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SKIN LESION ANALYSIS USING CNN

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***Abstract*— Skin Cancer is an uncontrollable growth of abnormal cells in the epidermis which is the outer layer of the skin. It is caused when the DNA is altered and it can't properly control skin cell growth. Skin cancer is also one of the most hazardous forms of cancer.**

There are 4 main types of skin cancer named as Basal cell carcinoma, Basal cell carcinoma, Merkel cell cancer, and Melanoma. Detection of Skin cancer in the early stage will be helpful to cure it. The normal dermatologist way to diagnose skin cancer is visual, with the dermoscopic assessment of the lesion followed by biopsy and histopathologic evaluation which is very long which leads the patient to critical stages of cancer. Currently, many technologies have been developed to increase the accuracy of detecting skin cancer as early as possible.

Computer Vision can play a vital role in medical Image diagnosis which has been proved by the existing systems. In this article, we are analysing all the seven types of skin cancers, they are Melanoma (MEL), Melanomic Neves (NV), Basal Cell Carcinoma (BCC), Actinic Keratosis (AKIEC), Benign Keratosis (BKL), Dermatofibroma (DF), Vascular Lesion (VASC) to get the better understanding of how to build the CNN (Convolutional Neural Network) model which will perform image processing on various image dataset of skin cancer to analyze and detect its type.

Keywords—skin cancer, CNN, image processing, cells, Melanoma (MEL), Melanomic Neves (NV), Basal Cell Carcinoma (BCC), Actinic Keratosis (AKIEC), Benign Keratosis (BKL), Dermatofibroma (DF), Vascular Lesion (VASC).

I. INTRODUCTION

Skin is the most exposed part of the body given the fact that it is the outermost part hence UV rays, dust, micro-organisms. This can lead to a number of diseases, and in worst case scenario, to skin cancer.

It is a depressing fact, as stated by World Health Organisation (WHO), that one in every three cancers identified is a skin cancer. As its correctly said absolute power corrupts absolutely, it is because of human's exponential increase in power over nature and subsequent global warming that the ozone layer is getting depleted, inversely leading to increase in the harmful UV radiations reaching Earth's surface because of loss of the protective filter. An additional 4,500 melanoma and 3,00,00 non-melanoma skin cancer cases will be resulting in case of a 10% decrease in ozone levels. Other causes of skin cancer include modernizing diets, smoking and alcohol. Abnormal changes in skin colour appearance, shape, size, itching, bleeding are the cautionary signs of skin cancer. Due to negligence, lack of facilities, or simply unavailability of crucial time the disease rushes to become fatal, by spreading to other body parts.

Upon understanding Dr. Sharmila Gaikwad's "Study on Artificial Intelligence in Healthcare." [1],[2] and getting motivated by it we understood the importance to curb this global incidence of skin cancer from reaching massive heights. There is an urgent need of reliable and accurate systems to not only help the expert dermatologists in the field but also individuals to detect skin lesion types as early as possible.

In this paper we have presented an Artificial intelligence take for developing a skin cancer classifier. There are 3 steps in this automated classifier:

- Pre-processing
- feature extraction
- classification

The paper speaks in volumes about the existing system, research gap identified in it and general steps in developing the classifie

II. LITERATURE REVIEW

Year of Publication	Title and Authors	Content
2017	skin lesion analysis towards melanoma detection using deep learning network (Yuexiang li and linlin shen)	technique that uses imaging processing as a previous step before training. This result in a normalization and noise reduction on the dataset[2]
2019	Melanoma Skin Cancer detection using Image processing and machine learning (Vijaylaxmi M M)	Uses AI algorithms like CNN and SVM, amalgamated it with image processing tools[3]
2020	Computer Vision for Skin Cancer detection and diagnosis Kamalpreet Kaur, et al.	Elaborately explains about the data collection , its cleaning and finally uses CNN for model building .[4]
2021	Skin Cancer Detection: A Review Using Deep Learning Techniques by Mehwish Dildar	Describes detailed systematic review of deep learning techniques for the early detection of skin cancer. Research papers published in well-reputed journals, relevant to the topic of skin cancer diagnosis, were analyzed [5]
2020	Melanoma Detection using Adversarial Training and Deep Transfer Learning Hasib Zunair	Interestingly, shows through feature visualization and analysis that their method leads to context based lesion assessment that can reach an expert dermatologist level.[6]
2018	Dermatologist Level Dermoscopy Skin Cancer Classification Using Different Deep Learning Convolutional Neural Networks Algorithms Habib Safigholi,	describes the effectiveness and capability of convolutional neural networks that have been studied in the classification of 8 types of skin diseases[7]
2020	"Melanoma Skin Cancer Detection Using Deep Learning and Advanced Regularizer" presented by Md. Arman Hossin	In this system, dermoscopic images are classified to predict skin cancer using a multi-layered CNN approach with multiple regularization techniques called dropout and batch normalization. [8]
2017	Detection and Analysis of Skin Cancer from Skin Lesions by Nidhal K. EL Abbadi	a new method for detecting asymmetry based on the rotation of lesion and dividing lesion into two horizontally and vertically parts then count the number of pixels that are mismatched is discussed here.[9]
2017	Skin Cancer Detection Using Image Processing presented by Uzma Bano Ansari et al	The detection methodology uses Image processing methods and a Support Vector Machine (SVM) algorithm.[10]

III. RESEARCH GAP IDENTIFIED

The disheartening truth about skin cancer is that even though it usually develops in many years, the incipient skin damage for instance as because of the damage to the DNA triggered due to UV radiation from Sun, may unfortunately advance and conclude into becoming skin melanoma and also regrettably progress to spread to other body parts.

However, melanoma is curable, if there is foresightedness of a potential lesion getting converted to melanoma. Hence the development and deployment of an accurate enough model which predicts a lesion at early stages, assists the mighty dermatologists becomes highly essential.

Taking the literature survey presented above as the ground for analysis we come to know that the complexities in the establishment of a real-time skin lesion classifier are based on pre-processing and important rubrics like texture, shape, color, etc.

The already existing setups for classifying a skin lesion into 7 types of skin cancer were hindered when there was ambiguity in the distinction between the lesion and surrounding skin and when there was a lack of clarity in lesion borders

The classifiers also performed disappointingly when there was a dissimilarity in the background of the new test input as compared to the input fed to the classifier during training or also when a lesion touches the boundaries of the image.

Another obstacle in achieving higher accuracy is the real-life problem of the limited availability of datasets.

Often its witnessed that patients undergoing the heart-wrenching trauma due to the said disease are not exactly comfortable with sharing the images of the lesions

Also one of the major loopholes identified is that classifiers may not be robust to discrepancies in image capture that will be inevitable when the classifier will be subject to on the spot images in routine life

The classifiers should also be able to demonstrate its vagueness in case its likely to be incorrect or is unfit to correctly classify and should be standardized to accept and admit it's erroneous prediction rather than predicting with high confidence as it deals with a delicate and sensitive issue such as skin cancer.

IV. METHADOLOGY/ GENERAL STEPS

According to a recent survey by World Health Organisation (WHO), the frightening figures of people being diagnosed with the deadly melanoma will total 13 million each and every year. To at least mitigate if not eliminate the wide-ranging mortality rate and expensive medical consultation cost makes it most vital to develop a reliable classifier that helps to detect this deadly condition at the earliest. To develop the same the important steps are as follows

A. Data Collection

One usually has to tackle a very important obstacle and that is the collection of datasets for skin cancer classification. Automated analysis and prediction of pigmented lesions on the skin often meet roadblocks such as limited dataset or also diverse and unique skin lesion images which is indeed necessary so that the classifier model is exposed to varied images during its learning time and doesn't suddenly get petrified but is rather habituated and confident while dealing with on the spot images in routine practice

We recommend using the easily available HAM10000 image dataset. It is the dataset of dermatoscopic images collected from different populations. The final dataset tallies up to 10015 images consisting of 7 different types of skin cancer: actinic keratoses and intraepithelial carcinoma (AKIEC) cases, dermatofibroma (DF)cases, melanoma, basal cell carcinoma (BCC), benign keratosis(BK), melanocytic nevi(NV), Vascular Lesion (VASC). These images were confirmed by follow-up with doctors, consensus with specialists, or microscopy. This dataset is accompanied by a .csv file with the help of which images can be tracked to their lesion ids which further informs the method of confirmation (consensus, follow-up, etc) of these images and their localization on the body.

B. FeaturesExtraction

Feature extraction means to be able to take important notes by taking into consideration only certain important properties that will be different from other inputs. A CNN model is considered to be appropriate here for processing the images as it is designed for working on pixel values. Layers such as Conv2D help by sliding a filter or kernel over input data which is in 2D and upon performing element-wise multiplication and concluding with summing up of results into a single output pixel. This kernel slides over every location performs the same operation and transforms the input 2d matrix into a new 2D matrix. The ReLU or Rectified Linear Unit is an activation function that outputs zero if the input is not positive and outputs the input if it is positive, and is considered in, many neural networks because of its excellent performance and better results. Max pooling assists in calculating the maximum value of every patch in all feature maps.

C. Classification

This is an important step because it is in charge of outputting the interpretations about the information acquired from previous steps to be able to classify the input image into 7 types.

These were the general steps in building a model for classifying skin cancer.

V. CONCLUSION

Malignant melanoma even if has the occurrence in only 4% population, it accounts for 75% of deaths

caused due to skin cancer. In this paper we have done extensive survey of existing systems and came to the conclusion that CNN based model will help to dermatologists in early detection of cancer in skin and give them more time to perfect their future steps in curing the patients, because time plays an extremely important role in providing cure for this deadly disease. The paper also talks about how its important that the classifier itself admit in its potential faults in case it is unable to classify correctly rather than giving confident predictions as it is an extremely sensitive issue and can harm somebody's life. The challenges which lie ahead of us are more and more collection of datasets and more awareness in patients to get themselves tested without being ignorant as it spreads quickly to other body parts too by beginning as a tiny lesion.

VI. REFERENCES:

[1] Gaikwad, Sharmila. "Study on Artificial Intelligence in Healthcare." 2021 7th International Conference on Advanced Computing and Communication Systems (ICACCS). Vol. 1. IEEE, 2021.

[2] Gaikwad, Sharmila, Saarah Patel, and Ajinkya Shetty."BrainTumor Detection: An Application Based on Machine Learning." 2021 2nd International Conference for Emerging Technology (INCET). IEEE, 2021

[3] Y. Li and L. Shen, "Skin Lesion Analysis towards Melanoma Detection Using Deep Learning Network"," Sensors, vol. 18, no. 2, p. 556, 2018.

[4] V. M, "Melanoma Skin Cancer Detection using Image Processing and Machine Learning", International Journal of Trend in Scientific Research and Development, vol. -3, no. -4, pp. 780-784, 2019.

[5] Kamalpreet Kaur, et al. "Melanoma Skin Cancer Detection Using Image Processing and Machine Learning.Vol 1 IEEE,2019

[6] M. Dildar et al., "Skin Cancer Detection: A Review Using Deep Learning Techniques", International Journal of Environmental Research and Public Health, vol. 18, no. 10, p. 5479, 2021.

[7] H. Zunair and A. Ben Hamza, "Melanoma detection using adversarial training and deep transfer learning", Physics in Medicine & Biology, vol. 65, no. 13, p. 135005, 2020.

[8] M. A. Hossin, F. F. Rupom, H. R. Mahi, A. Sarker, F. Ahsan, and S. Warech, "Melanoma skin cancer detection using Deep Learning and advanced regularizer," 2020 International Conference on Advanced Computer Science and Information Systems (ICACSIS), 2020.