utilized, measuring the volume of every sustenance parcel and measuring individual supplements iron sugar, and protein in the nourishment. A programmed sustenance classification framework with expanded exactness enhanced speed and decreased generation cost is earnestly required. General protest acknowledgment strategies have been connected to sustenance acknowledgment. These systems incorporate shading histogram; surface and sack of include classification. Lately, PC vision frameworks have been utilized immeasurably

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in sustenance acknowledgment methods (Gupta & Kaur, 2014; Liew Pol Yee & De Silva, 2002). Nonetheless, we all in all understand that there's a gigantic, arranged characteristics of sorts of nourishment. Without a doubt, even inside. Unclear sustenance class, there are sizable, arranged qualities. Subsequently, despite the tries at nourishment thing acknowledgment, acknowledgment execution isn't in any case worthy. Concerning sustenance picture acknowledgment (Velvizhy et al., 2014; Zhang et al., 2015). Nourishment adjusts, a side of healthful substance, was measurable by picture process (Aizawa et al., 2013; Bosch et al., 2011; Liew Pol Yee & De Silva, 2002). Picture recovery was connected to sustenance Recording. Profound learning has as of late been used in picture acknowledgment. Profound learning is a total term for figuring shaving a profound outline that deals with complex issues.

2. Brief description of the Food Recognition System:

It has been shown in the literature that recognizing different kinds of food with various appearances, for the recognition, it uses many algorithms like Support Vector Machines, K-Nearest Neighbor, Convolution Neural Networks, Multiple Kernel Learning, Deep Convolution Neural Networks, and Artificial Neural Networks. The main contribution of this dissertation is to the recognition of food using an Artificial Neural Network. The image contrast improved a lot after performance analysis and it's due to the designed technique. We accomplished a high-accuracy result with great computational efficiency.

2.1 CNN-Based Approach for Food Recognition

A CNN depends on a gathering of associated units called artificial neurons, (undifferentiated from axons in a natural mind). Every association (neurotransmitter) between neurons can transmit a flag to another neuron. The getting (postsynaptic) neuron can process the signal(s) and after that flag downstream neurons associated with it. Neurotransmitters and neurons may have a weight that changes as understanding improves. which may increment or decrease the quality of the flag that it sends downstream. CNN highlights have turned out to be effective for picture classification as well as picture recovery and specific question acknowledgment assignments. For this situation, a DCNN can be utilized for just an element extractor, and a direct SVM is generally utilized as a more tasteful.

2.2 Building A Dataset

Various pictures of conventional suppers element essential for the examination of sustenance thing acknowledgment. A feast picture for the most part includes a few sustenance things. Among the examination of sustenance thing acknowledgment, every nourishment thing district of the picture may be ideated from the dataset. Nourishment logging applications accessible for advanced mobile phones can make heavenly information, for this reason, we tend to have a tendency to make utilization of the information made by Food-Log (FL). A definitive open can utilize the Client to take a photo of a supper, and animal groups in every area including a sustenance thing by means of the bitboard show of the advanced cell by in swing the name nourishment thing(Aizawa et al., 2013; Detrano et al., 1989; Singh & Bansal, 2012). The sustenance thing name is typically looked over standard nourishment information. Thus, clean data with respect to picture areas of named nourishment things unit made. In our observations with nourishment acknowledgment, areas in that client's specie were marginally augmented because clients tend to indicate little districts for the sustenance things. American state could likewise be an openly accessible application, and, with the number of clients developing, the sustenance thing dataset is expanding. It took two months to gather recorded learning from Everglade State.

2.3 Detection of nourishment

The nourishment Recognition System is utilized to perceive the sustenance picture. To Recognize the nourishment in our framework there are different strides like pre-preparing, picture division, highlight extraction, and classification. Pre-processing: Pre-handling is a typical name of operation with pictures at the most minimal level of deliberation both information and yield are power pictures. The point of preprocessing is a change of picture information and expelling com- motion and standardizing the sustenance picture if the picture in any configuration needs to change over in specified design, resize in the specified size and expel superfluous components from it. It is a strategy for pre-preparing like Histogram balance, altering an RGB picture to Grayscale change, and so forth. Picture Segmentation: Image division alludes to the deterioration of a scene into different segments (subsequently

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to encourage the errand at more elevated amounts, for example, object identification and recognition). In Segmentation, the picture is divided into a square with portions. After division, the limited location of unpredictable sustenance divides turns out to be simple and it gives better identification of the nourishment parcel.

Highlight extraction: Feature extraction is a critical phase of the Food Recognition System where the execution of acknowledgment is dependent. It removes the significant arrangement of data which is known as a vector. Vector tells qualities of sustenance in pictures.
Classification: Classification applies to the component vector of preparing and testing the picture. this is utilized for the consequence of result in acknowledgment. There is a classier one like a Convolution Neural Network (CNN), Support Vector Machine (SVM), and Deep-learning Neural Network (DCNN).(Bosch et al., 2011; Devi, 2015; He et al., 2016)

3. Proposed Methodology of Food Recognition

This part gives a concise presentation of the Methodology of Food Recognition. In the execution half rst o we tend to take an infrequent qualification picture, or we will include a conventional picture so add a mathematician clamor thereto picture to imagine the execution of our arranged technique on shouting picture. At that point we tend to execute the predominant strategies on the shouting picture and got some expanded pictures then we tend to take after the arranged strategy for half and half system wherever we tend to utilize formal rationale and neural system for picture change here rst o we tend to utilize the origination of neural system wherever we tend to apply fourteen different fluffy guidelines on the hollering picture and set up the weights of Neural system. so from those weights, we will see some unequivocal esteems that at that point used in fuzzy classification strategy. Here we tend to arrange 3 enrollment performances for fuzzy classification strategy together with triangular participation capacity and 2 quadrilateral enrollment capacities. At that point, we tend to apply the de fu technique to prompt the enhanced picture once the entire procedure. At the tip, we will analyze different expanded pictures of existing procedures with the enhanced picture got from the arranged philosophy.(Chen et al., 2009; Kawano & Yanai, 2013; Liew Pol Yee & De Silva, 2002)

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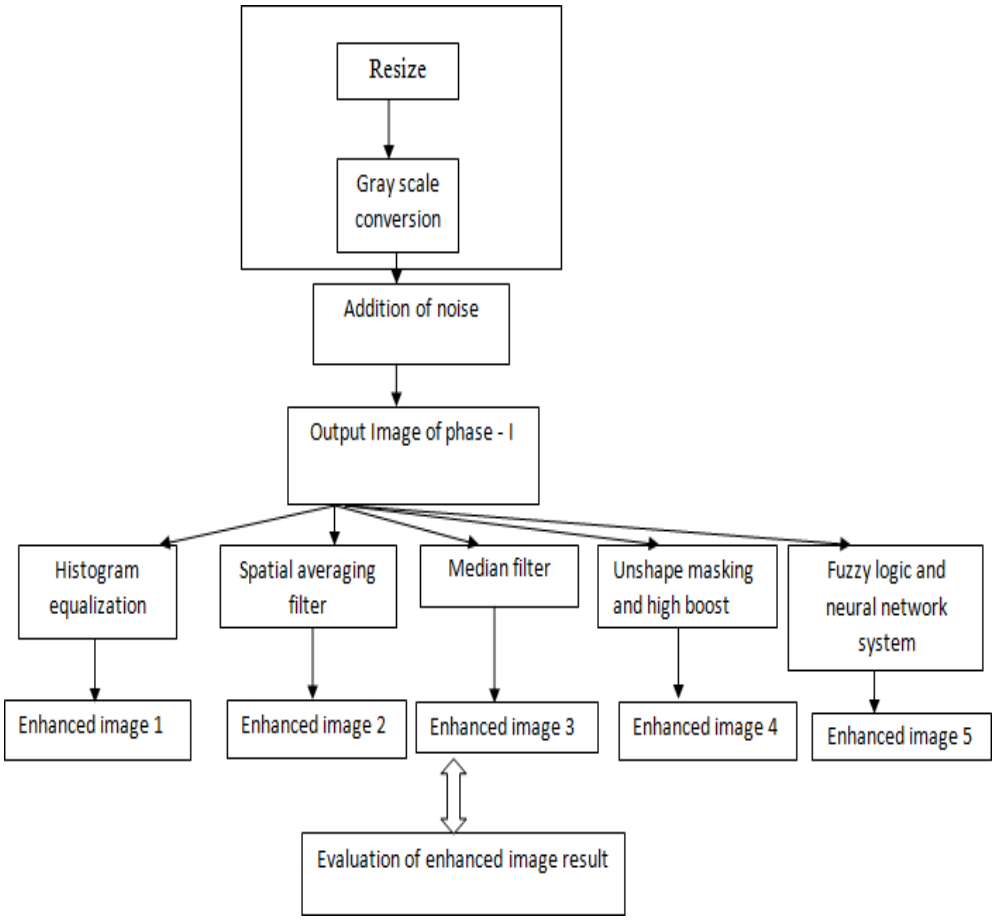

Figure 1: Classification of Different Image Conversion

3.1 Food Detection

We consider the sustenance recognition errand. It is different from sustenance thing acknowledgment in nourishment identification is a twofold classification of sustenance and non-nourishment pictures. In an entire picture that may contain sustenance and foundation, nourishment identification is most tasteful the picture as sustenance or non-nourishment. We directed analysis to assess CNN's execution. For this location undertaking, we utilized a different dataset because of including non-nourishment pictures. The flow of the proposed work appeared in Figure 3.3.

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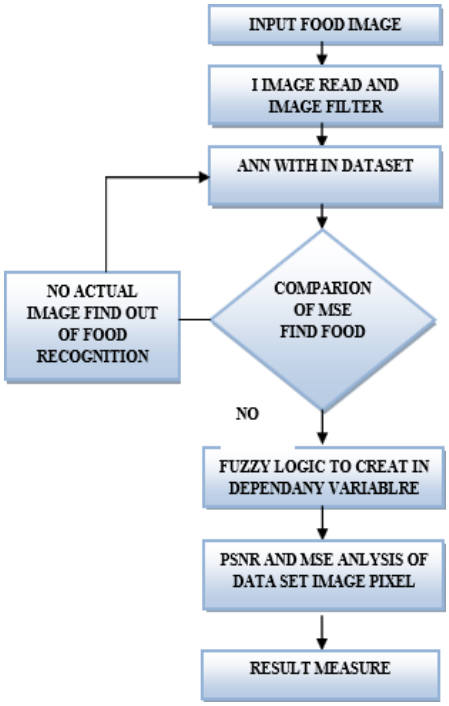

Figure 2: Flow of Proposed Work

3.2 Texture Segmentation Using Texture Filter

This case demonstrates the utilization of surface division to recognize districts in view of their surface. You will likely fragment two sorts of textures in a picture utilizing surface filters.

Properties of Texture Segmentation-

ˆAccuracy to expanding by utilizing high pass Filter strategy. ˆ Edge identification is additionally underneath the pass filter connected to distinguishing sustenance things. ˆThis strategy expands the limited power of any protest. ˆSharpening to enhance pictures

Figure 3.: Original Image

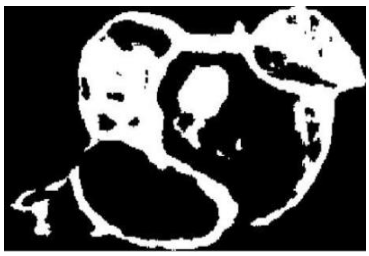

Figure 4: Textual Segmentation 1

Figure 5: Textual Segmentation 2

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3.3 Marker-Controlled Watershed Segmentation Method

This case demonstrates the utilization of watershed division to isolate touching items in a picture. The watershed change is regularly connected to this problem.

Properties of water Segmentation technique -

ˆ These depend on the guideline of morphology.

ˆ Based on high catch area.

ˆ Using the dim(gray) shading contrast and background of the picture.

ˆ Watershed method is a suitable approach to finding out the food.

ˆ These are tracking the light and dark pixels to convert for high and low intensity for lightness these are removed noise and highly efficient methods.

3.4 Color Segmentation using K-Means Clustering Method

The following example shows the use of segment colors in an automated fashion using the L*a*b* color space and K-means clustering.

ˆ This method creates a suitable gap between the higher and lower intensity of any image.

ˆ These are removed from the white Gaussian noise of any image.

ˆ Statically to remove the noise.

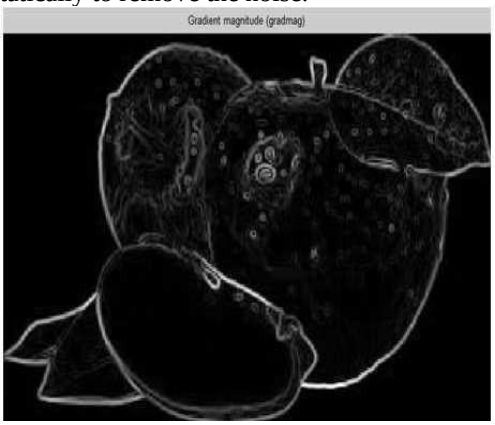

Figure 6: Watershed Segmentation of Gradient Magnitude(gradmag).

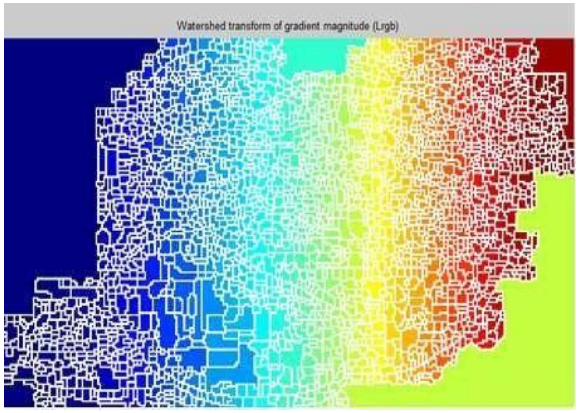

Figure 7: Watershed Transform of Gradient Magnitude(lrgb)

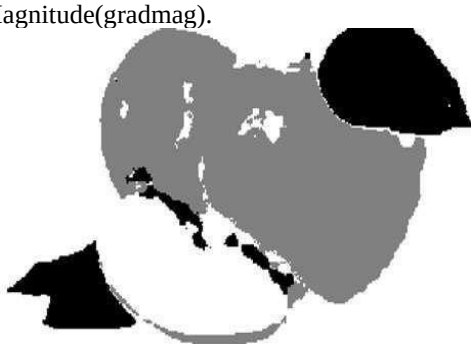

Figure 8: Image Labelled by Cluster Index.

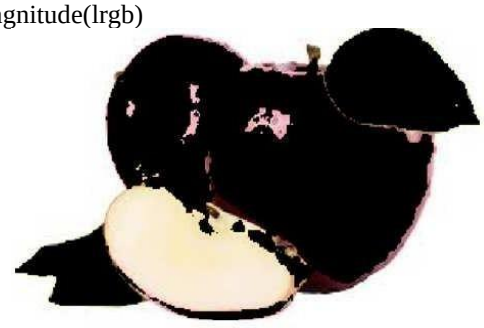

Figure 9: Object In Cluster1

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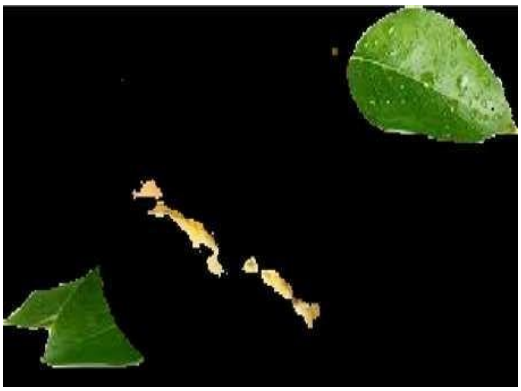

Figure 10: Object In Cluster2

Figure 11: Object In Cluster3

4. Experimental Result and Simulation

To improve the image contrast in the presence of a Convolution neural network has been implemented using MATLAB R2012b. Figure 4.1 shows Training, Testing, Validation, and overall Regression. Figure 4.2 shows a gradient of the dataset in terms of validation and mu. Figure 4.3 shows the error histogram with 20 bins for the three steps of training, Validation, and testing in convolutional neural network modeling. Figure 4.5 shows the output tracks the targets very well for training, testing, and validation, and the R-value is over 0.94 for the total response.

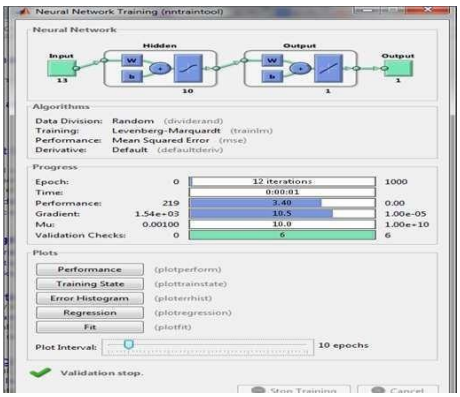

Figure 12: Layered MSE Iteration

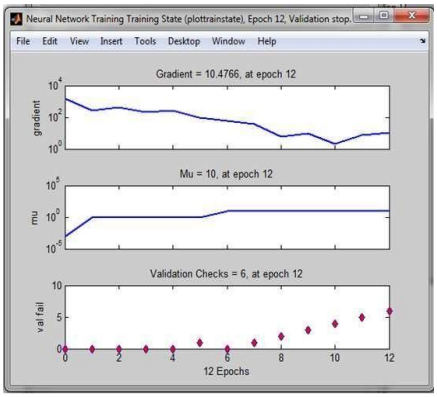

Figure 13: Gradient of Dataset

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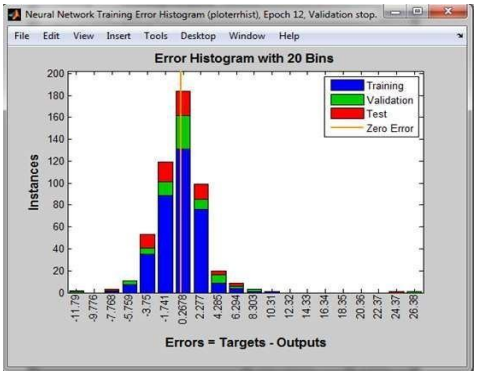

Figure 14: Error of Histogram

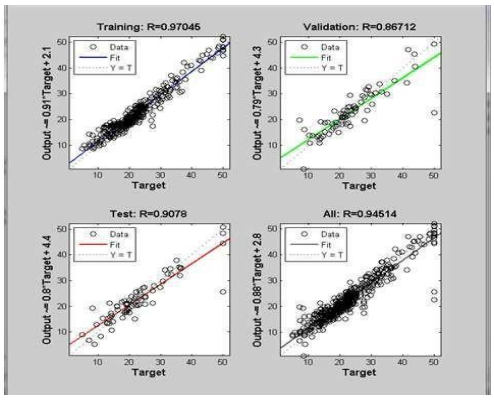

Figure 15: Recognition Output

Figure 16: Import Data

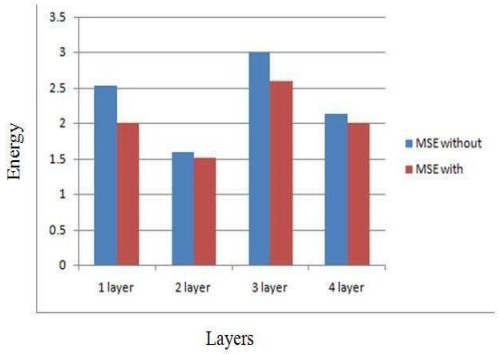

Figure 17: MSE Layer

5. Conclusion and Future Work

In this paper, an Artificial Neural Network based approach for food recognition using various filters is proposed to recognize Food. In this approach, we use various segmentation filters like Texture Segmentation Using Texture Filter which is used for accuracy, sharpening, and Edge identification. Marker Controlled Watershed Segmentation Method which is tracking the light and dark pixels to convert for high and low intensity for lightness these are removed noise and highly efficient method. Color-based segmentation using the K-Means Clustering Method creates a suitable gap between the higher and lower intensity of any image.

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