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Skin Cancer Detection Using Machine Learning

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ABSTRACT
Now a day's skin cancer is a major problem human beings are facing, To recognize skin cancer new methodology for diagnosing skin cancer by images of dermatologic spots using image processing is presented. Currently, skin cancer is one of the most frequent diseases in humans. This methodology is based on Fourier spectral analysis using filters such as classic, inverse, and to k-law nonlinear. The sample images are obtained by a specialist as a replacement spectral technique is developed and quantitative measurement in the complex pattern found cancerous skin spots. Finally which spectral index is calculated to get a variety of spectral indices defined for carcinoma. Our results show a confidence of level 95.4%. carcinoma mainly occurs thanks to exposure to sunlight. Skin Cancer alarming is disease for mankind, the need for early diagnosis the skin cancer are increased due to the rapid climb rate of Melanoma skin cancer, its high treatment Costs, and the death rate. The cancer cells are detected manually and it takes time to cure in most of the cases. This project proposed a man-made carcinoma detection system using image Processing and machine learning method. The features of the affected skin cells are extracted after the segmentation of the pictures using the feature extraction technique. A deep learning-based method Convolutional neural network classifier is employed for the stratification of the extracted features.

***Key Words*:** - Cancer, CNN, Machine Learning, Deep Learning, Image processing.

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1. INTRODUCTION

Cancer forms when healthy cells change and grow out of control, forming a the called tumor. A tumor can be cancerous or benign. A cancerous tumor is malignant, meaning that grows and spread over other parts of the body. As there begins as a tumor means that the tumor can grow but won't spread Skin cancer is also a chronic illness that affects people worldwide. The two types of skin cancer are melanoma (malignant) and non-melanoma (benign) (benign). This condition results in skin scarring and disfigurement, and also severe pain and bleeding. Since the ozone layer is depleting as a result of increased pollution in the atmosphere, ultraviolet (UV) radiation directly penetrates the earth's surface. Skin cancer is caused by direct exposure to UV radiation. Skin cancer warning signs include changes in skin color, size, shape, skin lesion or mole color, the appearance of net growth on the skin, swelling, and bleeding. If you

notice any of these signs, it is recommended that you see a dermatologist. According to some figures, the number of skin cancer cases and deaths is rising. Each year, the World Health Organization (WHO) reports that 3 million cases of nonmelanoma skin cancer and 132,000 cases of melanoma occur worldwide. Nearly ten thousand people are diagnosed in the United States with skin cancer and one in every five people will develop skin cancer at some point. Each year, skin cancer cases surpass the estimated number of cases. Other types of cancer are prevalent in the world. By offering proper treatment and care, early detection of skin cancer increases the patient's chances of survival and saves his life.

The ABCDE rule can assist people in detecting early signs of melanoma, a severe form of skin cancer. The rule states that you should look for asymmetry, which occurs when one half of a mole differs from the other half; border irregularity, which occurs when the edges of a mole are not smooth; color variations, which occur when a mole has different colors; diameter, which occurs when a mole is larger than a pencil eraser; and evolving, which occurs when a mole changes in size, shape, or color. Using this guideline to check the skin on a frequent basis is critical. It is best to see a doctor if there are any changes or concerns. Skin cancer can be reduced by protecting the skin from the sun and applying sunscreen.

Carcinoma is a kind of cancer that develops in epithelial cells, which line the surfaces of organs and tissues throughout the body. It is the most prevalent type of cancer and can affect the lungs, breast, colon, prostate, and skin. Adenocarcinoma (arising from glandular cells) and squamous cell carcinoma (arising from flat cells) are the two most common types of cancer. These malignancies have the ability to infect surrounding tissues and spread to other regions of the body, a process known as metastasis. Treatment options for carcinoma vary according to factors such as cancer stage, location, and specific patient considerations, and may involve surgery, radiation therapy, chemotherapy, or a combination of these.

The goal of this study is to create a cancer detection system that uses image processing and machine learning approaches. The technology analyses photos of afflicted skin cells. First, the images are processed to segment and isolate the important skin cell features. Using a feature extraction technique, key properties from photos are extracted. After obtaining the features, a deep learning-based method known as Convolutional Neural Network (CNN) is used. The CNN classifier is trained to categorize and stratify the retrieved features, allowing it to differentiate between malignant and non-cancerous cells. The system intends to accurately identify and detect carcinoma based on the analyzed attributes by using this approach, giving a viable tool for early detection and diagnosis of skin cancer.

1.2. Motivation

Melanoma incidence rates have risen dramatically in recent decades, and although the majority of people diagnosed with skin cancer have a better chance of being cured, melanoma survival rates are lower than non-melanoma skin cancer survival rates. Melanoma skin cancer (MSC) can develop on any skin surface and has been on the increase in many parts of the globe for the past two decades. Men's heads, necks, and between the hips and shoulders are the most common spots, while women's lower legs or between the shoulders and hips are the most

popular spots. When it does occur in dark-skinned people, it is usually found under the toenails, toenails, palms, or toes.

2. LITERATURE SURVEY

Md Shahin Ali, Md Sipon Miah, Jahurul Haque, Md Mahbubur Rahman, Md Khairul Islam. "An enhanced technique of skin cancer classification using a 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 a 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 Hussein Mahnashi "Skin Cancer Detection: A Review Using Deep Learning Techniques"[3],: It examines how skin cancer can develop as a result of genetic abnormalities or mutations in skin cells' DNA. Medical practitioners often use lesion features such as color, symmetry, form, and size to differentiate between benign skin cancer and melanoma. Deep learning techniques, a subset of artificial intelligence, are used in this setting. These methods entail teaching computer systems to analyze enormous datasets of skin photos in order to discover complicated patterns linked with various types of skin cancer. The goal is to increase the accuracy and efficiency of skin cancer diagnosis by applying deep learning, and assisting healthcare practitioners in spotting early indicators of the disease. The study presents a thorough examination of various deep-learning algorithms and their possible applications in clinical practice..

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.

3. PROPOSED SYSTEM

Pre-processing is used to enhance image data by removing undesirable distortions and improving certain image features needed for subsequent processing. Pre-processing is a concept that refers to operations on photos at a most fundamental level of abstraction, for both input and output being intensity images.

- **Feature Extraction**:

Feature extraction is a step in the dimensionality reduction process, which divides and reduces a large collection of raw data into smaller classes. As a result, processing would be simpler. The fact that these massive data sets have a large number of variables is the most important feature. To process these variables, a large amount of computational power is needed. As a result, feature extraction aids in the extraction of the best feature from large data sets by selecting and combining variables into features, effectively reducing the amount of data. These features are simple to use while still accurately and uniquely describing the actual data collection.

- **Classification:**

Classification of images involves extracting features from them in order to define patterns within a dataset. Using an ANN for image classification will be highly computationally costly due to the increase in trainable parameters. Accepting an input image and then describing its class is the primary objective of image classification.

The step-by-step process of the proposed system implementation is shown in Fig. 1.

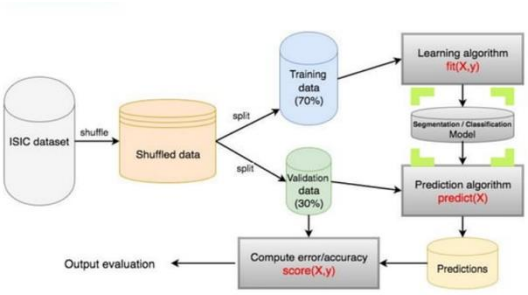

Fig. 1. Process of the system.

4. RESULT

This systematic review presents the work conducted over the last decade on skin cancer classification using ML and DL techniques with the aim of providing an overview of the problem and possible solutions to those who wish to approach this very important and extremely topical issue.

The proposed system successfully detects the skin cancer type with good accuracy as shown in Fig.4. The suggested system

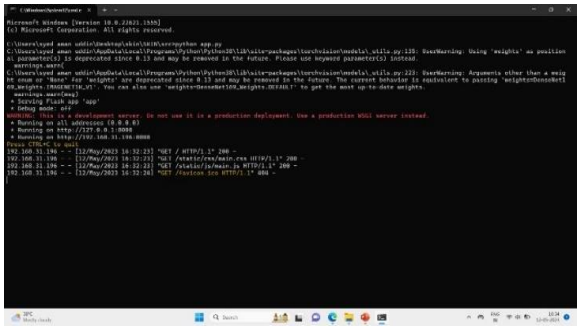

Fig. 2. Starting the flask app.

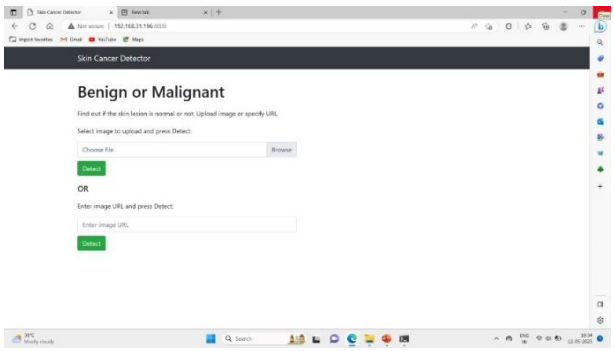

Fig. 3. Home page of the proposed system.

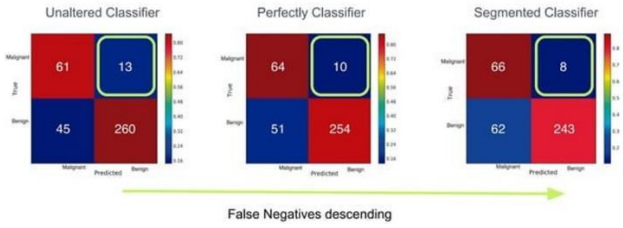

Fig 4. Confusion matrix of the model.

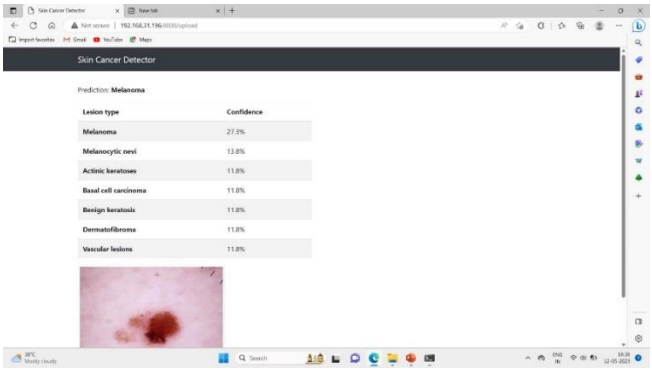

Fig. 5. Report of the given image of mole.

5. CONCLUSIONS

In this experiment, various stages of image processing were applied to skin nodules. The fuzzy filter can effectively cancel out the noise generated by these various image processing techniques. The image is segmented using a watershed algorithm based on markers, resulting in distinct regions of the image. GLCM is used to rapidly and efficiently extract various features from an image. This knowledge is loaded into the CNN Classifier, which decides the benign or malignant nature of the nodules. The CNN classifier has an accuracy rate of 92.5 percent.

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