Analysis of Food Recognition and Calorie Estimation using AI

Kalivaraprasad.B[1], MVD.Prasad[2], R.Vamsi[3] ,U.Tejasri [4],M.NVVSLD Santhoshi[5],S.Mohan[6]

[1,2,3,4,5] Dept of ECE, KLUniversity, Vaddeswaram, Guntur (dt)-India

[6]The University of South-Pacific, Fiji

baditakali@gmail.com[1]

Abstract. Nowadays, standard admission of sound food is fundamental for keeping a reasonable eating routine to dodge corpulence in the human body. In this paper, we present a novel framework dependent on AI that naturally performs exact grouping of food pictures and gauges food credits. This paper proposes a profound learning model comprising of a convolutional neural organization that orders food into explicit classifications in the preparation part of the model framework. The principle reason for the proposed technique is to improve the exactness of the pre-preparing model. The paper plans a model framework dependent on the customer worker model. The customer sends a picture location solicitation and cycles it on the worker side. We actualized three classifier SVM, ANN, CNN for analyse the improved precision of framework. counting a pre-prepared CNN model preparing module for grouping purposes, a book information preparing module for trait assessment models, and a worker side module. We explored different avenues regarding an assortment of food classes, each containing a great many pictures, and through AI preparing to accomplish higher grouping exactness.

Keywords: CNN, SVM, Accuracy, Loss, Image-Segment, Filters.

1. Introduction

Technology Assisted Dietary Assessment (TADA) has been one of Purdue EPICS' most important experiences for mounting sustenance intercession programs. With the developing worry about stoutness, the need to precisely gauge food consumption has gotten basic[1]. For instance, dietary evaluation among young people is dangerous as this gathering has sporadic eating designs and less energy for recording food consumption. Primer examinations among youths propose that the creative utilization of innovation may improve the exactness of dietary data from youthful people. Acknowledgment of arising headways in innovation, e.g., higher goal pictures, improved memory limit, quicker processors, permit these gadgets to deal with data not already conceivable. The objective is to create, actualize, and assess a cell phone food record (mdFR) that will mean a precise record of day by day food and supplement consumption among youths and adults[4]. Our initial steps incorporate further advancement of our pilot portable figuring gadget to incorporate computerized pictures, a supplement data set, and picture handling for recognizable proof and evaluation of food utilization. Versatile figuring gadgets give an exceptional vehicle

to gathering dietary data that diminishes trouble on record managers. Pictures of food can be set apart with an assortment of info strategies that connect the thing for picture handling and investigation to gauge the measure of food. Pictures when food sources are eaten can gauge the measure of food consumed[6,8]. The proposed framework or application to help typical individuals just as hefty individuals in adjusting their eating regimen by estimating every day consumption food ascribes and fixings through their straightforwardness. The proposed application will empower the client to sort out the substance of the food thing by giving the photo of food to the framework. The application will identify the food things inside the photo and remember them utilizing Convolution Neural Network. The framework can likewise appraise the food ascribes by creeping information from the Internet. The impending substance of this paper is organized as follows. Area II represents three classification models commonplace ANN,SVM,CNN plans are analysed first. Segment III portrays the proposed and existing framework . Area IV portrays the plan of CNN framework ; Results and reproduction results and correlations with earlier frameworks are given in segment V. Last however not the least, in segment VI Conclusions are made dependent on the exhibition.

2. Related Work

In Histograms of Oriented Gradients for Human Detection paper the topic of capabilities for hearty visual item acknowledgment, receiving straight SVM based human recognition as a test case[1]. In Object Detection with Discriminatively Trained Part-Based Models depicts an article discovery framework dependent on combinations of multiscale deformable part models. In Image-Based Date Fruit Classification introduced a strategy for programmed arrangement of date organic products dependent on PC vision and example acknowledgment. In Automatic leafy foods arrangement from pictures Contemporary Vision and Pattern Recognition issues, for example, face acknowledgment, fingerprinting distinguishing proof, picture order, and DNA sequencing regularly have a discretionarily enormous number of classes and properties to consider. To manage such complex issues utilizing only one component descriptor is a troublesome errand and highlight combination may become mandatory[10].

3. Existing System Work

In the current framework numerous food things perceived application has been actualized existing framework as for the order procedures, the most generally utilized are k-NN classifiers and Support Vector Machines An assessment of various arrangement strategies is accounted for in where SVM,[3] Artificial Neural Networks and Random Forest grouping techniques are dissected. As of late, Convolution Neural Network (CNN) is utilized with regards to food acknowledgment Researches in the writing has frequently cantered around various parts of the food acknowledgment issue. Numerous works address the difficulties in the acknowledgment of food by creating acknowledgment procedures that vary as far as highlights and order systems.

Concerning the highlights of framework AI calculation has been implemented[2,7]. The Disadvantages of this framework are less accuracy, less sensitivity, less specificity, high calculation time.

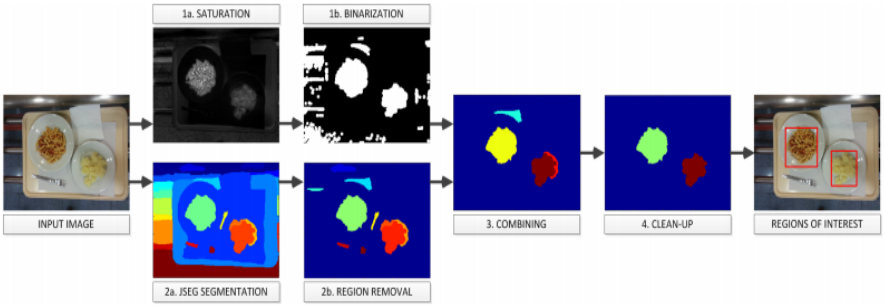


Fig.1. Food Recognition

Fig.1 is the food consider for training and testing which is used for food recognition with segmentation.

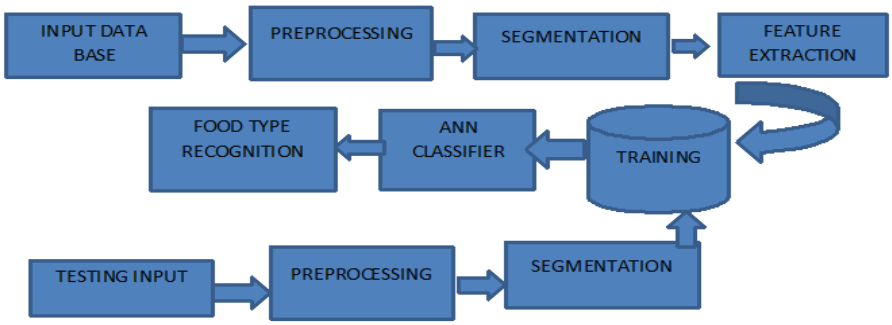


Fig.2. ANN Classifier for Recognition

Fig.2 and Fig.3 is the food consider for training and testing which is used for food recognition with segmentation using svm and ANN classifier .

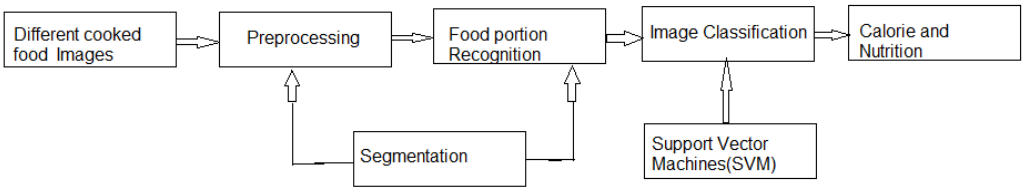


Fig.3. SVM Classifier for Recognition

Pre_ Processing

Generally, the pictures that are acquired during picture procurement may not be appropriate straight for distinguishing proof and grouping purposes due to specific elements, like commotion, lighting varieties, climatic conditions, helpless goals of a picture, undesirable foundation, etc.

FCM (fuzzy c mean clustering)

The fuzzy c-means (FCM) figuring is a packing estimation made by Dunn, and later on, improved by Bezdek. It is significant when the important number of bundles is pre-settled; in like manner, the count endeavours to put all of the data centres to one of the gatherings. What makes FCM particular is that it doesn't pick the absolute support of a data feature a given pack; in light of everything, it registers the likelihood (the degree of enrolment) that a data point will have a spot with that gathering. Thusly, dependent upon the precision of the gathering that is required eventually, appropriate versatility measures can be set up. Since the preeminent enrolment isn't resolved, FCM can be incredibly fast considering the way that the amount of accentuation expected to achieve a specific gathering exercise looks at to the essential precision.

Colour Feature Extraction

Shading space addresses the tone as force esteem. It can indicate, envision and make the tone by utilizing the shading space technique. There are distinctive shading highlight extraction strategies which incorporate like a.Histogram Intersection Method,(HI) considers worldwide shading Features. The shading histograms X and Y with k containers for each are characterized in the Histogram Intersection strategy, the quantity of canisters has an effect on execution. The enormous no of canisters addresses the picture in a mind-boggling way it expands the computational intricacy.

GLCM (The Grey Level Co occurrence Matrix)

The Gray Level Co-Occurrence Matrix ss Statistical methodology. Surface highlights are determined from the measurable conveyance[5]. This strategy is a procedure of separating resulting request factual surface highlights. The components of the grid address the relative recurrence. This strategy depicts surface by making insights of the dispersal of power esteems just as area and direction of comparatively esteemed pixels.

Neural Network

Neural Networks (NN) are significant information digging instruments utilized for characterization and bunching. It is an endeavour to fabricate a machine that can impersonate cerebrum exercises and learn.NN normally learns as a visual demonstration. On the off chance that NN is provided with enough models, it ought to have the option to perform characterization and even find new patterns or examples in information. Fundamental NN is made out of three layers, information, yield, and covered up layer. Each layer can have various hubs and hubs from the information layer are associated with the hubs from the secret layer. Hubs from the secret layer are

associated with the hubs from the yield layer. Those associations address loads between hubs Artificial neural organizations (ANN) think about characterization as quite possibly the most unique exploration and application zones. The significant disservice in utilizing ANN is to track down the most suitable gathering of preparing, learning, and move capacities for grouping the informational collections with a developing number of highlights and characterized sets. The various mixes of capacities and their impact while utilizing ANN as a classifier are considered and the rightness of these capacities are dissected for different sorts of datasets. for example it is given in matched information of info and yield[9]. The blunder emerging from the error between the organization yield and the objective is utilized to improve the organization boundaries. When the organization has been prepared, To begin with, the organization is prepared on a bunch of combined information to decide the info yield planning. The loads of the associations between neurons are then fixed and the organization is utilized to decide the orders of another arrangement of information. During arrangement, the sign at the information units spreads completely through the net to decide the initiation esteems at all the yield units. Every one of these secret units computes its own initiation worth and this sign is then given to yield units. The capacity totals together the commitments of all sending units, where the commitment of a unit is characterized as the heaviness of the association between the sending and accepting units increased by the sending unit's enactment esteem[11]. This whole is normally then further altered, for instance, by changing the enactment aggregate to an incentive somewhere in the range of 0 and 1 or potentially by setting the initiation incentive to zero except if a limit level for that entirety is reached.

4. CNN Work

The proposed an exchange learning-based novel framework that consequently plays out the specific characterization of the food picture and gauges the food ascribes. The work presents the dataset for assessing the current framework and other profound learning-based acknowledgment frameworks that will be created later on[14]. There is no informational collection that contains sub-mainland dishes accessible to people in general, so made another arrangement of information that incorporates both sub-mainland and other normal foods.

Pre-Trained Convolutional Neural Network Model

A pre-prepared organization model is utilized in AI to conquer the issue that the framework stalls out in nearby arrangement while in its preparation age. These models can do machine preparing to react quickly to various information[8]. A CNN model that we utilized in our proposed cycle of moving learning - based food acknowledgment and extraction credits utilizes an assortment of food things from our readied dataset to get various attributes from an article.

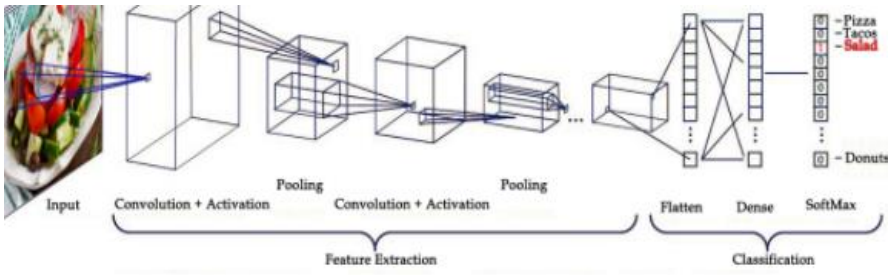


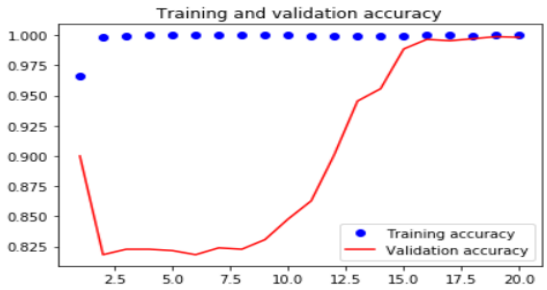
Fig.4 : Food items Recognition using CNN Layers

A CNN involves data and a yield layer, similarly as various mystery layers. The mysterious layers of a CNN routinely involve convolutional layers, pooling layers, totally related layers, and normalization layers[13]. The depiction of the communication as a convolution in neural associations is by the show. Mathematically it is a cross-association instead of a convolution. This simply has significance for the rundowns in the framework, and consequently which burdens are put at which list. A convolutional neural association (CNN or ConvNet) is conceivably the most notable computations for significant learning[4], such an AI wherein a model sorts out some way to perform portrayal tasks clearly from pictures.

5. Results and Discussion

Table.1:Training and Testing data set for quality Analysis

NO	Food Name	Training	Testing	total	calories	Estimated calories
1	Apple	80	20	100	53.96	40.48
2	Banana	88	20	108	170.88	188.81
3	Carrot	352	20	372	31.16	26.28
4	Cucumber	116	20	136	29.44	37.65
5	Onions	122	20	142	44.88	37.13
6	Orange	241	21	262	69.09	71.92
7	Tomato	100	20	120	17.46	13.82
8	Rice	128	20	148	56.45	54.23
9	cheese	293	20	313	65.23	68.52



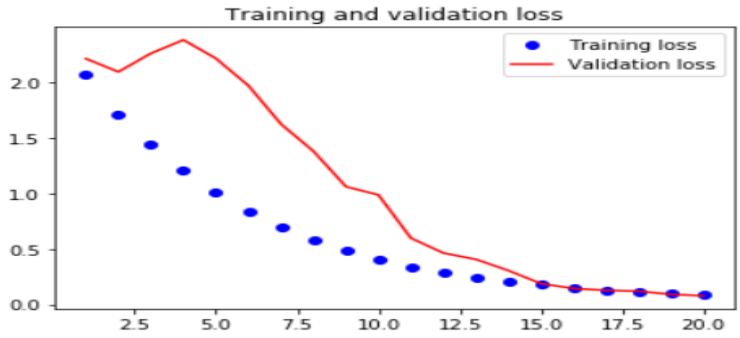


Fig.5.The accuracy graph and loss graph using CNN

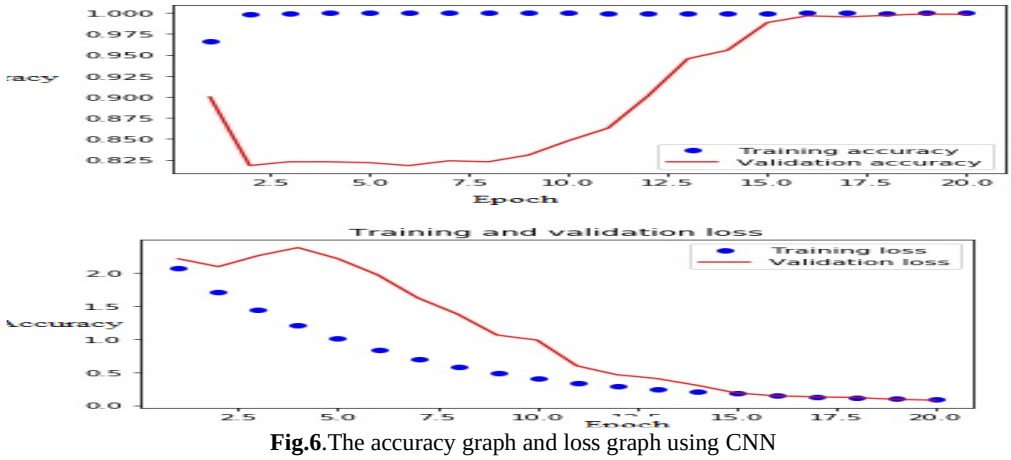


Fig.6.The accuracy graph and loss graph using CNN

6. Conclusion

In this the proposed the utilization of an exchange learning and adjusting convolution neural organization model Resnet-50 for picture object discovery. The preparation information of various pictures is utilized to lighten the trouble in portioning food. The neural organization utilized is an adaptable answer for taking care of various scales, sizes, and angle proportions[12]. These issues are significant in visual acknowledgment, however with regards to profound organizations, they frequently get little thought. Additionally, it shows extraordinary precision in division/identification undertakings. Utilizing CNN the testing exactness showed is 97% with a deficiency of 2%. In the current techniques, the precision is less contrasted with CNN.

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