IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 3, Issue 4, April 2023
Impact Factor: 7.301

Detection of Skin Cancer using Convolutional Neural Network

P. Manikanda Prabu[1], Samyukthasri R. M[2], Saranya R[3]
Assistant Professor, Department of Computer Science and Engineering[1]
Final Year Students, Department of Computer Science and Engineering[2,3]
Anjalai Ammal Mahalingam Engineering College, Thiruvarur, India

Abstract: *Due to their great complexity, expensive diagnosis, and subjective human interpretation, dermatological illnesses are one of the severe health challenges of today. When there are fatal illnesses like melanoma, which have a tendency to slowly spread throughout the body, they are best diagnosed in their early stages because this increases the likelihood of a successful treatment. Malignant melanoma, another name for melanoma, is the worst type of skin cancer and the cause of 75% of deaths from the disease. In 2022, it is anticipated to rank as the fifth most typical cancer for both males (57,180 instances) and women (42,600 cases). It's essential due to the high mortality rate connected with melanoma to find the first signs so they can be properly and quickly addressed. Skin biopsies are still used to diagnose skin cancer, however studies reveal that using new computer technologies like image processing mechanisms in processes connected to early diagnosis of this malignancy can enable discovery at an early stage that may heal the patient. The suggested model is built using a Convolutional Neural Network in conjunction with image processing software to create a better structure and increase accuracy. Phases involving data collection and preprocessing, CNN model creation, and detection make up our model's design. Early diagnosis will be aided by this, especially with the set photos of lesions on the skin. Skin cancer can be detected and can be distinguished from benign skin cancer and melanoma using lesion features including symmetry, colour, size, form, etc. When the model has been trained using the dataset of melanoma lesion images, user input data is handled. The user is presented with the results as high or low risks, and melanoma may be treated early on with little surgery.*

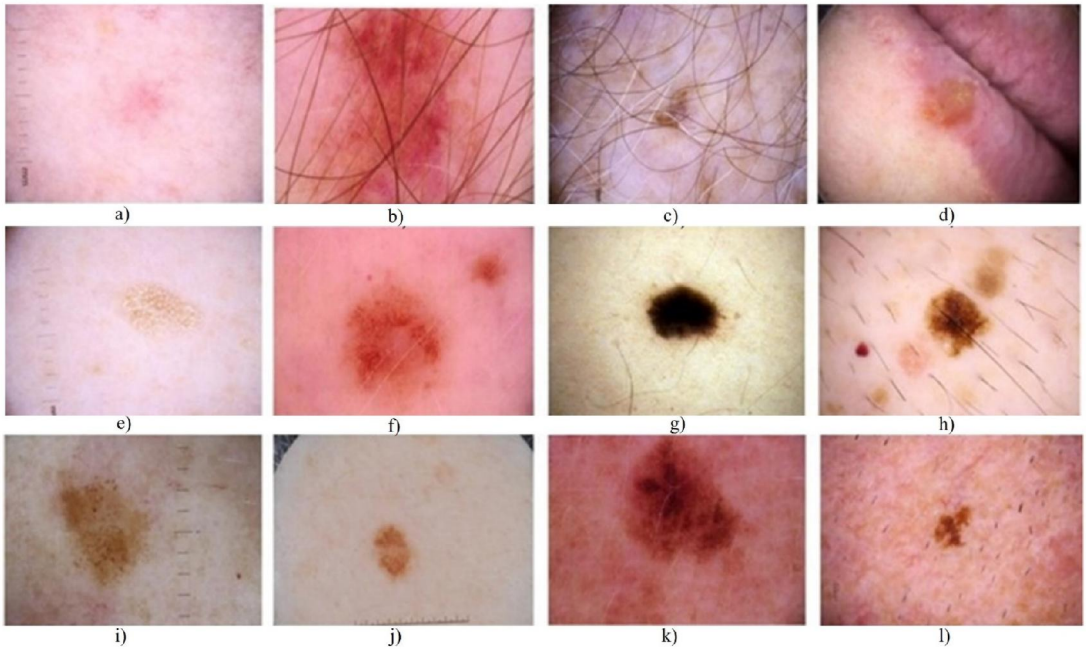
Keywords: Melanoma, Machine Learning, Convolutional Neural Network(CNN), Web application

I. INTRODUCTION

Skin cancer of the melanoma variety can be fatal if it is not found and treated at an early stage. Both patients and doctors may profit greatly from quick and precise diagnosis. In many medical domains, recent developments in deep learning-based computer vision have driven model performance to levels that are comparable to (or even surpass in some situations) those of human experts. Computer vision and deep learning methods, particularly Convolutional Neural Networks, can be used to identify melanoma (CNNs). A common type of artificial neural network utilised for image classification and identification applications is the CNN. Following one or more fully connected layers, they are made up of numerous layers of convolutional and pooling procedures. A CNN can be trained on a collection of skin lesion images in the context of melanoma detection to discover the features that distinguish between benign and malignant lesions. The network is fed a huge number of annotated images throughout the training process, allowing it to gradually learn and modify its internal parameters to reduce classification errors. After being taught, the CNN can be used to categorise newly discovered skin lesion images as benign or malignant. Being able to accomplish this in real-time makes it a potentially strong tool for melanoma early detection. Using CNNs to identify melanoma has generally yielded positive results, with some studies claiming accuracy rates of over 90%.

DOI: 10.48175/IJARSCT-9262

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 3, Issue 4, April 2023
Impact Factor: 7.301



Images of skin lesions

1.1 Melanoma

Melanoma is a type of skin cancer distinguished by a dark, irregularly shaped mole or other skin lesion. Early detection and treatment of melanoma can greatly increase the likelihood of a favourable outcome. Elevated or raised skin tissue, a lump-like or firmly attached lesion, a touchable, itchy, unpleasant, or tender lesion, a lesion with an uneven or fuzzy border or an asymmetrical shape, a lesion that oozes or bleeds fluid and has a mottled or varied colour pattern are all signs of melanoma skin lesions.

II. MACHINE LEARNING

In the fields of computer science and artificial intelligence (AI), machine learning focuses on creating statistical models and algorithms that allow computer systems to learn from experience and advance without explicit programming. A dataset, which may or may not be labelled, is used to train a computer system in machine learning. In contrast to unlabeled data, which simply contains input data, labelled data includes input-output pairs. The system analyses this information to find patterns and links, and then modifies its algorithms to increase accuracy. In machine learning, algorithms and models are created that allow computers to learn from data without being explicitly programmed. It aims to build models that can predict or decide based on relationships and patterns found in data. It is the process of teaching a computer program to recognize patterns and correlations between input and output data by training it on a dataset using statistical techniques and mathematical algorithms. The model can then be applied to new, untried data to generate predictions or choices after being trained on the dataset.

III. CONVOLUTIONAL NEURAL NETWORK (CNN)

A deep learning neural network known as a convolutional neural network (CNN) excels at image recognition and analysis. CNNs are based on the human visual system, which is made up of layers of neurons organised in the visual cortex that process increasingly complex visual data. A CNN's fundamental component is a convolutional layer. It applies a series of filters to the input image (also known as kernels or feature detectors) to extract features such as edges, lines, and textures. Each filter generates a feature map, which is a new image that highlights the presence of a specific feature in the input image. Convolutional layers are frequently joined by additional layers in CNNs, such as pooling layers that down sample feature maps to make the network more effective and smaller, and fully connected layers that use the output of convolutional and pooling layers to determine the final classification. In a variety of image

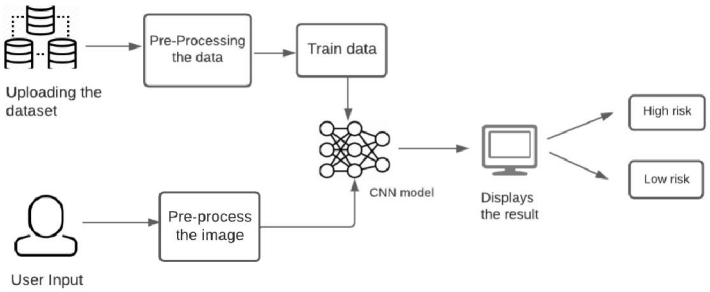
IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 3, Issue 4, April 2023
Impact Factor: 7.301

identification and analysis tasks, such as object detection, image segmentation, and image captioning, among others, CNNs have produced more accurate results.

IV. WEB APPLICATION

A web application can be accessed via a web browser or a web-based interface that runs on a web server and communicates with users via the internet. Web applications are used to deliver a variety of services. A web application integrated with CNN (Convolutional Neural Network) integration can be used to perform a variety of image recognition tasks. A CNN model could be used by the web application to classify user input images into groups. This could be useful in a variety of fields, including e-commerce, research, healthcare and education.

V. SYSTEM MODEL



V. PROPOSED METHODOLOGY

A proposed system for the detection of melanoma using Convolutional Neural Networks (CNN) and a web application would involve the following components:

- **Data Collection and loading:** A large dataset of skin images that includes both benign and malignant moles needs to be collected. The images should be of high quality and resolution. The images can be collected from various sources such as hospitals, clinics, and research institutions. The dataset includes images with different skin tone, ages, with and without hair. The dataset is loaded.
- **Data Pre-processing:** The goal of data preprocessing is to prepare the dataset for analysis by addressing any missing or invalid data, outliers, and removing columns that are not necessary. The collected images need to be pre-processed to remove any noise or artefacts. The images need to be normalised and resized to a fixed size to feed into the CNN model. The dataset is divided into training and test sets. The training set is given to train the Convolutional Neural Network model.
- **Convolutional Neural Network Model:** A deep learning model based on Convolutional Neural Networks (CNN) needs to be trained on the preprocessed images. The model should be able to classify the images as either benign or malignant with high accuracy. The architecture of the CNN model can be adjusted based on the complexity of the dataset. The system should be tested on a set of images that were not used for training the CNN model. The testing should be done to ensure the accuracy and reliability of the system.
- **Web Application for user input:** A web application needs to be developed to provide an interface for the users to upload their skin images. The web application should include a user-friendly interface for uploading the images and displaying the results. The trained CNN model needs to be integrated into the web application to classify the uploaded images. The results of the classification should be displayed to the user in a simple and understandable format. Once the system is tested and validated, it can be deployed for the public to access. Overall, this proposed system for the detection of melanoma using CNN with a web application can provide a cost-effective and accessible solution for early detection of skin cancer, which is crucial for better treatment outcomes.

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 3, Issue 4, April 2023
Impact Factor: 7.301

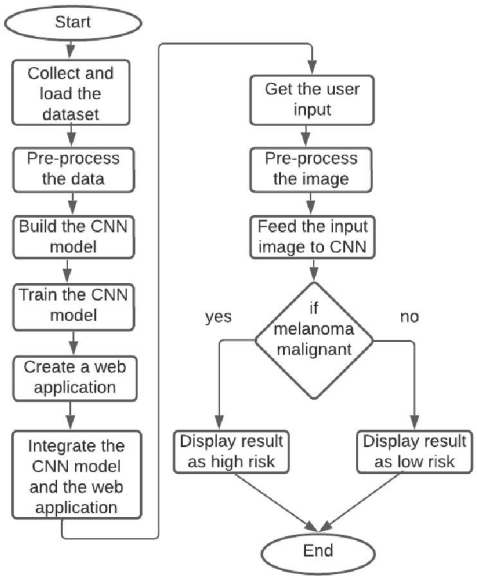
VI. RELATED WORKS

Skin cancer detection is critical for successful treatment. Skin cancer symptoms can now be detected quickly and easily using computer-based techniques. Several noninvasive methods for assessing skin cancer symptoms have been proposed. The use of machine learning in the early detection of cancer has opened up a new field of study and demonstrated the ability to overcome limitations in the manual method.

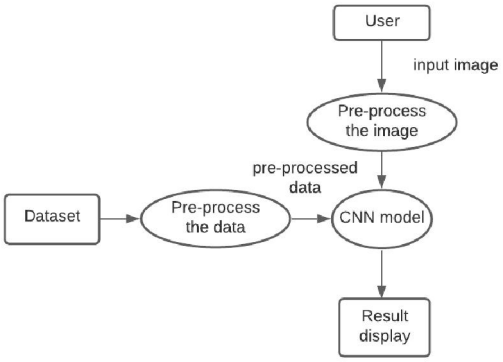
An overview of several relevant studies is presented here.Various approaches were used and evaluated on HAM10000 images (ISIC 2018), ISIC 2019, and ISIC 2020 datasets. A total of 112 German dermatologists and a CNN expert classified 300 biopsy-verified skin lesions into five categories. The two independently obtained sets of diagnoses were joined using gradient boosting to create a unified classifier. The InSiNet deep learning-based technique detects benign and malignant tumours obtaining 94.59%, 91.89%, and 90.549% accuracy when using the ISIC 2018, ISIC 2019, and ISIC2020 datasets..

Researchers proposed a deep-learning-based methodology, including a region-based convolutional neural network (RCNN) and fuzzy k-means clustering, to classify skin melanoma at an early stage. The proposed technique was tested using a variety of clinical photos in order to assist dermatologists in the early detection of this potentially fatal condition. The ISIC-2017, PH2, and ISBI-2016 datasets were used to evaluate the effectiveness of the provided methodology. It performed with an average accuracy of 95.40%, 93.1%, and 95.6%.

VII. FLOWCHART



VIII. DATA FLOW DIAGRAM



IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Impact Factor: 7.301
Volume 3, Issue 4, April 2023

IX. CONCLUSION

To achieve the aim of the project, that is to detect whether the patient has low or high risk, we have considered using Machine learning. We have reviewed that ML has numerous potential applications in the dermatologist's workflow from diagnosis to treatment. Recent advancements in access to large datasets (e.g., electronic medical records,image databases), faster computing have encouraged the algorithms' development with human-like intelligence in dermatology. The classification of images through CNN has garnered the most attention for its potential to increase the accessibility of skin cancer screenings and streamline the workflow of dermatologists

REFERENCES

[1]. Kaur, R.; GholamHosseini, H.; Sinha, R.Lindén, M. "Melanoma Classification Using a Novel Deep Convolutional Neural Network with Dermoscopic Images". Sensors 2022

[2]. Ahmad naeem, Muhammad shoaib farooq, Adel khelifi, and Adnan abid, "Malignant Melanoma Classification Using Deep Learning: Datasets, Performance Measurements, Challenges and Opportunities", June 10, 2020

[3]. Mehwish Dildar, Shumaila Akram, Muhammad irfan, "Skin cancer detection : A review using deep learning techniques", 2021

[4]. Rehan Ashraf, Sitara Afzal, Atiq Ur Rehman, Sarah gul, Junaid Ul Baber,Maheen Bakkhtyar, Irfan Mehmood, Oh young song, Muzzam Maqsood "Region-of-Interest Based Transfer Learning Assisted Framework for Skin Cancer Detection", July 2020

[5]. P. Ghosh, B. Kong, S. Sun, X. Wang, Q. Song, and S. Zhang, ''Invasive cancer detection utilising compressed convolutional neural network and transfer learning,'' in Proc. Int. Conf. Med. Image Comput. Comput.-Assist. Inter-vent. Cham, Switzerland: Springer, 2018, pp. 156–164.

[6]. R. Kasmi and K. Mokrani, ''Classification of malignant melanoma and benign skin lesions: Implementation of automatic ABCD rule,'' IET Image Process., vol. 10, no. 6, pp. 448–455, June. 2016.

[7]. S. Demyanov, R. Chakravorty, M. Abedini, A. Halpern, and R. Garnavi, ''Classification of dermoscopy patterns using deep convolutional neural networks,'' in Proc. IEEE 13th Int. Symp. Biomed. Imag. (ISBI), Apr. 2016, pp. 364–368.

[8]. I. Giotis, N. Molders, S. Land, M. Biehl, M. F. Jonkman, and N. Petkov, ''MED-NODE: A computer-assisted melanoma diagnosis sys-tem using non-dermoscopic images,'' Expert Syst. Appl., vol. 42, no. 19, pp. 6578–6585, Nov. 2015.

[9]. R. B. Oliveira, J. P. Papa, A. S. Pereira, and J. M. R. S. Tavares, ''Computa-tional methods for pigmented skin lesion classification in images: Review and future trends,'' Neural Comput. Appl., vol. 29, no. 3, pp. 613–636, Feb. 2018.

[10]. "M. Q. Khan, A. Hussain, S. U. Rehman, U. Khan, M. Maqsood, K. Mehmood, and M. A. Khan, ''Classification of melanoma and nevus in digital images for diagnosis of skin cancer,'' IEEE Access, vol. 7, pp. 90132–90144, 2019.