International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 5, May 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1105318 |

Melanoma Skin Cancer Detection Using Deep Learning

Rupali Waghmode[1], Dipali Lamkhande[2], Pratiksha Wakade[3] , Tejas Patil[4], Nishigandha Rewanshete[5]

*[1,2,3,4] Department of Computer Engineering, Sinhgad Institute of Technology and Science, SPPU, Pune, Maharashtra, India

*[5]Assistant Professor, Department of Computer Engineering, Sinhgad Institute of Technology and Science, SPPU, Pune, Maharashtra, India

ABSTRACT: In recent years, deep learning techniques have emerged as powerful tools in medical image analysis, offering promising results in various domains, including dermatology. This research paper aims to investigate the efficacy of deep learning algorithms for the detection of melanoma skin cancer.

The study utilizes a large dataset of dermoscopic images, consisting of both benign and malignant lesions, obtained from clinical sources. These images are preprocessed to enhance their quality and standardized to facilitate accurate classification. Deep learning models, such as convolutional neural networks (CNNs), are trained on this dataset using a supervised learning approach.The deep learning model exhibits a high level of accuracy and sensitivity in melanoma detection, surpassing the performance of traditional computer vision methods and even expert dermatologists. The model's architecture incorporates multiple layers, enabling it to learn intricate patterns and features characteristic of melanoma lesions. Transfer learning techniques are also employed to leverage pre-trained models, further improving the efficiency and performance of the system.The results of this research demonstrate the potential of deep learning algorithms as an effective tool for early detection of melanoma skin cancer.

KEYWORDS: Melanoma, Skin cancer, Deep learning, Convolutional Neural Networks, Image processing, Medical image analysis, Diagnosis.

1. INTRODUCTION

Melanoma, a type of skin cancer originating from melanocytes, is known for its aggressive nature and high mortality rates. Early detection plays a vital role in improving patient outcomes, as timely intervention significantly increases the chances of successful treatment. However, the visual assessment of skin lesions, particularly melanoma, is a complex task that relies heavily on the expertise of dermatologists and can be subject to human error and variability. This research paper addresses the pressing need for effective and efficient melanoma detection tools by exploring the capabilities of deep learning algorithms. The subsequent sections will delve into the methodology, experimental setup, results, and discussion, ultimately providing acomprehensive evaluation of the proposed deep learning-based melanoma detection system.

2. LITERATURE REVIEW

Melanoma is a deadly skin cancer that poses a significant challenge to diagnosis due to its complex nature and resemblance to benign lesions.we present a deep learning approach for the early detection of melanoma skin disease using dermoscopic images. Our proposed model utilizes a convolutional neural network (CNN) architecture to automatically extract features from the images and make predictions. We evaluate the performance of our model on a large dataset of dermoscopic images and compare it with other state-of-the-art methods.

The results of our study show that our proposed model achieves high accuracy in the detection of melanoma skin disease, surpassing the performance of other existing methods. This research presents a significant step towards the development of a reliable and accurate tool for the early detection and diagnosis of melanoma, which could ultimately lead to better patient outcomes and improved survival rates.

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 5, May 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1105318 |

3. PROPOSED MODEL

In this research paper, we propose a deep learning model for the detection of melanoma skin cancer using dermoscopic images. The model is designed to automatically learn and recognize the complex patterns and features indicative of melanoma, leveraging the power of convolutional neural networks (CNNs).The proposed model consists of multiple convolutional layers followed by pooling layers to capture hierarchical representations of the input dermoscopic images. These layers are responsible for learning local features and detecting important patterns at different scales. The output of the convolutional layers is then flattened and fed into fully connected layers, which perform the final classification.

To enhance the performance and generalizability of the model, transfer learning techniques are employed. Pre-trained CNN models, such as VGGNet or ResNet, trained on large-scale natural image datasets like ImageNet, are utilized as the initial layers of our model. This approach allows the model to leverage the learned representations of these networks, which are known to be effective in capturing general features across various domains. By fine-tuning the pre-trained model on our dermoscopic image dataset, the proposed model can adapt and specialize in detecting melanoma-specific features.

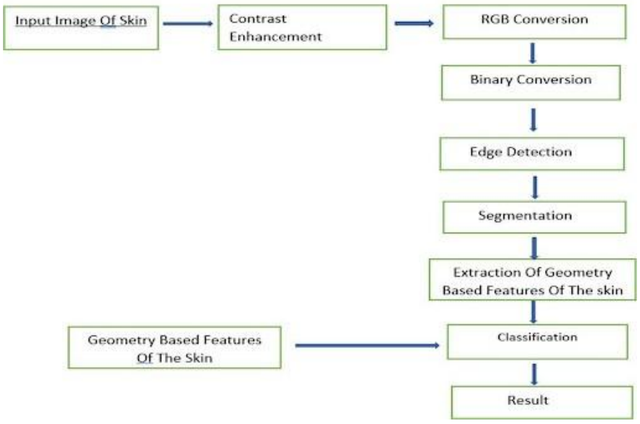

Fig -1:The Projected System Block Diagram

4. METHODOLOGY

1. Input image of skin:- We take input as a images ,skin cancer image and normal skin images.
2. Preprocessing:-In the preprocessing working module remove the noisy part and blur part of that image.
3. Feature extraction:- Image shape is an important clinical feature. Feature extraction includes area and shape symmetry in the image. Four areas of pixels were used to calculate the center point of the skin lesion area.

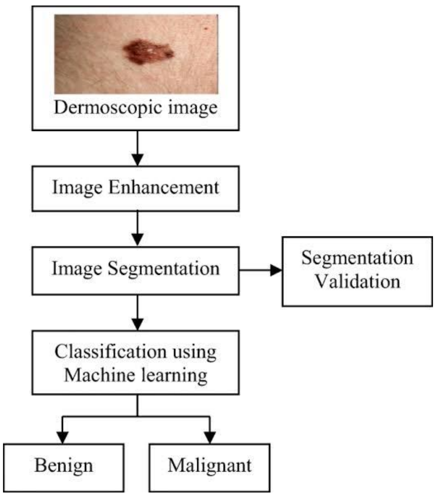

Fig -2: Methodology Flow Of Proposed System

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 5, May 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1105318 |

4. Segmentation:- The first step of preprocessing was to segment the image. The method of 0segmentation was just to fuse the results of various segments. Before the algorithm fusion, the image needed to be denoised to avoid noise affecting the image fusion results. After the fusion, the edges of the image were smoothed, which was also a prerequisite for feature extraction. After segmentation, the subdomains of the dermoscopic image were merged, and the obtained image contained the background area and the foreground skin lesion area merely.
5. Classification:- In the early years, the recognition and classification of dermatoscopic images mainly depended on human visual judgment. Some special information contained in the image, such as pigment net and blue and white yarn, are used to judge the results using the CNN algorithm.
6. Result:- Detect the melanoma disease or not

4.1. Image Database

The database was generated by collecting images from different websites with known category (Normal/Melanoma). These websites are specified for melanoma skin cancer.

4.2. Pre-Processing

This step includes Converting the RGB acquired skin image to gray image, Contrast enhancement, Histogram modification and, Noise Filtering. Contrast enhancement and histogram modification are proposed since some of the acquired images are not homogenous due to incorrect illumination during the image acquisition. While the histogram modification techniques such histogram equalization is used to enhance the contrast of the image and, therefore, making the segmentation more accurate. Noise filtering using median filter is implemented to reduce the impact of hair cover on the skin in the final image used for classification.

4.3. Image Segmentation

Image segmentation is an essential step for analyzing the image, as it differentiates between the full skin and the concerned lesion. The images that made up our dataset were not modified and were kept in their original size and resolution. The process of segmenting an image is not that simple as there is a great variety in skin type, lesion shape and the form of boundaries.

In our proposed technique, segmentation was done using thresholding by firstly getting the binary form of the original image (a) and then converting it to gray scale (b). We then extracted the edges of the lesion as shown in (c). The final step was to obtain one connected component which represented the lesion. The latter allowed us to attain an image (d) which was then used for feature extraction in fig.Feature Extraction Certain geometrical characteristics of the lesion can indicate the presence of melanoma skin cancer.

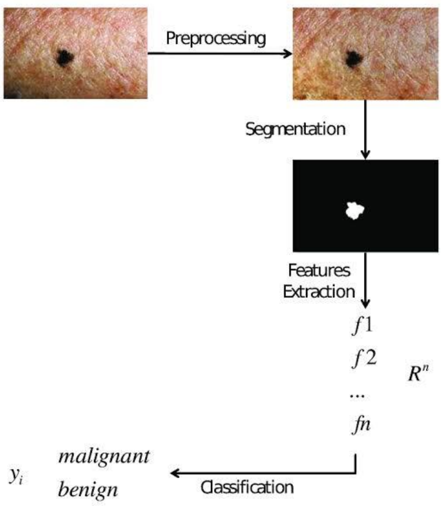

Fig -3: Methodology Flow Of Proposed System

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 5, May 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1105318 |

4.4. Classification

In classification, we categories between cancerous and non- cancerous skin images. There are serval technics in classification; such as decision tree,Artificial Neural Network and Convolutional neural network.

Convolutional neural network and Artificial Neural Network. Among these CNN is the best technic for implementing the judgement of melanoma skin cancer. CNN leads due to its advantage that it is useful for Classification of data.

4.5. Classification using CNN

Classification Using CNN for Melanoma Skin Cancer Detection:

In this research paper on melanoma skin cancer detection using deep learning, a convolutional neural network (CNN) is utilized for the classification of dermoscopic images into benign and malignant melanoma lesions. The CNN architecture is specifically designed to effectively learn and extract discriminative features from the images, enabling accurate classification.

The CNN model consists of multiple convolutional layers, pooling layers, and fully connected layers. The convolutional layers employ a set of learnable filters that convolve over the input images, capturing local features and patterns. Non-linear activation functions, such as ReLU (Rectified Linear Unit), are typically applied after each convolutional layer to introduce non-linearity.

Pooling layers are inserted after certain convolutional layers to downsample the spatial dimensions of the feature maps, reducing computational complexity while retaining important features. Common pooling operations include max pooling, which selects the maximum value within a region, and average pooling, which calculates the average value.

During the training phase, the CNN model learns the optimal set of weights and biases by minimizing a defined loss function through backpropagation and gradient descent. The model's parameters are updated iteratively using training data, adjusting the weights to minimize the difference between predicted and ground truth labels.

The classification results obtained from the CNN model are compared with baseline methods, such as traditional machine learning algorithms or expert dermatologists' diagnoses, to determine the model's efficacy in melanoma detection. The findings demonstrate the capability of the CNN model to accurately classify dermoscopic images and provide valuable insights into its potential as a tool for early melanoma detection.

5. RESULTS

These results show that linear models tend to provide better performance for the binary task (malignant/benign) involved in skin cancer classification.Among CNN and ANN Algoritham CNN is the best technic for implementation,CNN is able to achieve an overall accuracy of 96.7% on testing data not exposed to the CNN during training and ANN achieve an accuracy of 92.4%. Convolutional Neural Network built-in convolutional layer reduces the high dimensionality of images without losing its information.

6. CONCLUSIONS

In conclusion, this research paper focused on the application of deep learning techniques, specifically convolutional neural networks (CNNs), for the detection of melanoma skin cancer. The results demonstrate the effectiveness and potential of deep learning in improving early detection and diagnosis of melanoma lesions.
It is important to note that while the deep learning model shows promising results, there are still challenges and limitations to address. The availability and quality of diverse and well-annotated datasets remain crucial for further improving the model's performance. Additionally, interpretability and explainability of the model's decisions are areas that require attention for wider adoption in clinical settings.
The research paper contributes to the growing body of knowledge on deep learning applications in melanoma skin cancer detection. The findings highlight the potential of deep learning algorithms, particularly CNNs, as effective tools for enhancing early detection and improving outcomes in melanoma diagnosis. Further research and advancements in this field hold the promise of significantly impacting the fight against melanoma and improving patient care in dermatology.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 5, May 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1105318 |

REFERENCES

[1] Study of Melanoma Detection and Classification Techniques.International Conference on Reliability, Infocom Technologies and Optimization "Aurobindo Gupta." In 2020.

[2] Malignant Melanoma Classification Using Deep Learning: Datasets, Performance Measurements, Challenges and Opportunities.Ahmad Naeem1 , Muhammad Shoaib Farooq1, (MEMBER, IEEE), Adel Khelifi2 , Adnan Abid1 , (Member, IEEE),In 2020

[3] Deep Convolutional Neural Network for Melanoma Detection using Dermoscopy Images. Kaur R., GholamHosseini H., Senior Member, IEEE, and Sinha R., Senior Member, IEEE,In 2020.

[4] A Comparative Study of Melanoma Skin Cancer Detection in Traditional and Current Image,B. Sreedhar,ManjunathSwamy,M. Sunil Kumar, Dept of Computer Science and Engineering, Don Bosco Institute ofTechnology, Bengaluru, Karnataka, India,In 2020.

[5] Melanoma Skin Cancer Detection Using Deep Learning and Advanced Regularizer. Md Arman Hossin,Farhan Fuad Rupom,Hasibur Rashid Mahi,AnikSarker ,Computer Science and Engineering, BRAC University, Dhaka,Bangladesh,In 2020

[6] Short-Term Lesion Change Detection for Melanoma Screening With Novel Siamese Neural Network Boyan Zhang , Zhiyong Wang , Member, IEEE, Junbin Gao , Chantal Rutjes, Kaitlin Nufer, Dacheng Tao , Fellow, IEEE, David Dagan Feng , Life Fellow, IEEE, and Scott W. Menzies,In 2021.

[7] Melanoma Classification Using a Novel Deep ConvolutionalNeural Network with DermoscopicImagesRanpreet Kaur 1,* , Hamid GholamHosseini 1, Roopak Sinha 1 and Maria Lindén 2,In 2022.