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SKIN DISEASE RECOGNITION METHOD BASED ON IMAGE COLOR AND NEURAL NETWORK

1.GUDURU DIVYA,2. DR.PRAVIN KSHIRSAGAR,3. NELIKANTI SREEJA, 4. KUKUDALA JHANSI1,3&4.UG SCHOLAR,2. PROFESSOR& HEAD - ECE

DEPARTMENT OF ECE, AVN INSTITUTE OF ENGINEERING AND TECHNOLOGY, KOHEDA ROAD, IBRAHIMPATNAM(M), R.R.DIST-501510, HYDERABAD

ABSTARCT:

Skin diseases have a serious impact on people's life and health. Current research proposes an efficient approach to identify singular type of skin diseases. It is necessary to develop automatic methods in order to increase the accuracy of diagnosis for multitype skin diseases. In this paper, three type skin diseases such as herpes, dermatitis, and psoriasis skin disease could be identified by a new recognition method. Initially, skin images were preprocessed to remove noise and irrelevant background by filtering and transformation.a deep neural network based ensemble method is experimented for automatic identification of skin disease from dermoscopic images.

INTRODUCTION:

Composed of epidermis, dermis, and subcutaneous tissues, skin is the largest organ of human body, containing blood vessels, lymphatic vessels, nerves, and muscles, which can perspire, perceive the external temperature, and protect the body. Covering the entire body, the skin can protect multiple tissues and organs in the body from external invasions including artificial skin damage, chemical damage, adventitious viruses, and individuals' immune system. Besides, skin can also avoid the loss of lipids together with water within epidermis and dermis so that skin barrier function can be stabilized [1]. In spite of defense and barrier function, skin is not indestructible in that skin tends to be constantly influenced by a variety of external and genetic factors. Currently, there are three main types of skin diseases appearing in human body, including viral skin diseases, fungal skin diseases, and allergic skin disease. Despite the fact that these types of skin diseases can be cured at present, these diseases indeed have brought trouble to patients' life. Nowadays, the majority of conclusions on the patients' existing symptoms are drawn mainly based on doctors' years of

experience or their own subjective judgments, which may lead to misjudgments and consequently delay the treatment of these. +erefore, it is of great theoretical significance and practical value to study how to extract symptoms of diverse skin diseases on the basis of modern science and technology. Under this circumstance, effective and accurate identification of the types of skin diseases can be achieved to prescribe treatment according to patients' symptoms [2]. Over the past few years, the image processing technique has achieved rapid development in medicine. Some equipment based on digital image technology has also been widely applied to people's everyday life, for instance, computed tomography (CT), digital subtraction angiography (DSA), and magnetic resonance imaging (MRI). Deeper research on this direction has been carried out by scholars all over the world. For example, the skin disease varicella was detected by Oyola and Arroyo [3] through image processing technique's color transformation, equalization as well as edge detection, and the image of varicella was eventually collected and classified through Hough transform. +e final empirical results demonstrated that a better diagnosis was received in terms of detection on varicella, and preliminary test was also conducted onvaricella and herpes zoster on that basis. Chung and Sapiro [4] put forward a method to detect the image of skin lesions based on partial differential equation (PDE), with which a contour model of skin lesions was extracted on the basis of its morphological filtering through PDEThe classification of pigmented skin lesions with unaided eye is challenging, even for the highly experienced dermatologists. So, dermoscopy is used for visual inspection of the skin lesions in a better way. This device can magnify the inspected regions as well as eliminates the surface reflection of the skin which leads to improve the diagnostic accuracy. But in several occasions using dermatoscope a trained experts also fail to make correct prediction [1], [2]. Hence, several computer assisted automated approaches are proposed to analysis dermoscopy images [3]–[5]. The identification of skin disease from dermoscopy images are treated as an image classification problem. The tradition approach of image classification needs robust feature representation which are feed to the classifier for training. So, inspired by the medical diagnostic procedure several color, texture and shape features are used to characterize the skin lesion. However, it is very much difficult to develop robust feature representation to deal with the dermoscopy images obtained from different acquisition devices and captured in diverse illumination conditions [3]. This

draws the computer vision researchers to use deep convolutional neural networks. The convolutional neural network (CNN) [16][17][18][19][20]binds the feature extraction, feature selection and classification modules into a single unit. It can automatically extract discriminating features from the labelled images [6]. Hence, CNN produces unimaginable performance in several image classification problems. But the limitation of CNN is that it is data hungry[26][27][28][29][30]. So, to get rid of that, transfer learning is used [7]. The transfer learning approach is nothing but tricky initialization of the network weights. In transfer learning scheme, the network weights are initialized with the leant weights of a CNN trained on another dataset[21][22][23][24][25]. Generally, a CNN trained on the imagenet classification challenge is used for that purpose. In this paper, ensemble of deep convolutional neural networks are used to classify the dermoscopy images into one of the seven disease classes- Melanoma, Melanocytic nevus, Basal cell carcinoma, Actinic keratosis, Benign keratosis, Dermatofibroma and Vascular lesion. We fine-tune three popular deep learning architectures namely- ResNet50 [8], DenseNet121 [9] and MobileNet-50 [10]. to predict the disease class. Finally, a majority-voting is applied on the basis of the predicted class probability maps obtained from the trained classification networks.

DATASET

In this research, the challenge dataset produced for the workshop ISIC 2018: Skin Lesion Analysis Towards Melanoma Detection1 is used [11], [12]. In training set, there are a total of 10015 skin lesion images from seven skin diseases- Melanoma (1113), Melanocytic nevus (6705), Basal cell carcinoma (514), Actinic keratosis (327), Benign keratosis (1099), Dermatofibroma (115) and Vascular (142). The validation dataset consists of 193 images. Sample images from all seven lesion

EXISTING SYSTEM:

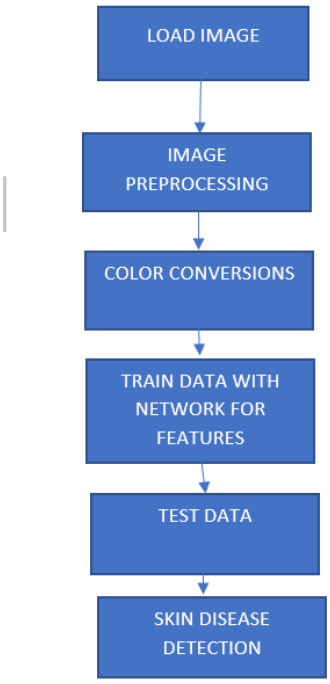
- Skin tone is often combined with other cues like texture and edge features. This is achieved by breaking down the image into individual pixels and classifying them into skin colored and non-skin colored [1]. One simple method is to check if each skin pixel falls into a defined color range or values in some coordinates of a color space. There are many skin color spaces like

RGB, HSV, YCbCr, YIQ, YUV, etc. that are used for skin color segmentation

- K -means A clustering method for grouping similar data, that is popular for cluster analysis in data mining .K-means clustering[2] aims to partition observations on different categories. The problem occurs if the dataset is very large, complex and computational of clustering is difficult. So, the proposed method directly uses an ensemble of neural network models [10]where clustering is not used for better efficiency
- Image gradient The edge detector[15][26][27][28][29][30] in most of image processing models uses an image gradient algorithm for edge detection.Using Image Gradient algorithm various points are not detected accurately. Differentiating the background pixels and foreground pixels will not be that much accurate. For example, differentiating the skin and the background will be not accurate. This is the major disadvantage of using image gradient algorithm[3]. The proposed approach overcomes this issue. In the proposed system the features are extracted first various values differentiate the background and foreground pixels.
- RGB color algorithm Unique features from the medical image are taken and are segmented using Histogram algorithm. The diseases are classified based on the Histogramvalues[4] and tolerance level value of the image. We taking into consideration of mean values[4] of images RGB(RED,GREEN,BLUE).The values are calculated and the background of the images is considered to be black. This is not applicable for all images where the error in mean values may occur and the background of the image may not be black always. The proposed model does not take mean values and the features are not extracted based on the histogram. So the possibility of the wrong classification of the image is avoided.

PROPOSED METHODOLOGY In this paper, we used ensemble of three trained convolutional neural networks to identify the skin lesion. Ensemble learning is nothing but aggregation of predicted scores obtained from different classifiers. It is used for combining multiple weak

classifiers to develop a stronger classifier. The individual classifiers can be constructed in several ways such as (a) using different classification algorithms [31][32][33][34][35][36],(b) training same classifier with different hyperparameters (c) using different training sets. In this paper, we used three state-of the art convolutional neural network models namely ResNet50 [8], DenseNet121 [9] and MobileNet [10]. The success of these networks in image net classification challenge motivate us for choosing them. The training dataset suffers from data imbalance. We tackle this problem by back propagating the weighted loss from the loss layer. For classifier model construction, we fine-tuned the pre-trained weights of these models separatelyFinally, the average predicted class probabilities obtained from these trained networks are used to decide the class label of the test image. Thus an input image is classified into one of the specified lesion classes.



RESULTS:

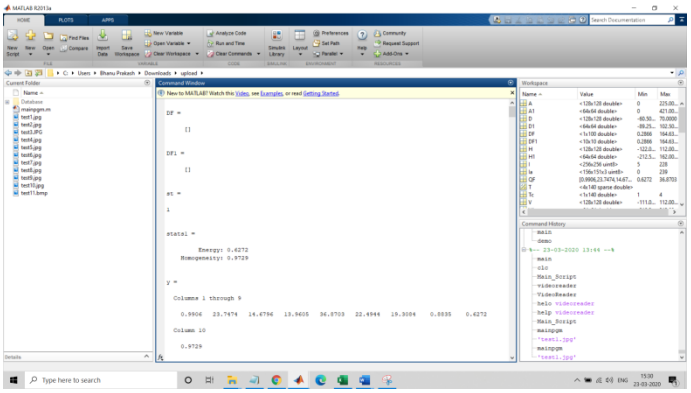


Fig (1)

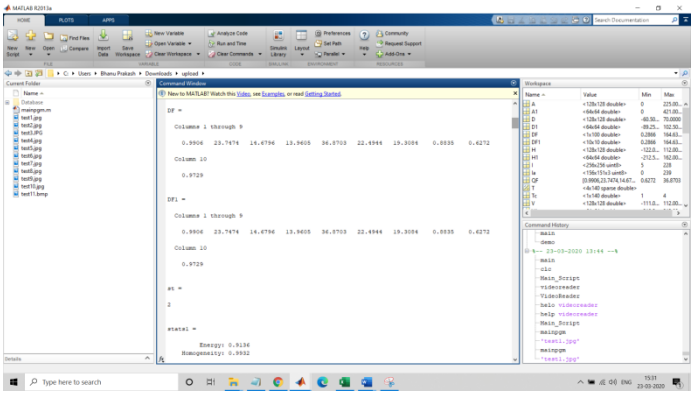


Fig (2)

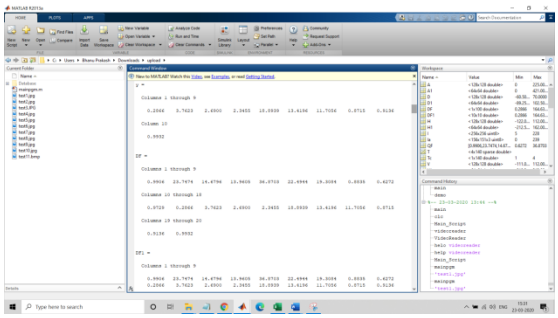
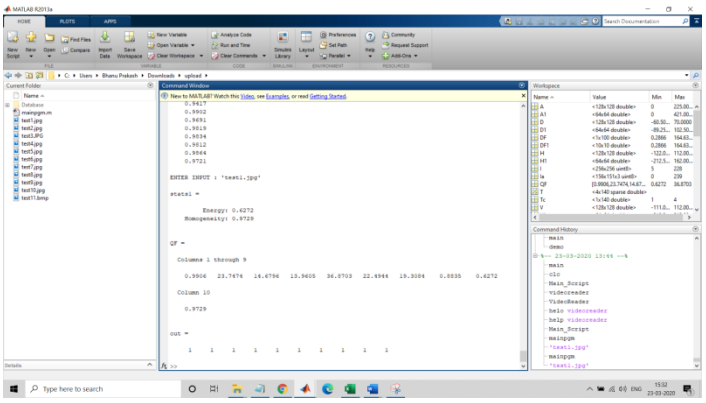
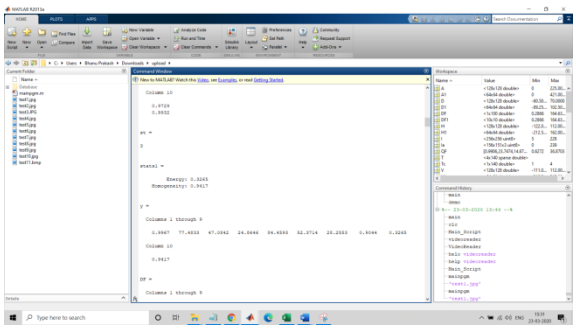


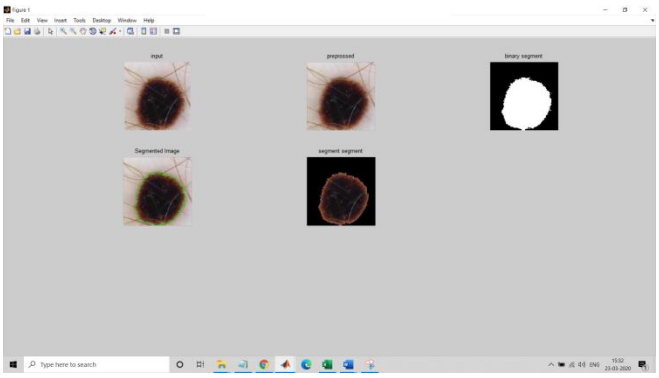
Fig (3)



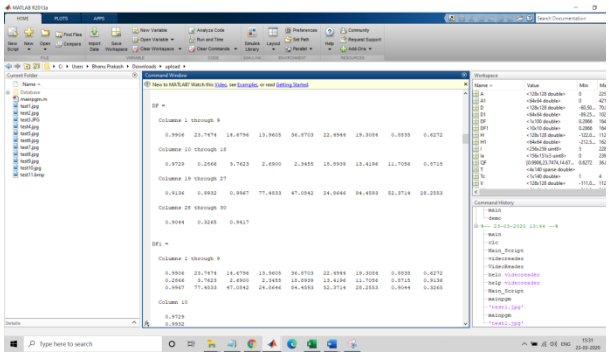
Fig(7)



Fig(4)

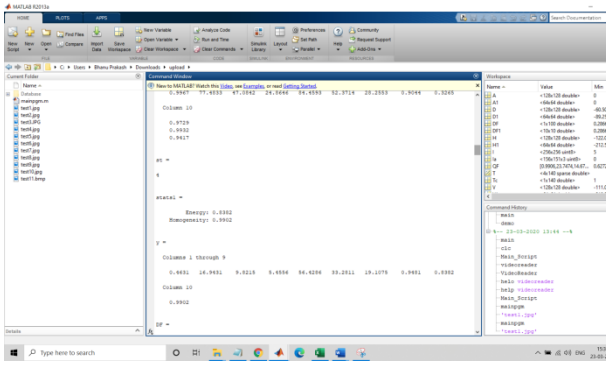


Fig(8)



Fig(5)

Fig(1)-fig(7) Training and Testing itriation Values Of an Data Set, Fig(8) Skin Disease Detection



Fig(6)

CONCLUSION:

We used 10% of the training images as validation images. The validation images are used for deciding the training hyper parameters. Before fine-tuning a pre-trained model, firstly the last layer (soft-max classification layer) is removed and then the number of node in last layer is set to 7 (as we are dealing with 7 class classification problem). Firstly, except the the last layer all other layers are freezed and the network is trained with a learning

rate of 0.01, for 10 epochs with early stopping having a patience of 5 (i.e., if there is no improvement in validation loss after 5 epochs the backpropagation algorithm automatically terminates). After that, all layers are unfreezed and fine-tuned with a learning rate of 0.001 for 100 epochs. This time we used early stopping having a patience of 10. Horizontal and vertical flipping is used for augmentation.The performance of the developed classifiers are scored using a normalized multi-class accuracy metric (balanced across categories). This scoring is obtained from the online portal of the challenge

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