International Journal of Scientific Research & Engineering Trends
Volume 7, Issue 6, Nov-Dec-2021, ISSN (Online): 2395-566X

Dermoscopic Image Classification using Resnet 50 in MATLAB

V. Rajmohan
Department of ECE,
Freelance MATLAB & Python Developer
Email: matlabprojectscdm@gmail.com

Abstract- Now a days, cancer is one of the most complex disease for diagnostics. It means cells in the body grow out of control. Due to skin exposes in sun, it may cause the abnormal growth of skin cells level in a human body. Among the skin cancer, it has some types such as basal, squamous cell carcinoma and melanoma among those skin cancer types melanoma is can't able to predict for dermatologist. If we detect the melanoma on earlier stage, it's easy to cure it. Computer vision and Image processing toolboxes plays a pivotal portion in medical imaging and its diagnosis field and also it's already proved on several methods. In our work, we represent the computer aided manner for skin cancer detection (i. e melanoma) using MATLAB-Image Processing toolbox. The input dermoscopic skin cancer image is used in the system, further applied to the system using new schemes. By using the image analysis tool segment the skin cancer region, its features are extracted. Based on features will be applied to classifier, it will predict the skin cancer segmented region and it's belong to either melanoma or not melanoma type.

Keywords- skin cancer, deep learning, Resnet, computer vision.

I. INTRODUCTION

The second foremost cause for death in worldwide is Cancer, it may cause the abnormal growth of skin cells level in a human body. According to WHO (world health organization) survey which is valued around 9.8 million of deaths in 2018. Out of 6, 1 death is caused by cancer throughout the world. In developing and poor countries (i.e. less and middle level income countries) nearly 70% of deaths are caused due to cancer. The largest organ of the integumentary system and outer most covering layer of the body is human skin. Immunity which present in human skins plays a vital aspect or role on protecting our human body opposing to pathogens.

Among the skin cancer, it has some types such as basal, squamous cell carcinoma and melanoma among those skin cancer types melanoma is dangerous, and it may lead to death. According to the WCRF (World Cancer Research Fund) survey in 2018, melanoma is typically appearing for both men and women and also around 0.3 million of new cases were found. The top countries which have highest levels melanoma-skin cancer in 2018 (both male and female) are Australia, New Zealand, Norway, Denmark, Netherland, Sweden, Germany, Switzerland, etc.

A malignant melanoma is caused due to lesser amount of derma tint which is mainly caused by ultra violet (UV) rays from Sun i.e pollution occurred due to reduction in ozonosphere and exorbitant disclosure to sun. Not only this, skin cancer is also caused by heightened usage of cosmetics, radiations and pollutions.

It is one of the least amount of usual than different type of skin malignancy disease, it can be grow up and disseminate on human body. In skin malignancy disease regions and some other tissues like malignant or begnin. In skin cancer these are varies in nature, they might be smooth or rough, deep and moving are unstable in size and shape.

(a) (b)

Fig 1. Melanoma-Skin Cancer Image's (a) & (b).

In paper [1], suggests the image segmentation process based on snake active counter and support vector machine. It will help us to finding the parameters from SVM, Snake algorithm. To make the Snake algorithm effective by appropriate selecting the initial curve and snake parameters. Same parameters, initial curve and other parameters will apply for support vector machine (SVM).

The following shapes like rectangle, eclipse and curve are predicted by using the initial curve. In order to decrease

the level of complexity, while on implementation of SVM method and without any deterioration these shapes are chosen to keep the SVM implementation.

In testing dataset, the images are used as a template creation and also to determine the edges based on accuracy. These testing results of snake algorithms will shows about the finding of edge. To get the good results on segmentation and classification of this algorithm is required.

In paper [2] it describes about the detecting the skin cancer from captured images to determine the affected tumor region. The final stage of skin cancer is melanoma; in order to survive the patient from death earlier stage of diagnosis is possible. By computer aided techniques will help the dermatologist to find out the skin cancer using image processing. In this work, graph cut algorithm type is used to detect the melanoma from the images and also the features like color, shape and geometry features are extracted from the images using image processing.

Based on the extracted features will be classified as malignant or begnin stage using support vector machine on radial basis of kernel.

In paper [3] tells about the usage of segmentation of image based on lesion detection using deep learning of pixel wise labeling scheme. It has an architectural network for testing the public data and using the ISIC database images for training. These results will give a good accuracy rate and perform well while in presence of hair, air and oil bubbles on images. This implementation of this process in GUI which gives some additional weightage about the paper.

In paper [4] which describes about artificial intelligence and image processing techniques. In order to improve the image quality level by eliminating the noise in preprocessing stage. This skin image is segmented after applying the thresholding method. From that the features are extracted by 2D wavelet transformation technique. These extracted features were applied as input for artificial neural network of back –propagation based method to classify their dataset into either cancer or non-cancer.

In paper [5] tells about, JSEG algorithm was used to diagnose the skin cancer by using the lesion boundary method.

In paper [6] it convey about the features like color and texture which are extracted from gray level co-occurrence matrix (GLCM) and support vector machine (SVM) classifier which are used for diagnosis about malignant lesions. In this work, they can get the accuracy level around 90% by dermoscopic images.

In paper [7] which explains about the thresholding methods and maximum entropy methods, and these lesions such as correlations, energy, and on unsymmetrical features which obtained from gray level co-occurrence matric. And final, feed forward artificial neural network.

II. PROPOSED ALGORITHMS

It conveys the information's about what are the algorithms are going to use in our work for diagnosis of skin cancer (i.e. melanoma).

III. WORKFLOW DIAGRAM

In our proposed scheme, melanoma classification is done through by using conventional neural network of deep learning technique. Here we are using the pre-trained network model for prediction and classification.

In this work, database contains melanoma and non-melanoma images which are separated each other for analysis. These database images are splitted and number of images present in melanoma, non-melanoma are counted by their label or category wise and also identify the minimum number of images present in each class or type. Then load the pre-trained network model "Resnet-50" convolution neural network.

1. Pre-Trained Deep Neural Networks:
While we can extract the powerful and descriptive features which are gathered from natural images by using pre-trained image classification network. These pre-trained networks which has an Image database are trained by using the large scale visual recognition challenge and these networks trained by more than 0.001 billion images are classified into categories of 1000 objects such as animal, car, bus, tea, cup etc.
Resnet-50 (Network Model)

It is also one of the types of pre-trained network model of Conventional neural network; it is trained by more than 0.001 billion images from the Image Net database. This Resnet-50 pre-trained network which has 50 deep layers, classifies their corresponding database images into classified into categories of 1000 objects. While loading the pre-trained network, it has some properties. In this pre-trained network, from input to output layer which has a huge number of fully connected layers or convolutional layers on path is known as network depth.

After loading the pre-trained network model, then go for image network classification (i.e identify the prediction class) and preprocess the image on prediction class or label wise by CNN features.

After that resize the images of image data store as per the pre-trained network model (i.e 224 by 224) and visualize their weightage level. Then initialize the feature layer of the pre-trained network model.

2. Feature Extraction in Images on Pre-trained network model:

Without time investment and endeavor for complete network training, it's also a simplest and nimble approach for using the capability of deep learning technique. These features are extracted from images by using the pre-trained network and then it's trained by a classifier, like support vector machine (svm).

3. Test Image Features & Prediction:

Similarly, select the test or query image from any of the category in a image datastore. Resize the selected input image as per pre-trained network model (i.e 224 by 224) and features are extracted from images by using the pre-trained network and then it's corresponding category is predicted by classifier by trained features, test features and trained labels. At final classifier predicts the category and accuracy rate is calculated from confusion matrix by taking the mean value of diagonal elements of confusion matrix.

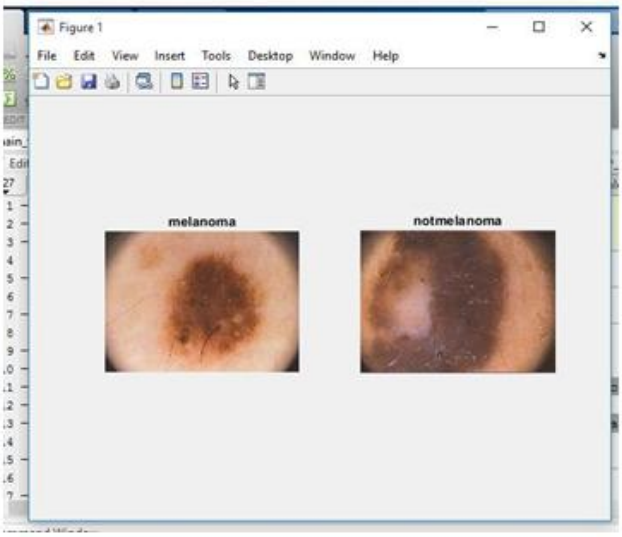

Fig 3. Images of melanoma & not melanoma.

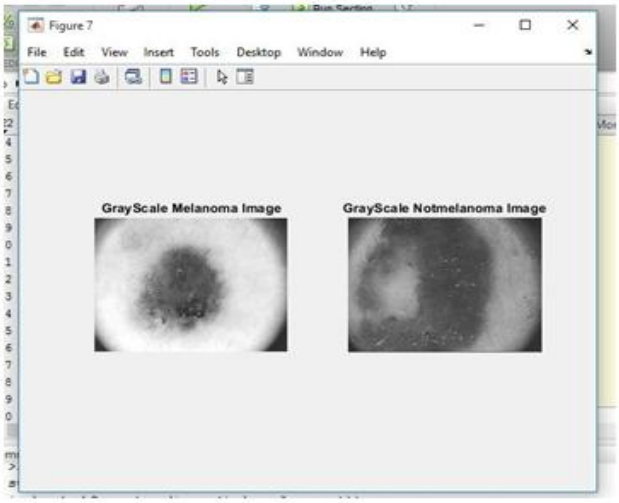

Fig 4. Grayscale Images of melanoma & not melanoma.

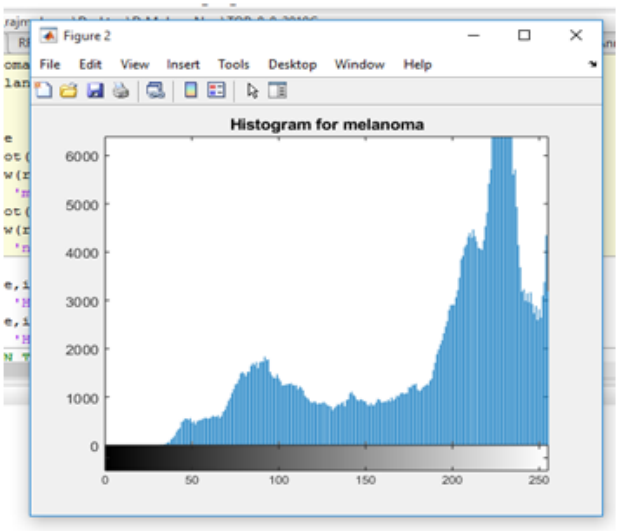

Fig 5. Histogram of melanoma & not melanoma.

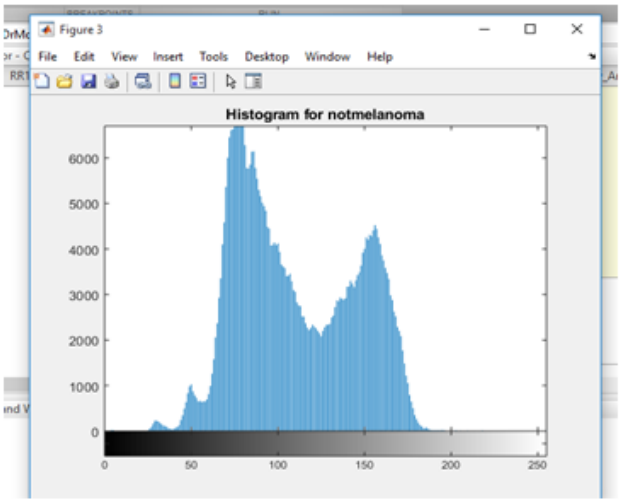

Fig 6. Histogram of melanoma & not melanoma.

```
ImageDatastore with properties:

                  Files: {
                         'C:\Users\rajmohan v\Desktop\DrMohan_New\RRR\RATTTD\melanoma\IMD030.bmp';
                         'C:\Users\rajmohan v\Desktop\DrMohan_New\RRR\RATTTD\melanoma\IMD039.bmp';
                         'C:\Users\rajmohan v\Desktop\DrMohan_New\RRR\RATTTD\melanoma\IMD050.bmp'
                          ... and 21 more
                         }
                 Labels: [melanoma; melanoma; melanoma ... and 21 more categorical]
  AlternateFileSystemRoots: {}
                ReadSize: 1
                 ReadFcn: @readDatastoreImage


testSet =

  ImageDatastore with properties:

                  Files: {
                         'C:\Users\rajmohan v\Desktop\DrMohan_New\RRR\RATTTD\melanoma\IMD004.bmp';
                         'C:\Users\rajmohan v\Desktop\DrMohan_New\RRR\RATTTD\melanoma\IMD009.bmp';
                         'C:\Users\rajmohan v\Desktop\DrMohan_New\RRR\RATTTD\melanoma\IMD016.bmp'
                          ... and 51 more
                         }
                 Labels: [melanoma; melanoma; melanoma ... and 51 more categorical]
  AlternateFileSystemRoots: {}
                ReadSize: 1
                 ReadFcn: @readDatastoreImage
```

Fig 7. Properties of Image Data Store (both melanoma & not melanoma).

International Journal of Scientific Research & Engineering Trends
Volume 7, Issue 6, Nov-Dec-2021, ISSN (Online): 2395-566X

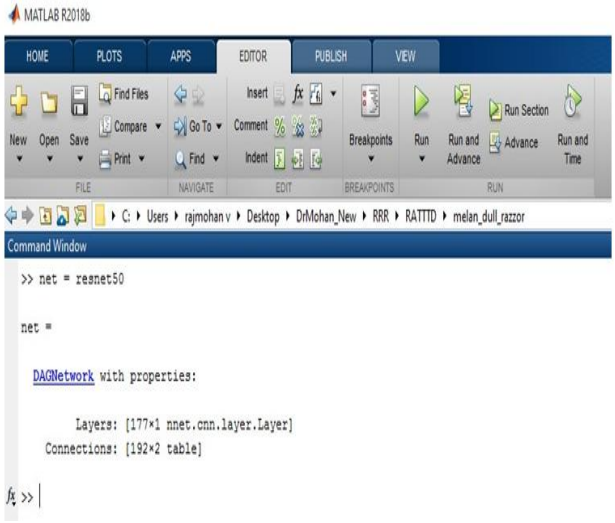

Fig 8. Resnet50 (Pre-trained network model).

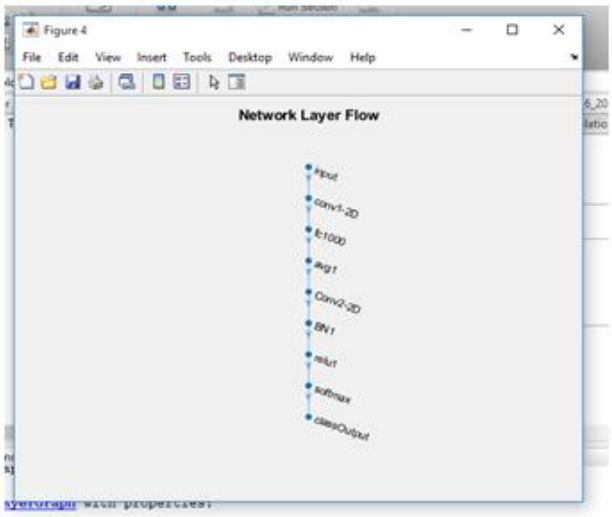

Fig 11. Network – Layer flow.

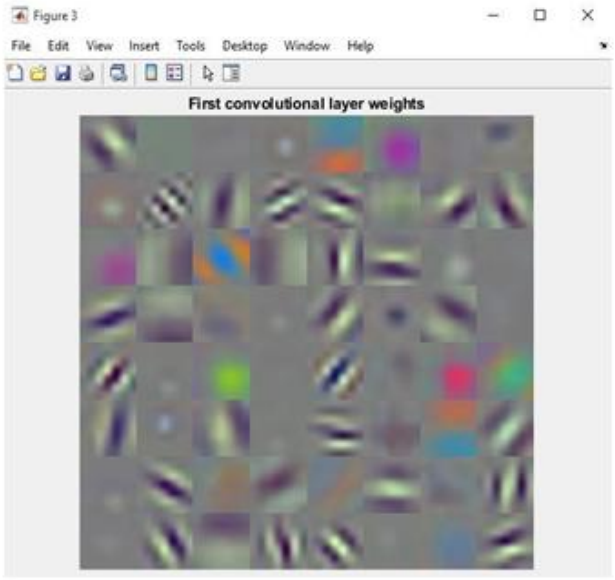

Fig 9. Weighted Matrix

Fig 12. Classifier.

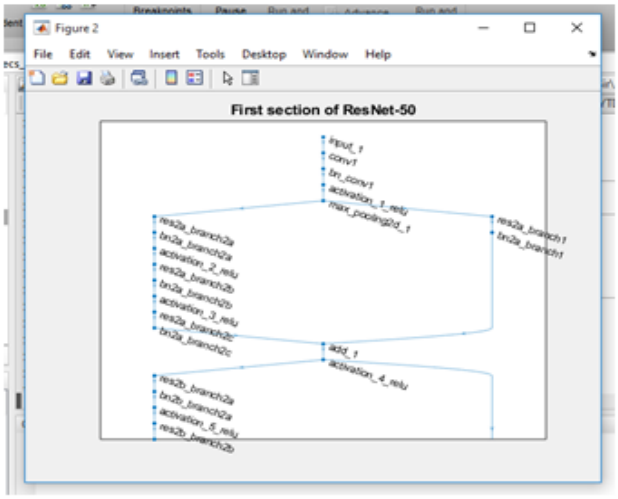

Fig 10. Resnet-50 Layers.

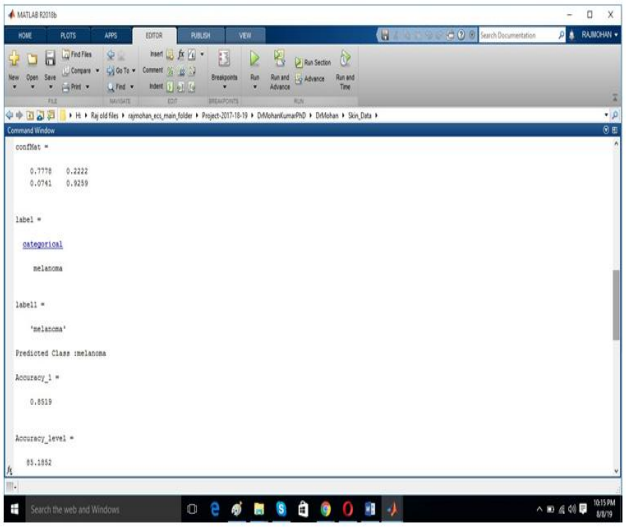

Fig 13. Our Results.

IV. CONCLUSION

In this work, our aim is to finding the level of skin cancer in human body based on pre-trained network of (Resnet-50-categories of 1000 objects) model and CNN features. And these CNN features dataset and query image features are analyzed and its level is predicted by using deep learning, whether the query image which belongs to which category either melanoma or not.

In our pre-trained network model (Resnet-50) getting 85.18 % accuracy. In future, creating the new network model for skin cancer prediction.

REFERENCES

[1] Detection skin cancer using SVM and snake model. Bumrungkun P., Chamnongthai K., & Patchoo W. 2018 International Workshop on Advanced Image Technology.
[2] A SVM based diagnosis of melanoma using only useful image features, Suleiman Mustafa; Akio Kimura, International Workshop on Advanced Image Technology (IWAIT) Year-2018.
[3] Deep Convolution Pixel-wise Labeling for skin lesion Image Segmentation, Ali Youssef; Domenico D. Bloisi; Mario Muscio; Andrea Pennisi; Daniele Nardi; Antonio Facchiano IEEE International Symposium on Medical Measurements and Applications (MeMeA) Year: 2018
[4] M.E. Celebi, el al. "A methodological approach to the classification of dermoscopy images," Computerized Medical Imaging and Graphics, vol. 31. no. 6, pp. 362-373, 2006.
[5] Y. Deng, B.S. Manjunath and H. Shin, "Color image segmentation," Computer Vision and Pattern Recognition, IEEE Computer Society Conference on computer vision and pattern recognition, vol. 2, pp. 446-451, 1999.
[6] J. A.Jaleel, S. Salim and R.B. Aswin, "Computer aided detection of skin cancer," International Conference on Circuits, Power and Computing Technologies, pp. 1137-1142, 2013.
[7] C. Barata, et al. "Two systems for the detection of melanomas in dermoscopy images using texture and color features," IEEE Systems Journal, vol.8, no. 3, pp. 965-979, 2013.