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Skin Cancer Prediction Using Deep Learning

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ABSTRACT: There are over 200 different types of cancer. With 200 cases, melanoma is the deadliest form of skin cancer. The process of diagnosing melanoma begins with clinical screening, followed by dermoscopy and histopathology. Cutaneous melanoma has a high cure rate if detected early. The first step in diagnosing cutaneous melanoma is a visual inspection of the affected skin area. Dermatologists use high-speed cameras to capture dermoscopic images of skin lesions, and without any additional technical support, the diagnostic accuracy of melanoma reaches 65-80%. With further visual inspection by cancer treatment specialists and dermoscopy images, the overall predictive accuracy of melanoma diagnosis increased to 75-84%. This project aims to establish an automatic classification system based on image processing technology to classify skin cancers from images of skin lesions. Early detection of skin cancer is necessary and can prevent some cases of skin cancer from spreading further, such as melanoma and focal cell carcinoma. Either way, there are several factors that can affect tracking accuracy. More recently, there has been greater development in the use of image processing and computer vision in medicine and medical applications. In this article, convolutional neural networks are used to detect and classify cancer categories based on historical clinical image data using CNN. Some goals of this research are to build a CNN model for skin cancer detection with an accuracy of more than 80%, to keep the false negative rate in the prediction below 10%, to achieve an accuracy of more than 80% and to retest the data provided. Simulation results show that the proposed method outperforms other comparative methods.

KEYWORDS: CNN algorithm, image of skin lesions, prediction of skin cancer, melanoma, deep learning

I. INTRODUCTION

Skin cells grow and age every day. Sometimes, for some reason, the growth mechanism of the skin is disrupted. As a result, some unnecessary skin cells are produced. These extra skin cells are called carcinomas. Melanoma, the most malignant and serious type of cancer, is the cancer that causes the highest mortality rate of the skin. Cancer is a global health problem and the greatest threat to increased mortality worldwide. The skin is the main and largest body tissue in animals and humans and provides some protection against heat, light and disease. It also supports the effects of blood sugar, water and fat accumulation in the body. One of the main concerns regarding the skin of the body is the possibility of developing skin cancer. The principle of the skin mechanism is the growth and division of cells into new cells and old cells. Skin cells grow and age every day. Sometimes, for some reason, the growth mechanism of the skin is disrupted. As a result, some unnecessary skin cells are produced. These extra skin cells are called carcinomas. Melanoma, the most malignant and serious type of cancer, is the cancer that causes the highest mortality rate of the skin. Although skin cancer is divided into three main types: melanoma (M), squamous cell carcinoma (SCC) and basal cell carcinoma (BCC), melanoma is the most important type of skin cancer. three main types: melanoma (M), squamous cell carcinoma (SCC) and basal cell carcinoma (BCC), melanoma is the most important type of skin cancer. The most powerful factor is the ecological link between UV light and the cause of disease. Melanoma is the least common of all types of skin cancer, but accounts for 75% of deaths. It's a rare skin cancer, but it can quickly spread to other parts of the body if not caught early. The International Skin Imaging Collaboration (ISIC) helps reduce deaths from melanoma by capturing images of the skin. Melanoma is curable if diagnosed and treated early. Digital images of skin lesions can be used to create automated



1.1 Background and Motivation for the Study

Its main purpose is to support efforts to reduce skin cancer deaths. The main motivation of this project is to use advanced image classification techniques for the well-being of people. Computer vision has made significant advances in machine learning and deep learning, which can be extended to many fields. Through this project, we aim to bridge the gap between diagnosis and treatment. The success of this project, with a more accurate data set, will better support the work of the dermatology clinic. Improving model accuracy and efficiency can help detect melanoma earlier and reduce unnecessary biopsies.

1.2 Purpose of the Research

The purpose of this study is to diagnose skin cancer. This method takes a digital approach to the affected area and then uses image analysis to identify the type of skin cancer. Our proposed method is simple, fast and does not require expensive equipment.

II. LITERATURE REVIEW

[1] Melanoma Skin Cancer Detection Using Classical Machine Learning and Deep Learning Techniques: A Hybrid Approach by JinenDaghrir, LotfiTlig, MoezBouchouicha, MounirSayadi. The proposed system relies on predictions from three different methods: a convolutional neural network and two classical machine learning classifiers trained on a set of features describing the boundaries, texture and color of skin lesions. These methods are then combined to improve performance through majority voting. Experiments show that the combination of the three methods provides the highest level of accuracy.

[2] An attention-based mechanism for combining images and metadata in deep learning models, applied to skin cancer classification by Andre G.C. Pacheco and Renato A. Krohling. MetaBlock is a new algorithm that uses metadata to support data classification, improving the classification pipeline to extract the most relevant features from images. We compare the proposed method with two other combined methods (MetaNet method and feature linking).

[3] Dorin Moldova Analysis of skin lesions for classification of melanoma based on the convolutional neural network. Classification of 7 types of skin diseases by a machine learning-based approach using a convolutional neural network (CNN). Transfer learning using CNN improves classification accuracy on the 2018 International Skin Imaging Collaboration (ISIC) dataset. Evidence shows an 11% improvement in accuracy using transfer learning compared to using a CNN.

[4] M, Vijayalakshmi Detection of skin cancer melanoma using image processing and machine learning. CNN is an automatic skin disease identification system based on images of lesions, with mechanical intervention rather than traditional detection involving medical personnel. Our model is divided into three phases: damage data collection and completion, model development, and final prediction. Various artificial intelligence algorithms such as convolutional neural network and support vector machine are used, combined with image processing tools to form a better structure.

[5] Gaana, M and Gupta, Shweta and Ramaiah, Narayana Swamy Diagnosis of skin cancer melanoma using machine learning. Image acquisition, preprocessing, segmentation, denoising and feature extraction. They are the first to use cubic regression for supervised machine learning. In this approach, they trained a machine to automatically classify skin cancers into benign, melanoma, and melanoma.

III. METHODOLOGY

The skin cancer detection method is divided into three steps:-

- (1) Raw image processing
- (2) Feature extraction
- (3) Classification

1. Image pre-processing: The first method to detect skin cancer is image pre-processing. Image pre-processing is a non-linear process of overall image enhancement that involves the user inputting an image, then filtering the image, removing noise, resizes the image and performs all required pre-processing steps before the image proceeds to the next step.

2. Feature Extraction: This is the second phase of the breast cancer detection method. It analyzes the features, textures of the image and checks with the dataset to show the different textures and features, and forms the model phase.



3. Classification: It is the latest a detection method of the skin cancer au, after feature extraction, an image is classified and indicates what type of skin cancer it is.

IV. CONCLUSION

One of the deadliest cancers is melanoma, and the proportion of patients with melanoma is increasing rapidly. We successfully integrated the optimized model into our CAD system, making the solution available to the public and dermatologists. It turns out that the Efficient Net model is better suited to the skin cancer dataset. The network generalizes well to the dataset and has higher validation accuracy. Additionally, model sets help reduce model errors and prediction errors. If the sets are larger in the different configurations proposed, the prediction error of the model can be further reduced. Optimizing the prediction takes the same time as optimizing the learning process. Following the three main principles of model maintenance, we focus on two principles: model size and latency. The last component (prediction throughput) is considered when making online predictions over the Internet. Prediction throughput measures the number of predictions a system can make in a given amount of time.

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