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Survey Paper on Skin Cancer Detection Using CNN

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ABSTRACT

With over 5,000,000 new cases every year skin cancer is a concerning public health predicament. Generally, skin cancer is of two types: melanoma and non-melanoma. Melanoma also called Malignant Melanoma is the 19th most frequently occurring cancer in women and men. It is the deadliest form of skin cancer. Over 350,000 cases of melanoma skin cancer were detected in 2015 alone. The most prevalent non-melanoma tumors are squamous cell carcinoma and basal cell carcinoma. Non-melanoma skin cancer is the 5th most frequently occurring cancer, with over 1 million diagnoses worldwide in 2018 alone . As of 2019, more than 1.7 Million new cases are expected to be diagnosed . Even though the mortality is significantly high, when detected early, survival rate exceeds 95%. This encourages us to come up with a solution that could save millions of lives by detecting skin cancer at an early stage. Convolutional Neural Network (CNN) or ConvNet are a class of deep neural networks, basically generalized versions of multi-layer perceptrons. This project aims to develop a CNN model to help in early detection of skin cancer. To develop an optimized model, we analyzed research papers on the subject of skin cancer diagnosis published in well-known specialized journals. The proposed model will be developed and tested with different network architectures by training the network with varying

types of layers.

Keywords:- Convolutional Neural Networks, Malignant Melanoma, Melanoma

1.INTRODUCTION

Skin cancer is the out-of-control growth of abnormal cells in the epidermis, the outermost skin layer, caused by mutations in the unrepaired DNA damage These mutations cause skin cells to grow rapidly, resulting in cancerous tumours.The most common kinds of skin cancer are Basal cell carcinoma (BCC), squamous cell carcinoma (SCC), melanoma, and Merkel cell carcinoma (MCC). The sun's harmful ultraviolet (UV) radiation and the usage of UV tanning beds are the two main causes of skin cancer. Fortunately, if detected early, skin cancer can be treated with little to no scarring and is more likely to be completely eliminated.

2.MOTIVATION

Melanoma incidence rates have risen dramatically in the last three decades, and despite the fact that most individuals diagnosed with skin cancer have a higher chance of being cured, Melanoma survival rates are lower than non-Melanoma skin cancer survival rates. Melanoma skin cancer (MSC) can occur on any skin surface, and its incidence has continued to increase in many parts of the world over the last two decades. It's mostly found on the skin of the head, neck, or between the shoulders and hips in men, and on the skin of the lower thighs or between the shoulders and hips in women. It's rare in dark skinned people, and when it occurs, it generally occurs under the fingernails, under the toenails, on the palms of the hands, or on the soles of the feet.

3. LITERATURE SURVEY

Md Shahin Ali, Md Sipon Miah , Jahurul Haque, Md Mahbubur Rahman, Md Khairul Islam.

"An enhanced technique of skin cancer classification using deep convolutional neural network with transfer learning model" [1], : Skin cancer is one of the top three types of cancer caused by damaged DNA that can cause death. There is some research for the computerized analysis of malignancy in skin lesion images. In this paper, the authors propose a deep convolutional neural network (DCNN) model based on deep learning approach to distinguish between benign and malignant skin lesions. The authors were able to get training accuracy of 93.16% and testing accuracy of 91.93%.

Mahamudul Hasan, Surajit Das Barman, Samia Islam, Ahmed Wasif Reza."Skin Cancer Detection Using Convolutional Neural Network"[2], : This paper focuses on early diagnosis of skin cancer. Scientists have proposed an artificial skin cancer detection system using image processing and machine learning methods. The authors used a deep learning based method convolutional neural network classifier for the stratification of the extracted features and achieved an accuracy of 89.5% and training accuracy of 93.7%.

Mehwish Dildar, Shumaila Akram, Muhammad Irfan, Hikmat Ullah Khan, Muhammad Ramzan , Abdur Rehman Mahmood, Soliman Ayed Alsaiari , Abdul Hakeem M Saeed, Mohammed Olaythah Alraddadi and Mater Hussen Mahnashi "Skin Cancer Detection: A Review Using Deep Learning Techniques"[3], : Skin cancer is caused by genetic defects or mutations in unrepaired deoxyribonucleic acid (DNA) skin cells. Lesion parameters such as color, symmetry, shape, size etc. are used to detect and distinguish between benign skin cancer from melanoma. In this paper a systematic review of deep learning techniques for the early detection of skin cancer has been conducted.

Yunendah Nur Fu'adah, NK Caecar Pratiwi, Muhammad Adnan Pramudito and Nur Ibrahim

"Convolutional Neural Network (CNN) for Automatic Skin Cancer Classification System"[4], : Early diagnosis and proper treatment can minimize and control the harmful effects of skin cancer. The authors used the Convolutional Neural Network (CNN) model consisting of 3 hidden layers and also used several optimizers and achieved an accuracy of 99% when tested on a publicly available dataset.

Jinen Daghrir, Lotfi Tlig, Moez Bouchouicha, Mounir Sayadi. "Melanoma skin cancer detection using deep learning and classical machine learning techniques: A hybrid approach"[5], : The model proposed in this paper combines the results from a convolutional neural network and two classical machine learning classifiers trained with a set of parameters describing the borders, texture and the color of a skin lesion and uses a majority voting strategy to predict the presence/absence of skin cancer.

4. MATHEMATICAL MODEL & ALGORITHM

In a classification problem, only one metric such as Accuracy cannot help us evaluate the complete model efficiency effectively. Hence we measure the Accuracy, Precision, Recall, F1 Score and Support for every class of the skin lesion disease. We also plot the Confusion Matrix in order to check how well our model performs in every class. Confusion matrix is where,

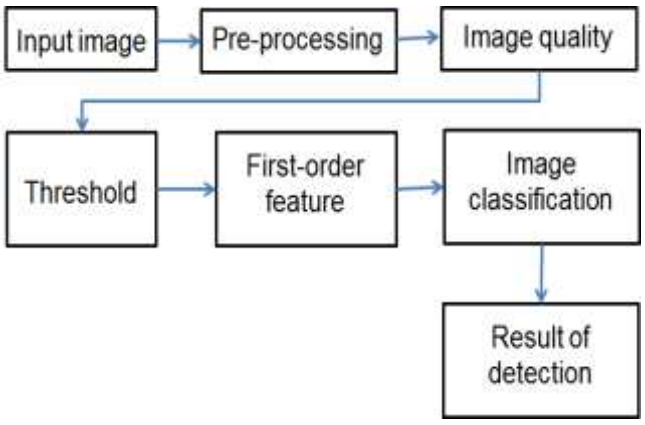
TP = True Positive;

FN = False Negative;

FP = False Positive;

TN = True Negative.

For example if the skin lesion image is labeled with the melanoma and the model also melanoma, this is considered as the true positive case. If the image is labeled with melanoma but it is classified as any of the other six classes, the case of false negatives. False positive cases happen when the skin lesion is indicated by the classification model to have melanoma but it actually belongs to any of the other six diseases. If a non-melanoma skin image is suggested as non-melanoma by the classifier. It is the case of true negatives.



Data Flow Diagram

5. SYSTEM ARCHITECTURE

6. ACKNOWLEDGEMENT

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7. CONCLUSION

In this paper, a Convolutional Neural Networks based approach has been proposed for melanoma classification. A system is developed that can help patients and doctors to be able to detect or identify skin cancer classes whether it is benign or malignant. From the experimental and evaluation section, it can be said the model can be considered as a benchmark for skin cancer detection by assisting healthcare

professionals. By taking some random images any doctor can identify the accurate results but in the traditional approach too much time is taken to detect the cases correctly.

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