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Detection of Melanoma Using Distinct Features

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***Abstract:** Melanoma is one of the most dangerous types of skin cancer because it grows fast and causes the majority of skin cancer fatalities. Hence, early detection is a very important task to treat melanoma. In this work, we suggest a method for dermoscopic images that segments skin lesions based on the U-Net architecture with VGG-16 encoder and the semantic segmentation. Base on the segmented skin lesion, diagnostic imaging systems can evaluate skin lesion features to classify them. The suggested approach requires fewer resources for training, and it is suitable for computing systems without powerful GPUs, but the training accuracy is still high enough (above 95 %). In the experiments, we train the model on the ISIC dataset–a common dermoscopic image dataset. To assess the performance of the proposed skin lesion segmentation method, we evaluate the Sorensen-Dice and the Jaccard scores and compare to other deep learning-based skin lesion segmentation methods. Experimental results showed that skin lesion segmentation qualities of the proposed method are better than ones of the compared methods.*

***Keywords:** Skin Detection, CNN Model, Skin Lesion Segmentation, Image Processing, Deep Learning.*

I. INTRODUCTION

Cancers that start in the skin are known as skin cancers. They result from the growth of aberrant cells that can infiltrate or disseminate to other areas of the body. The five different kinds of skin cancer- Basal & Squamous Cell Skin Cancer, Merkel Cell Skin Cancer, Melanoma Skin Cancer, Lymphoma of the Skin and Kaposi Sarcoma. In this project we deal with the Melanoma Skin Cancer. One of the most serious types of skin cancer is melanoma. It grows fast and causes most of the skin cancer deaths. For cancer in general and skin cancer in particular, early detection is a very important task, because doctors can help to stop the metastatic – one of the leading causes of cancer-related mortality. One important method for diagnosing melanoma is the ABCD rule. Segmenting skin lesions from dermoscopic pictures is required to enhance the diagnosis accuracy of the ABCD rule. Features of skin lesions will be retrieved from the segmented region and used to evaluate the lesion. The skin lesion segmentation problem plays an important role in medical image processing. Several methods were studied, including learning-based and non-learning-based approaches such as thresholding and level set methods. In this paper, we mainly focus on learning-based methods that become a hot research trend. In recent years, deep learning is an efficient approach to solve image processing problem, including image segmentation. As a result, convolutional neural networks (CNNs) and artificial neural networks (ANNs) have emerged as the most potent tools in the domains of image processing, pattern recognition, computer vision, and other sciences, engineering, and technologies. Many medical picture segmentation issues, such as the segmentation of tumours, human organs, the brain, and the brain, are solved using CNNs. There are numerous CNN-based techniques for segmenting skin lesions, including the fully convolutional-deconvolutional network technique and the deep completely convolutional network with Jaccard distance technique, and the method based on multistage fully convolutional networks. All of these techniques emerged using the fully convolutional networks (FCNs). Many works denoted that training on FCNs is complicated, and FCNs are not sensitive enough for segmenting small details and low-intensity regions as in the case of skin lesion. Moreover, FCNs typically require a large amount of training data. Some other models based on CNN such as the high resolution CNN and combined deep convolution networks and unsupervised learning are also proposed for segmenting skin lesions. However, the accuracy of the methods for skin lesion segmentation, especially for low-density regions of skin lesions is not high. The skin lesion segmentation methods based on dense deconvolution networks were proposed. Although these methods are good enough for skin lesion segmentation, they cannot reliably segment low-intensity regions. Some other skin lesion segmentation methods based on CNN were proposed. However, the methods cannot work on colourful images directly. Therefore, we need to convert dermoscopic images to gray scale images, process on separate channels, or normalize colors. Some methods are only applied after skin lesion images were pre processed, such as remove hair, extract regions of interest (ROI), remove shadow.

II. LITERATURE SURVEY

1) Using ensemble data mining approaches compare the prediction of skin diseases based on feature selection.

In the proposed work, we provide a novel methodology that employs six distinct data mining classification approaches, and we then create an ensemble strategy employing Bagging, AdaBoost, and Gradient Boosting classifier techniques to forecast classes of skin disease. Additionally, a feature importance approach is used to pick the top 15 features that will have a significant impact on prediction. After choosing the 15 features, a portion of the original dataset is acquired to compare the outcomes of six machine learning algorithms, and the complete dataset is then subjected to an ensemble approach.

2) A Challenge in Skin Lesion Analysis for Melanoma Detection at the International Skin Imaging Collaboration's 2017 International Symposium on Biomedical Imaging (Isbi)

This article details the newest iteration of the benchmark challenge for dermoscopic image analysis, including its concept, execution, and outcomes.

The objective is to encourage the study and creation of algorithms for the automated diagnosis of melanoma, the deadliest form of skin cancer. Lesion segmentation, feature identification, and illness classification were the three tasks that made up the challenge. This was the largest standardised and comparative research in this sector to date, with 593 registrations, 81 pre-submissions, 46 finalised submissions (including a 4-page article), and about 50 attendance. Although the formal challenge period is over and the competitors have been ranked, the dataset snapshots are still accessible for more analysis and improvement.

3) A first of its type comparison research on computer-aided diagnosis of psoriasis skin pictures with HOS, texture, and colour aspects.

This study compares the performance of principal component analysis (PCA) based CADx systems for psoriasis risk stratification and image classification using (i) 11 higher order spectra (HOS) features, (ii) 60 texture features, and (iii) 86 colour feature sets and their seven combinations. We used 540 total picture samples from 30 individuals with psoriasis of Indian ethnicity (270 healthy and 270 sick). PCA-based machine learning is used to identify the dominant features, which are then input into a support vector machine classifier (SVM) for the best performance. Three separate feature sets are used to create three different protocols. The CADx's reliability index is calculated.

III. EXISTING SYSTEM

The current practices used by dermatologists include biopsy, scrapings, and bioscopy, patch testing and prick Test which are invasive methods of detection.

In patch testing and prick test, the allergen is directly applied to the infected area. It could take the skin a few days or even longer to react to the allergy.

The current image processing techniques for identifying skin diseases also have certain limitations. The main problem is the high computational cost of the median filter. Inaccurate results are also produced by the software implementation of the median filter. The issue with sharpening filter is that when a high pass mask is applied to the image, there are negative pixel values in the output image. Disadvantages of Existing System: Efficiency is very less, the accuracy level is less.

IV. PROPOSED SYSTEM

Based on one of the well-liked convolutional neural network (CNN) characteristics, a unique approach to detection of melanoma is suggested.

With CNN, features may be automatically extracted, learned, and classified. Comparatively speaking to other image classification algorithms, CNNs employ a minimal amount of pre-processing. This implies that the filters, which were manually designed for traditional techniques, are learned by the network. This feature design's independence from past information and human effort is a significant benefit for picture classification.

A. Advantages

1) Accuracy is more.
2) Less time consuming.

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V. HARDWARE AND SOFTWARE REQUIREMENTS

1) System : Pentium IV 2.4GHz
2) RAM : 4GB RAM
3) Hard Disk : 500GB HDD
4) Operating System : Windows 11
5) Coding Language : Python
6) Software : Anaconda Navigator
7) IDE : Jupyter Notebook

VI. BLOCK DIAGRAM

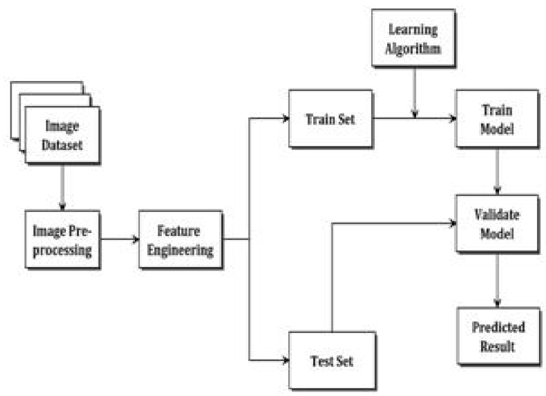

Fig 1 System Architecture

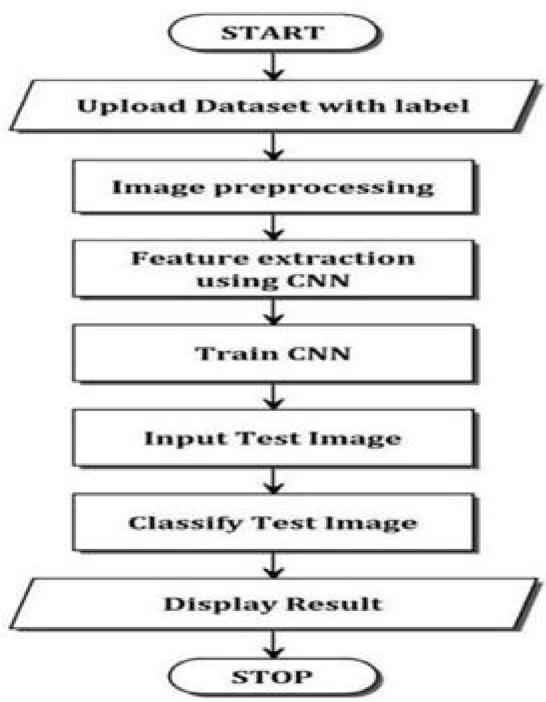

Fig 2 Flow chart

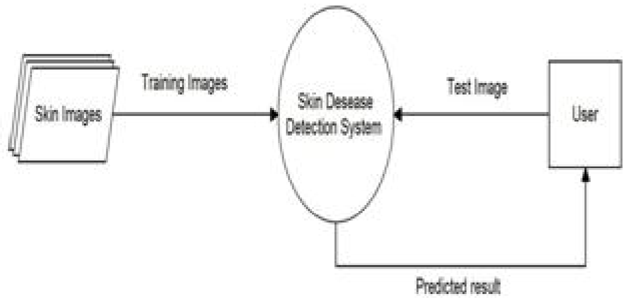

Fig 3 Level 0 Data Flow diagram

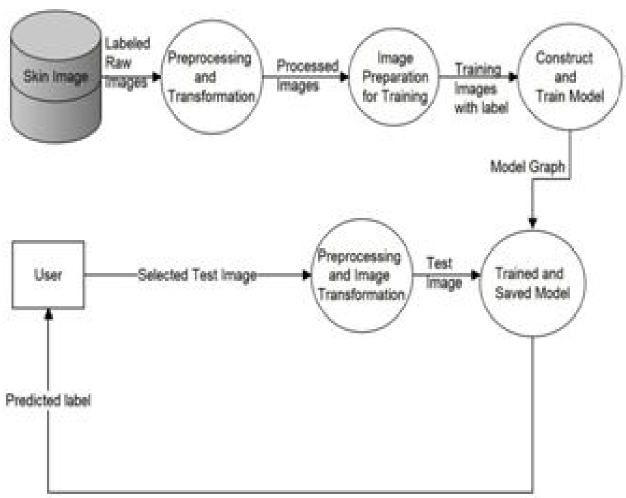

Fig 4 Level 1 Data Flow Diagram

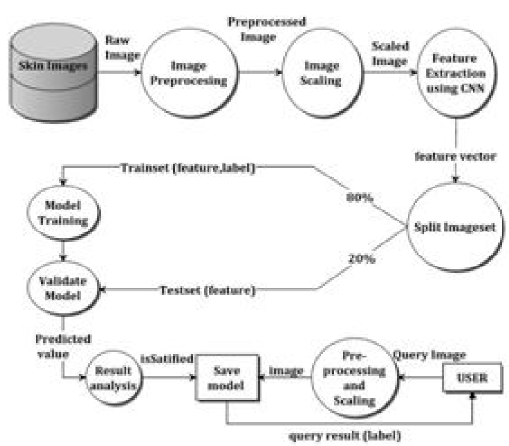

Fig 5 Level 2 Data Flow Diagram

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VII. INTERPRETATION OF RESULTS

The outcomes or outputs that we will receive after carefully executing each module of the system are shown in the following snapshots.

A. Interpretation

Fig 6 Login Page

Fig 7 Home Page

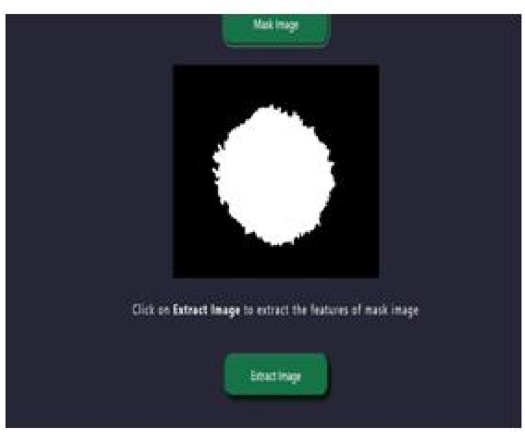

Fig 8 Masking image

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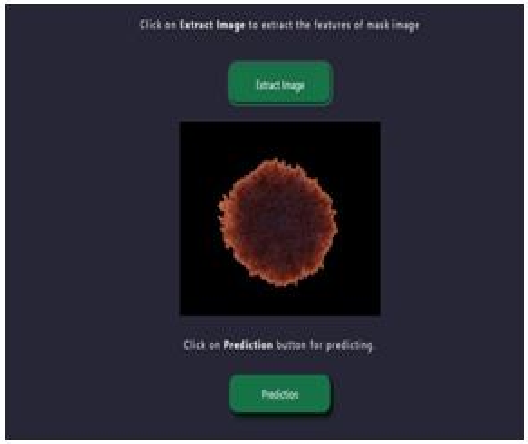

Fig 9 Extracting image

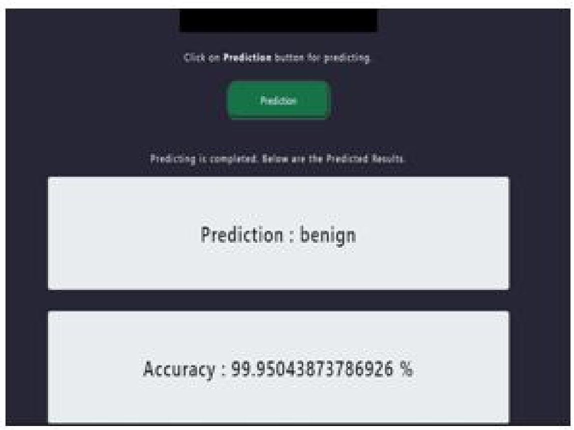

Fig 10 Prediction of Benign cell

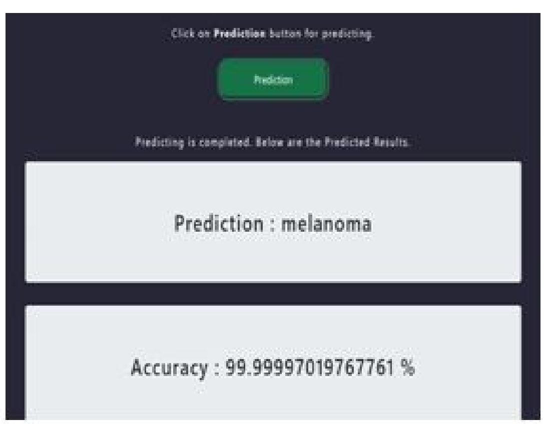

Fig 11 Prediction of Melanoma cell

VIII. CONCLUSION

The proposed system was implemented in anaconda Jupyter notebook on a Windows 1064-bit operating system with Intel(R) Core(TM) i5-6100U CPU @ 2.30GHz processor. Skin Diseases being extremely common must be detected at the earliest stage. The proposed system in this paper provides a feasible solution for skin disease detection providing up to more than 80% efficiency in CNN. This paper gives the description, result analysis and comparison of the efficiency between the three transforms CNN. From implementation of the proposed system, we can conclude that the parallel combination of the three transforms provides the maximum and efficient detection. It can be used as a basic prototype to pave way for faster diagnosis of skin diseases.

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