SKIN DISEASE DETECTION BY IMAGE PROCESSING USING CNN

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This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Computer Science and Engineering

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APPROVAL

This Project titled "**SKIN DISEASE DETECTION BY IMAGE PROCESSING USING CNN",** submitted by Sraboni Akhter and ID No: 201-15-13917 to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 19-01-2023.

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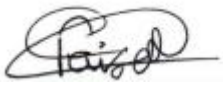

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I hereby declare that, this project has been done by us under the supervision of **Saiful Islam, Lecturer, Department of CSE** Daffodil International University. I also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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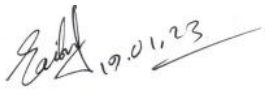

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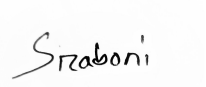

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Finally, I must acknowledge with due respect the constant support and patients of my parents.

ABSTRACT

Image processing is remarkable algorithm for detecting a anything from image data. There are some models in Image processing. Such as CNN, ResNet50, EfficientNetB3, VGG19 etc. There are many existing works used by CNN. And the accuracy of those are also high. So CNN is recognized as most useful method in image processing. So in this paper ResNet50, EfficientNetB3 and VGG19 are introduced. Those methods are also useful and bring more accuracy while performing image processing. In ResNet50 and VGG 19, there are 50 and 19 methods respectively. So those method can show a better possibility in future for image processing. Skin Disease is a now days, a concern thing which can be more dangerous if there is no proper detection path. For detecting perfectly image proceeding is the key. And those proposed methods can be crucial if those methods works perfectly. So in this paper ResNet50, EfficientNetB3 and VGG is introduced and will work through it. In future, Image processing will reach a higher level. So for this project it can be turn over to AI technology, so that the measurement would be more dynamic and accurate. So this work will recognize as a beginning of the work which will be pathway of future works.

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CHAPTER 1
INTRODUCTION

1.1 Introduction

Skin disease is considered as one of the dangerous disease at this moment. Now a days, the rate of skin disease is increasing very fast. There are various reason behind this. The most dangerous thing is, detecting skin disease is difficult now a days. On this paper i will review the morality, epidemiology. Also the reason of this occurrences is depending on those. Now a day's all types of people are facing a lots of challenges for skin diseases. For detecting skin disease Image Processing can be major key there a lots of existing work on this field. Most of the case while image processing CNN is being used. So in this paper, i will try to bring the best accuracy using CNN.CNN is a strong image processing technique. These algorithms are presently the best. Many businesses utilize these algorithms to accomplish things like detect items in images. And most delightful thing is in previous many existing work proved that using CNN while image processing. There are some pros and cons of using CNN. Such as, pros are this method gives the best accuracy. Also without any person's supervision CNN gives the best output. But as cons a big number of training is needed and input data constraint is another complexity.

In the paper i have used ResNet50,EfficientNetB3 and Vgg19. Here ResNet50 ResNet is a form of convolutional neural network (CNN) introduced in the 2015 publication "Deep Residual Learning for Image Recognition" by He Kaiming, Zhang Xiangyu, Ren Shaoqing, and Sun Jian.

ResNet-50 is a convolutional neural network with 50 layers (48 convolutional layers, one MaxPool layer, and one average pool layer). Residual neural networks (RNNs) are artificial neural networks (ANNs) that build networks by stacking residual blocks. EfficientNet is a convolutional neural network design and scaling approach that uses a compound coefficient to consistently scale all depth/width/resolution dimensions. And

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VGG-19 is a 19-layer deep convolutional neural network. A pretrained version of the network trained on over a million photos from the ImageNet database may be loaded.
Those algorithms are very efficient while you are using image processing to detect something. Resnet50 is a update version of CNN and most of the case it is very effective than CNN. So it can be predict that while using ResNet50 , more accuracy can come. And efficientnet B3 and Vgg19 can also support the accuracy of resnet50 also.
There are many existing work on this but in this paper it can be predicted that here the accuracy of detecting skin disease using image processing will be top. In future this work can be a role model of detecting skin disease. In previous time most of the people died for skin disease. Not only for treatment only but also for wrong treatment also. So in future this research will be a remarkable work. And from this research.

- Spreading the sincere ness on this topic
- For leading a better life, the detection technique of skin disease using image processing is very much needed.
- Create more scope of image processing

1.2 Objectives

- To detect exact skin disease using CNN image processing
- To get best accuracy result while running CNN on skin disease images
- Spreading the sincere ness on this topic.
- For leading a better life, the detection technique of skin disease using image processing is very much needed.
- Create more scope of image processing

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1.3 Motivation

CNN is a strong image processing technique. These algorithms are presently the best. Many businesses utilize these algorithms to accomplish things like detect items in images. And most delightful thing is in previous many existing work proved that using CNN while image processing.

There are some pros and cons of using CNN. Such as, pros are this method gives the best accuracy. Also without any person's supervision CNN gives the best output. But as cons a big number of training is needed and input data constraint is another complexity.In the paper i have used ResNet50,EfficientNetB3 and Vgg19. Here ResNet50 ResNet is a form of convolutional neural network (CNN) introduced in the 2015 publication "Deep Residual Learning for Image Recognition" by He Kaiming, Zhang Xiangyu, Ren Shaoqing, and Sun Jian That's why automatic Bengali text summarization is a solution for this problem to get the desired information quickly.

1.4 Rationale of the Study

There are a lots of method for prediction. Such as Data mining, Image processing etc. In this paper Image processing is been used. Image processing is been used because in image processing many algoorithms are ued on data. Using various algorithm gies different accuracy. Then it becomes more easy to predict what method can be useful. Image processing cant give the 100% proper result but it can give the best method to go on process.

On following topic, CNN algorithm was used. Its because thee are alots of existing work on CNN. And those proves that CNN can oredict the proper problem. As in CNN thee are some complications. Such as large amount of training data. But also it is a proven algorithm while using image processing.

Skin disease is a common disease which mainly occurs for many bacterias and viruses. From old history it can be known that, on previosu years many people died for skin

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disease. It is because on those times there were no proper treatment of skin disease. Also the detecting method was not top notch. So some people died with out treatmet and some were died for wrong treatment.

In this paper detecting skin disease with image processing is been introduced. Although there are many existing work, in this paper more accuracy will be introduced. Those will help people to be more sincere. All over the world, there is posing an alarming situation on this disease.

Almost every hospital inthe world has a special department for this disease. So from this it can be easily assume that the problem is becoming strong day by day.

1.5 Research Questions

- What is the main goal of Skin Disease Detection?
- How ResNet50 works?
- How much efficient ResNet50 is?
- How EfficientNetB3 works?
- How much efficient EfficientNetB3 is?
- How VGG19 works?
- How much efficient VGG19 is?

1.6 Expected Output

In this paper image processing algorithm runs. Here three methods were introduced. Such as Resnet50, EfficientNetB3, VGG19. Those are the methods contains a lots of convolutional methods. Also those are very much effective while image processing is in process. In Resnet50 there are almost 50 Convolutional Methods. Which gives a better accuracy than the other methods. From the experiment the main goal is to achieve better accuracy than the other methods. For achieving better accuracy i have ran three methods

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together. It is because, i can compare them with each other. If in Resnet50 some data failures then as substitute efficient net B3 will work. Also VGG19 is an useful algorithm which can run image processing in effective way. But the issue is there are only 19 methods. So while it comes to accuracy it shows less accuracy. For that reason i have run three methods so that i can compare and can select the best of three.

1.7 Layout of the Report

There are 6 portions in this research. It started from Chapter 1, which includes Introduction, Rationale study, Objectives. Then it comes 2nd chapter. It contains background, related works, background information etc. Then comes chapter 3. Where all specifications were discussed. It is called methodology. There all the methods were discussed. Then comes chapter 4. Where all the information's were given about the paper. In chapter 5 the impact n society, environment, ethics and sustainability were discussed. In Chapter 6 conclusion and future works were discussed. This paper is for a greater move. That's why all parts were discussed relatively.

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CHAPTER 2
BACKGROUND

2.1 Introduction

Skin disease is considered as one of the dangerous disease at this moment. Now a days, the rate of skin disease is increasing very fast. There are various reason behind this. The most dangerous thing is, detecting skin disease is difficult now a days. On this paper i will review the morality, epidemiology. Also the reason of this occurrences is depending on those. In the paper i have used ResNet50,EfficientNetB3 and Vgg19. Here ResNet50 ResNet is a form of convolutional neural network (CNN) introduced in the 2015 publication "Deep Residual Learning for Image Recognition" by He Kaiming, Zhang Xiangyu, Ren Shaoqing, and Sun Jian.

2.2 Related Works

Diagnosis of skin diseases using Convolutional Neural Networks research proposes an automated image-based method for skin disease identification using machine learning classification. This system will use computational techniques to evaluate, process, and relegate picture data based on various visual attributes. Skin photos are filtered to reduce undesirable noise and then processed for image enhancement. Feature extraction employing complicated techniques such as Convolutional Neural Network (CNN), classification of the picture using the softmax classifier algorithm, and generation of the diagnosis report as an output.

Also in Research on a method for detecting skin diseases using image processing and machine learning is currently being conducted. The method that I have suggested is uncomplicated, can be carried out in a short amount of time, and does not need for any costly equipment other than a camera and a computer. The method is successful when applied to the inputs of a colored picture. After that, resize the portion of the picture to extract features using a convolutional neural network that has been pretrained. After that,

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the Multiclass SVM was used to classify the features. At this point, the findings are presented to the user, who is informed of the nature of the ailment, its scope, and its severity. The technology is able to identify three distinct forms of skin illnesses with a degree of precision that is equal to or more than one hundred percent.

A Smartphone-Based Skin Disease Classification Using MobileNet CNN is the title of the study that was conducted. The advocates amassed a total of 3,406 photographs; nevertheless, the dataset is considered imbalanced due to the unequal distribution of pictures throughout its many categories. Investigations into alternative sampling strategies and the preparation of input data were carried out with the goal of improving the accuracy of the MobileNet. While using the undersampling methodology and the input data's default preprocessing setting, the accuracy reached a level of 84.28 percent. The accuracy was 93.6% despite the fact that we were using an imbalanced dataset and the preprocessing of input data that was set to default.

In the study titled "Multi-Class Skin Diseases Classification Using Deep Convolutional Neural Network and Support Vector Machine," the authors classify skin diseases into many categories. In the course of this research, an intelligent diagnostic strategy for the classification of many classes of skin lesions was established. The method that has been proposed makes use of a hybrid approach, namely a deep convolution neural network in conjunction with an error-correcting output codes (ECOC) support vector machine (SVM). The technique that has been presented is designed to classify photographs of skin lesions into one of the following five categories: healthy, acne, eczema, benign, or malignant melanoma. Experiments were conducted on a total of 9,144 photographs obtained from a variety of different sources.

This study studied various different CNN algorithms for face skin disease classification using clinical photographs. The paper was titled "Studies on Different CNN Algorithms for Face Skin Disease Classification Based on Clinical Images." To get started, I created a dataset using Xiangya-Derm, which is, to the best of my knowledge, China's largest clinical image dataset of skin diseases [seborrheic keratosis (SK), actinic keratosis (AK),

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rosacea (ROS), lupus erythematosus (LE), basal cell carcinoma (BCC), and squamous cell carcinoma (SCC)].

In Diagnosis of skin diseases in the era of deep learning and mobile technology, As a result, in this work, a unique model was built utilizing MobileNet. A unique loss function has also been devised and implemented. The following are the study's primary contributions: I developing an unique hybrid loss function; and (ii) developing a modified-MobileNet architecture.

In Automatic diagnosis of skin diseases using convolution neural network, Convolutional Neural Networks are used in the suggested technique, with an emphasis on skin disorders. In this article, a Convolutional Neural Network (CNN) of 11 layers was used: Convolution Layer, Activation Layer, Pooling Layer, Fully Connected Layer, and Soft-Max Classifier. The design is validated using images from the DermNet database.

So it is proved that most of the image processing is used by CNN and the accusracy is sometimes 100% and sometimes less than 90%. So CNN is very efficient algorithm while using image processing. In this paper ResNet50, EfficientB3 and Vgg19 is used. Here ResNet50 is the core algorithm used for detecting skin disease. It is a big version of CNN where 48 CNN is used. So, hoping that it will give the most efficient result. Also EfficientB3 and Vgg19 will be the supportive algorithm which will assist ResNet50 for more accurate result.

2.3 Comparative Analysis and Summary

Image processing algorithm is introduced in this paper. As method ResNet50, EfficientNetB3, VGG19 were introduced. i used balanced data for each method. Our own dataset was utilized to create this model. Dataset is gathered from Kaggle dataset. While reviewing other paper, something exciting came to light. Such as in Diagnosis of skin diseases using Convolutional Neural Networks, there used CNN algorithm method. There accuracy was approximately 70%.

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In “Automatic diagnosis of skin diseases using convolution neural network”, they also used CNN method and in their paper accuracy was 85.7%, 92.3%, 93.3% and 92.8% respectively. In

“Studies on Different CNN Algorithms for Face Skin Disease Classification Based on Clinical Images”, they used ResNet50 algorithm. In “A Smartphone-Based Skin Disease Classification Using MobileNet CNN”. They used CNN algorithm for image processing and they got 78% accuracy. So it can be seen that most of the paper used by CNN algorithm but in my paper I have used ResNet50, EfficientNet B3 and VGG19. I have seen that in previous paper only ResNet50 were introduced. But the unique thing is i have used three different algorithms for better accuracy.

2.4 Background Information

2.4.1 RESNET50

ResNet is an example of a convolutional neural network (CNN) that was first described in the article "Deep Residual Learning for Image Recognition" written in 2015 by He Kaiming, Zhang Xiangyu, Ren Shaoqing, and Sun Jian. ResNet is also known by its acronym, which is "Residual Network." Applications that rely on computer vision often make use of CNNs as their power source.

ResNet-50 is a convolutional neural network that has 50 layers (48 convolutional layers, one MaxPool layer, and one average pool layer). Leftover neural networks are a subclass of artificial neural network (ANN) that are formed by stacking residual blocks in the network formation process. The volume and complexity of textual data produced each day are both steadily rising. Large volumes of data are produced by social media, news articles, emails, texts, and other sources, making it challenging to read lengthy sections of text resources. Thankfully, with Deep Learning developments, i can construct models to reduce big bits of text and provide a clear and coherent summary to save time and understand the key points effectively. In our approach, to create some thorough summaries, I employed two algorithms: the first is a bi-directional.

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2.4.2 EfficientNetB3

The difficulty of scaling up CNN models was the impetus for the development of the EfficientNet family, which was created utilizing an innovative technique. It uses a simple compound coefficient that works quite well and is highly efficient. In contrast to standard approaches that scale dimensions of networks such as width, depth, and resolution, EfficientNet scales each dimension in a uniform manner using a predefined set of scaling coefficients. This is in contrast to standard approaches that scale dimensions of networks such as width and depth. Scalability, to put it in a more concrete sense. Within the residual block, the number of channels is cut down or compressed to 16, and as a consequence, the number of parameters that are required for the 3x3 convolutions in the next layer is also cut down. In the inverted residual block shown in Fig. 2b, the diameters of the associated channels are switched around. This can be seen in the illustration. As a direct consequence of this, skip connections are now being made between thinner layers that have a limited number of channel connections. Because of this, the blocks are often referred to as inverted residual blocks, which makes sense. The number of parameters in this later kind of ResNet is actually lower when compared to the first residual block of ResNet. This is the case despite the fact that the number of channels in the layer within the block grows to 64. The reason for this is that I employ depth wise convolutions in this later kind.

2.4.3 VGG19

It was created by a different group named as Visual Geometry Group at Oxford's and hence the name VGG. It carries and uses some ideas from it's predecessors and improves on them and uses deep Convolutional neural layers to improve accuracy. AlexNet was released in 2012 and it improved on the traditional Convolutional neural networks. So i can understand VGG as a successor of the AlexNet. However, it was created by a different group named as Visual Geometry Group at Oxford's and hence the name V.

Let's investigate what VGG19 is, evaluate it in relation to some of the previous versions

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of the VGG design, and then look at some applications that make use of the VGG architecture that are both helpful and practical.

Let's have a fundamental understanding of CNN and ImageNet before i get into what the VGG19 Architecture is. Before i do that, let's take a look at ImageNet.

The Convolutional Neural Network is being used (CNN)

First things first, let's investigate what ImageNet really is. It is a collection of photos that contains 14,197,122 pictures that are arranged in a hierarchical structure based on WordNet.

2.5 Scope of the Problem

In this paper ResNet50, EfficinetNetB3 and VGG19 used. In ResNet50 there are almost 50 methods. So it gives more accuracy. In ResNet50 and Efficient Net B3 more accuracy can come. But In VGG19 there are some complication. Such as all epochs are not allowed to run in this algorithm. Also in VGG19 only 19 convolutional situated. So it is the main problem of the problem.

2.6 Challenges

- There were many challenges while run those algorithm. Such as
- In ResNet50, there are almost 50 to methods, in between 48 methods are active. So it is a risk to work with this
- As in CNN more accuracy can come , in ResNet50 it is hard to gain more accuracy easily
- EfficientNetB3 is useful but hard to conduct
- EfficientNetB3 is not the main algorithm
- Vgg19 cannot contain proper accuracy as it has lack of methods
- Vgg19 cannot contain proper epoch

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CHAPTER 3
METHODOLOGY

3.1 ResNet

ResNet is an example of a convolutional neural network (CNN) that was first described in the article "Deep Residual Learning for Image Recognition" written in 2015 by He Kaiming, Zhang Xiangyu, Ren Shaoqing, and Sun Jian. ResNet is also known by its acronym, which is "Residual Network." Applications that rely on computer vision often make use of CNNs as their power source.

ResNet-50 is a convolutional neural network that has 50 layers (48 convolutional layers, one MaxPool layer, and one average pool layer). The ResNet-50 Architecture is comprised of residual neural networks, which are a subcategory of the artificial neural network (ANN) category.

The first design for ResNet was known as ResNet-34, and it was composed of a total of 34 weighted layers. By using the idea of shortcut connections, it offered an original strategy for adding additional convolutional layers to a CNN without triggering the vanishing gradient issue. This was made possible by to the innovation. A conventional network may be transformed into a residual network by using shortcut connections, which "skip over" certain levels.

The architecture of ResNet-50 is based on the model described up above, however there is one significant change between the two. A bottleneck architecture serves as the basis for the 50-layer ResNet's building block. The inclusion of 1x1 convolutions, sometimes known as a "bottleneck," in a bottleneck residual block helps to minimize the total number of parameters as well as the number of matrix multiplications. Because of this, the training of each layer may take place considerably more quickly. Instead of having just two levels, this one has three stacked on top of each other.

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Fig 3.1: Skin disease

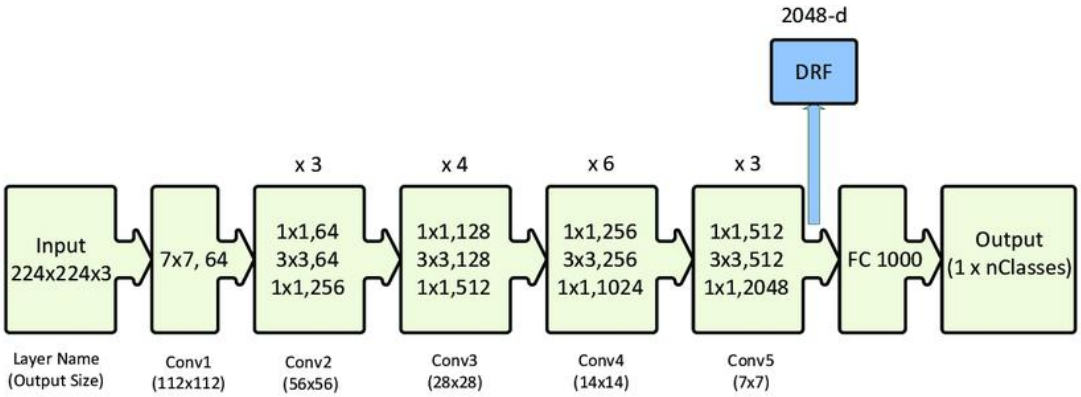

Fig 3.2: Resnet50 [21]

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3.2 EfficientNetB3: EfficientNet is an architecture for convolutional neural networks as well as a technique for scaling that makes use of a compound coefficient to scale all dimensions of depth, breadth, and resolution in a consistent manner. The EfficientNet scaling approach, in contrast to the prevalent practice, which arbitrarily scales these parameters, adjusts network breadth, depth, and resolution evenly using a set of predetermined scaling coefficients. For instance, if i want to employ multiple times the amount of computing resources, all i have to do is raise the network depth by and the network breadth by respectively.

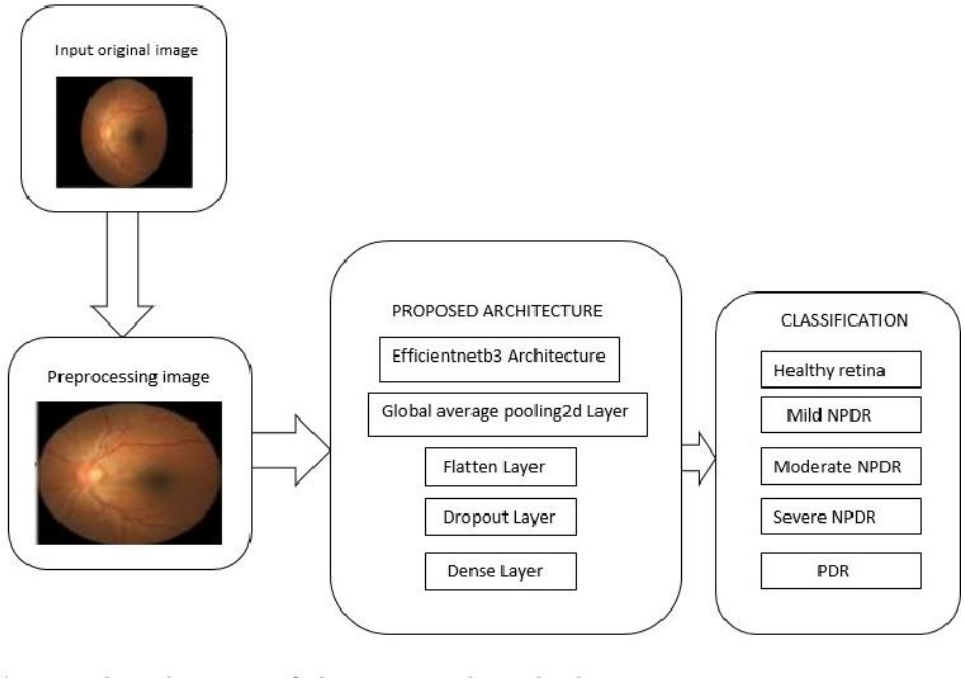

Fig 3.3: EfficientNetB3 [22]

3.3 VGG19: There are a total of 19 levels of depth inside the convolutional neural network that is known as VGG-19. You have the option of importing a network that has already been trained using the ImageNet database, which consists of more than one million different photographs [1].

The pre trained network has the capability of classifying photographed things into one thousand various categories, including "keyboard," "mouse," "pencil," and "many animals."

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As a direct result of this, the network has developed the capacity to gain the ability to learn rich feature representations for a wide variety of different kinds of image. The maximum dimensions that a photograph may have when it is posted to the network are 224 pixels on each side. You may get further pre trained networks in MATLAB® by clicking here.

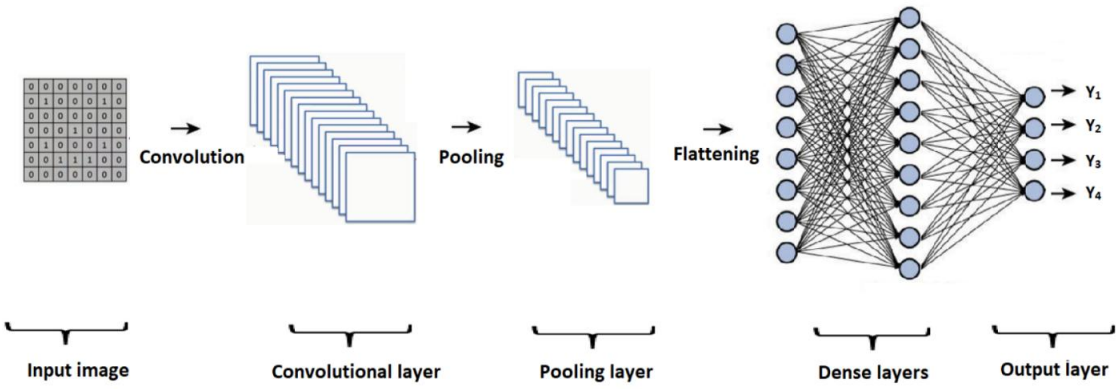

Fig 3.4: VGG19 [23]

3.4 Implementation Requirements

Hardware and Software:

- Processor: Intel Core i5 10th generation
- RAM: 8GB
- Google Colab with free GPU

Development Tools:

- Windows 11
- Google Colab
- Pycharm
- MS Excel
- Programming language: Python

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CHAPTER 4

EXPERIMENTAL RESULTS AND DISCUSSION

4.1 Experimental Setup

After preprocessing data it is now the time for implement all algorithms and models. But firstly it was need to notice about the device. For implementation the configuration of device was AMD Ryzen 7 5800 X. Ram 8 GB. I implemented the technical part in the Google Colab with free GPU runtime. I divided the dataset for training and testing purposes. 80% data for training and 20% data for testing. The table 9 represents the libraries which are used in this research. The model configuration is shown in table 1.

Table 4.1: Model

Hyperparameters	Value
Epoch	100

4.2 Experimental Results & Analysis

It combines the Keras callbacks Reduce Learning Rate on Plateau, Early Stopping, and Model Checkpoint, but it eliminates some of the limitations that were previously included in those callbacks. In addition to this, it offers a clearer and more comprehensible description of the model's At the end of each term, performance is evaluated and rated. It also has a helpful feature that allows you to specify the number of epochs to train for before a message displays asking if you want to stop training on the current epoch by typing H or entering an integer to decide. This feature allows you to choose how long you want to train for before the message appears.

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4.2.1: Resnet50: There are a total of 50 layers in the convolutional neural network known as ResNet-50 (48 convolutional layers, one MaxPool layer, and one average pool layer). Leftover neural networks are a subclass of artificial neural networks (ANNs) that are created by stacking remnant blocks during the process of forming a network. This process results in the construction of the networks that are known as leftover neural networks.

```
97/97 [==============================] - 36s 374ms/step - loss: 0.9131 - accuracy: 0.7430
accuracy [ResNet50] on the test set is 74.30 %
```

Fig 4.1: Accuracy of ResNet50

Resnet 50 is one of the core method i used to bring the accuracy in my algorithm. Here data's were introduced through the recognized model. The actual accuracy from ResNet50 model is 74.30%

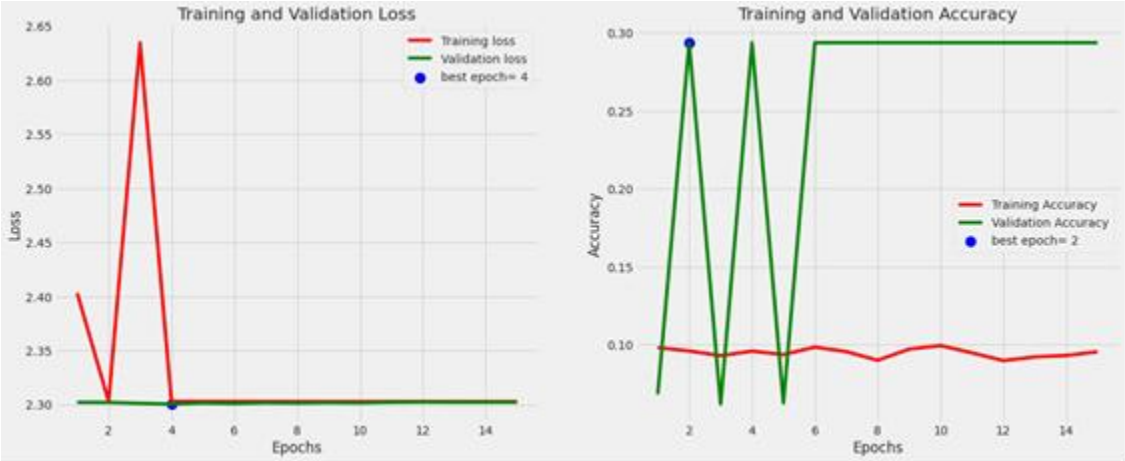

Fig 4.2: Training and Validation Loss

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Classification Report:

	precision	recall	f1-score	support
1. Eczema 1677	0.70	0.38	0.50	167
10. Warts Molluscum and other Viral Infections - 2103	0.64	0.58	0.61	211
2. Melanoma 15.75k	0.93	0.89	0.91	314
3. Atopic Dermatitis - 1.25k	0.44	0.68	0.53	125
4. Basal Cell Carcinoma (BCC) 3323	0.85	0.79	0.81	333
5. Melanocytic Nevi (NV) - 7970	0.93	0.89	0.91	797
6. Benign Keratosis-like Lesions (BKL) 2624	0.55	0.72	0.62	208
7. Psoriasis pictures Lichen Planus and related diseases - 2k	0.61	0.46	0.52	206
8. Seborrheic Keratoses and other Benign Tumors - 1.8k	0.72	0.70	0.71	185
9. Tinea Ringworm Candidiasis and other Fungal Infections - 1.7k	0.48	0.71	0.57	170
accuracy			0.74	2716
macro avg	0.68	0.68	0.67	2716
weighted avg	0.76	0.74	0.75	2716

Fig 4.3: Classification Report

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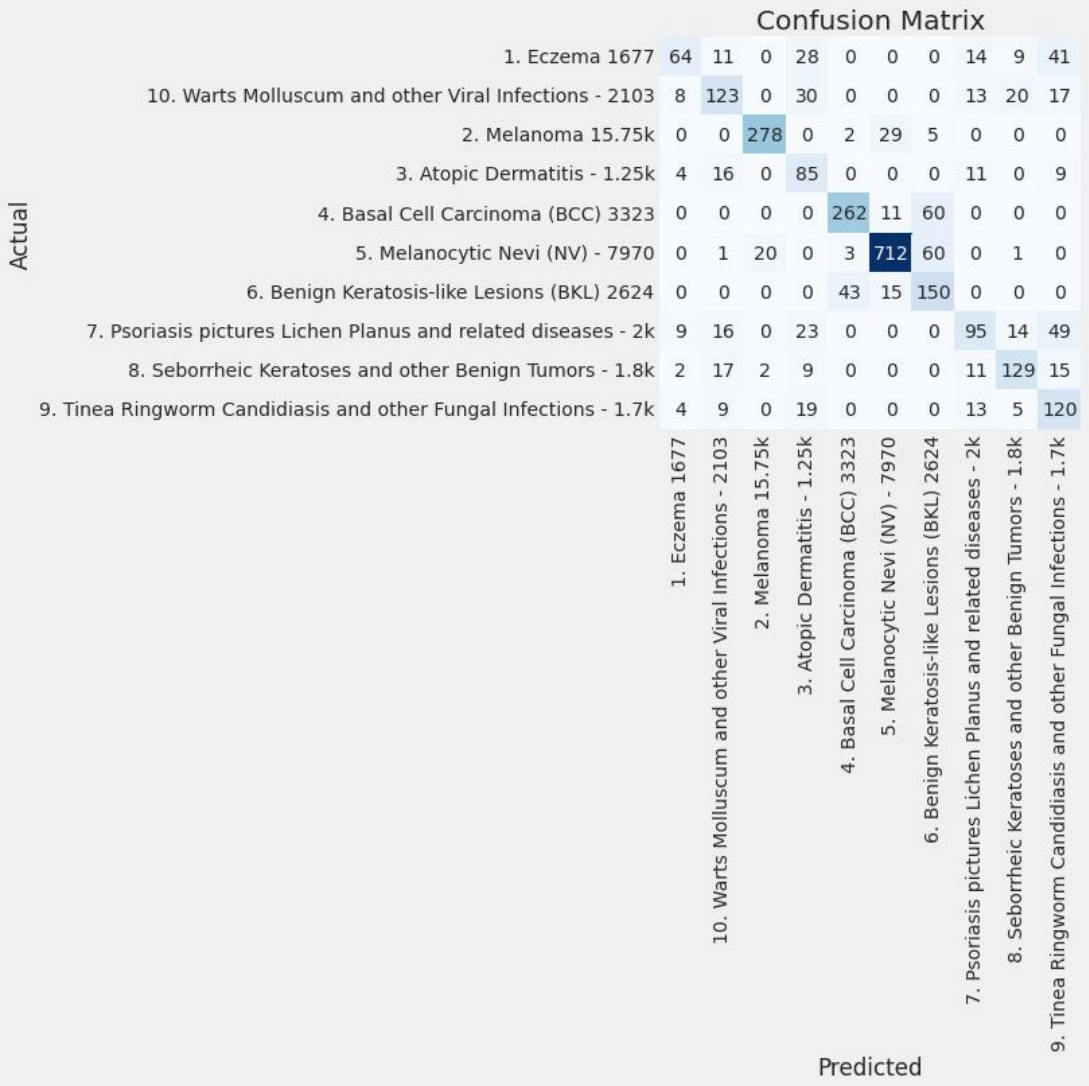

Fig 4.4 : Confusion Matrix

4.2.2 EfficientNetB3: Efficient Net is a technique and architecture for scaling convolutional neural networks that uses a compound coefficient to scale all dimensions of depth, breadth, and resolution in a convolutional neural network equally. Here Efficientnet B3 is used as a substitute model for bringing more accuracy in skin disease detection using image processing. The accuracy were 84.17% from EfficientNetB3.

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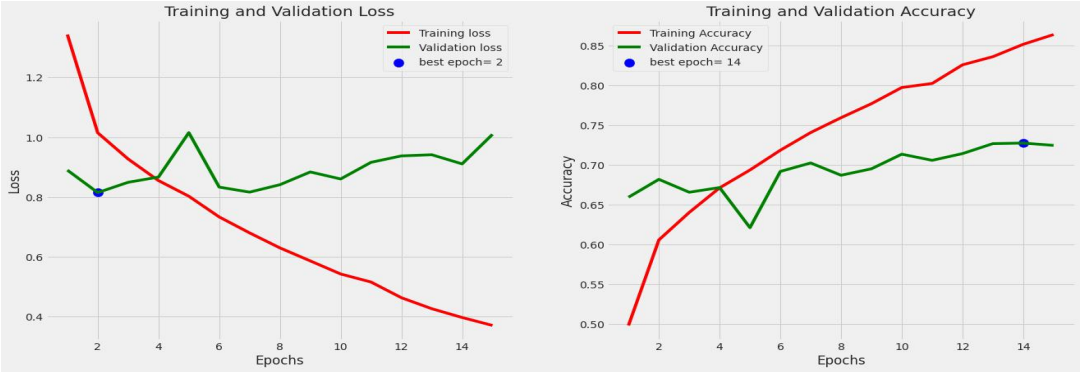

Fig 4.5: Test Set for Efficient NetB3

```
97/97 [==============================] - 58s 593ms/step - loss: 0.7370 - accuracy: 0.8417
accuracy on the test set is 84.17 %
```

Fig 4.6: Accuracy for EfficientNetB3

4.2.3 VGG19: There are a total of 19 levels of depth inside the convolutional neural network that is referred to as VGG-19. You have the option of loading a network that has already been trained using the ImageNet database, which consists of more than one million different photographs. The pre-trained network has the capability of classifying photographed items into one thousand different categories, such as "keyboard," "mouse," "pencil," and "many animals." This algorithm has a level of accuracy of 29.34% based on VGG19.

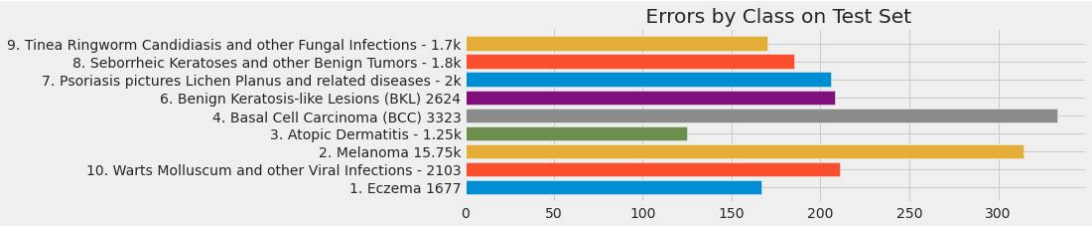

Fig 4.7: Test Case VGG19

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```
Classification Report:
----------------------
                                                    precision    recall  f1-score   support

                                      1. Eczema 1677       0.00      0.00      0.00       167
          10. Warts Molluscum and other Viral Infections - 2103       0.00      0.00      0.00       211
                                   2. Melanoma 15.75k       0.00      0.00      0.00       314
                               3. Atopic Dermatitis - 1.25k       0.00      0.00      0.00       125
                          4. Basal Cell Carcinoma (BCC) 3323       0.00      0.00      0.00       333
                             5. Melanocytic Nevi (NV) - 7970       0.29      1.00      0.45       797
                  6. Benign Keratosis-like Lesions (BKL) 2624       0.00      0.00      0.00       208
   7. Psoriasis pictures Lichen Planus and related diseases - 2k       0.00      0.00      0.00       206
         8. Seborrheic Keratoses and other Benign Tumors - 1.8k       0.00      0.00      0.00       185
9. Tinea Ringworm Candidiasis and other Fungal Infections - 1.7k       0.00      0.00      0.00       170

                                                    accuracy                           0.29      2716
                                                   macro avg       0.03      0.10      0.05      2716
                                                weighted avg       0.09      0.29      0.13      2716
```

Fig 4.8: Classification Report of VGG19

```
97/97 [==============================] - 1143s 12s/step - loss: 2.3022 - accuracy: 0.2934
accuracy [vgg19] on the test set is 29.34 %
```

Fig 4.9: Accuracy report for VGG19

4.3 Discussion

There datas were in unbalance set. For balancing data we take 1006 data from wach section. After selecting specific 1006 datas it were much more easy to balance all the datas. After balance datas, next objectives were to train data. Data training: After balancing data , it seems easy to track the the datas. So its time to train data. For data train ResNet50, EfficientB3 and VGG19 were used. ResNet50 were the main model for data training. It uses algorithm of 48 convlational networks which held.

Table: 4.2

Model	Accuracy
ResNet50	74. 30%

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EfficentNet B3	84. 17%
VGG19	29.34%

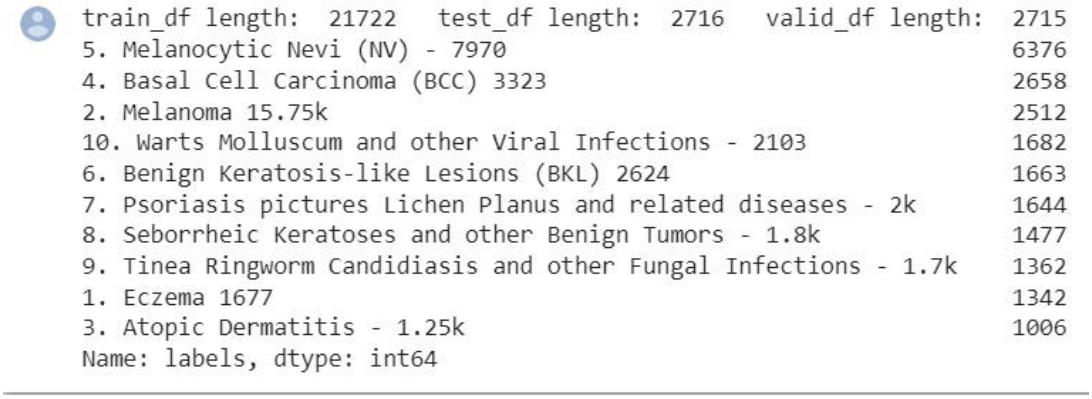

Fig 4.10: Accuracy and Calculation of Algorithms

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CHAPTER 5
IMPACT ON SOCIETY, ENVIRONMENT AND SUSTAINABILITY

5.1 Impact on Society

With the advancement of this image processing this will increase awareness to disease attention. Now a days skin disease are becoming threat in society. So to overcome this threat image processing is needed very much. Also which methods are used here can be so much effective and efficient. Also in society skin disease is affecting a lot now a days. So if this research stands then image processing would be recognized in society. It will increase social awareness in society. Also it will be work as a tonic in society. The methods will be recognized as life saver for skin disease patients. So Impact on society with greater benefits is waiting.

5.2 Impact on Environment

Image processing is an approach which can give solution for any problems. In Image processing there are many methods. In this paper skin detection with image processing is running. In environment it will bring a huge impact. In environment there are many problems which nature has not any solution. But when image processing is delivering then by using various methods many solutions can get. So image processing is creating a huge impact. So in environment detection with image processing can be a key point. Also skin disease can be affect from bacteria and viruses. If image processing can detect the problem, the environment will be free from bacteria and virus. So this is going to be a great addition according to impact of Environment

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5.3 Ethical Aspects

There are so many ethical aspects in image processing. Such as while ethics work then image processing will be efficient for society and environment. Detecting skin disease is an efficient work. If this work is done by loyalty and ethics will come to light. So from ethical aspect all algorithms and models will be very much effective. But only one thing is must need to keep in mind that those work would be done by ethics.

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CHAPTER 6
CONCLUSION AND FUTURE WORK

6.1 Conclusion

Skin disease is becoming a threat in upcoming days. Not for lack of treatment but for wrong treatment. It is because detecting proper skin disease is difficult. In recent time, many works are happening on this. To continue the flow here skin disease detection with image processing is performed. Most of the work is performed by CNN model. But in this paper new methods were introduced. Such as ResNet50, EfficientNetB3 and VGG19. Here where ResNet50 has 50 methods and in VGG19 has 19 methods.

6.2 Future Works

Skin disease detection with image processing have many aspects. Also in future days this will be more efficient. In coming days Resnet50, EfficientNetB3 and VGG19 will become more effective. In this paper it is known that there were 50 methods in Resnet50. But while running some of the data were not working. In future this will be fixed. Also Efficient Net B3 and VGG19 were effective as substitute. Those methods were used to get better accuracy. But in future those method will be used individually. So technology will be updated. And image processing will be on another level. In next days, image processing will be more effective and easy. So in future this will effective on society and environment also. Also image processing will bring sustainability. So in future, image processing possibility is bright.

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