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Skin Cancer Detection by Feature Extraction using Neural Networks

Dr.K.Rama[1], K.Raajasekhar[2]

[1]IQAC Coordinator, Loyola Academy, Secunderabad
[2]PG Student, Automation and Robotics Department, OU, Hyderabad

Abstract:
One of the most serious diseases, human cancer is primarily brought on by various molecular changes and genetic instability. Skin cancer is the most prevalent type of cancer in people. We will research and examine them using various segmentation and feature extraction approaches in order to detect skin cancer at an early stage. Due to the high concentration of melanoma-Here we provide our skin, in the dermis layer of the skin, our focus is on the identification of malignant melanoma skin cancer. Here, we applied our ABCD rule dermoscopy [1] technology for the identification of malignant melanoma skin cancer. In this system, there are several steps for melanoma skin lesion characterization, including image acquisition, pre-processing, segmentation, and feature definition for skin features. Lesion characterization and classification methods are then determined by the lesion's characterization and features. We employed LBP to extract the texture-based features as well as symmetry detection, border detection, colour detection, and diameter detection in the feature extraction process for digital image processing. Here, we suggested using a convolutional neural network to distinguish between stages of healthy skin and skin illness.

Keywords: Skin Cancer, Neural Networks, images**,** Feature Extraction

1. Introduction

Cancers that start in the skin are known as skin cancers. They result from the growth of aberrant cells that can infiltrate or disseminate to different areas of the body. Basal-cell skin cancer (BCC), squamous-cell skin cancer (SCC), and melanoma are the three main kinds of skin cancer. Non melanoma skin cancer (NMSC) refers to the first two as well as a few less frequent skin cancers. Basal-cell cancer has a modest growth rate, has the potential to harm nearby tissue, but is not likely to metastasize (spread to other places) or be fatal. It frequently manifests as a painfully elevated, glossy region of skin with a little blood artery running over it or as an ulcerated, raised area. The spread of squamous-cell skin carcinoma is more likely. Although it typically appears as a hard lump with a scaly surface, it can potentially develop into an ulcer. The most aggressive tumors [2] are melanomas.

1.1 Digital Image Processing

The process of identifying objects in an image would likely begin with image processing methods like noise removal, then move on to (low-level) feature extraction to find lines, regions, and perhaps places with certain textures. The trick is to think of clusters of these forms as distinct things, like cars on a road, conveyor belts of boxes, or cancerous cells [3] on a microscope slide. An object might appear

considerably differently when viewed from different angles or in varied lighting conditions, which is one reason this is an AI problem.

Making a distinction between features that belong to an item and those that are backdrop, shadows, etc. is another challenge. The majority of these actions are carried out subconsciously by the human visual system, but for a computer to match human performance, it needs to be programmed carefully and have a lot of processing capacity. Manipulation of data using a variety of methods to create an image. An image is typically understood as a two-dimensional array of brightness values, and it is most frequently represented by patterns found on screens for television, movies, slides, and photographic prints. A computer can process a picture digitally or optically.

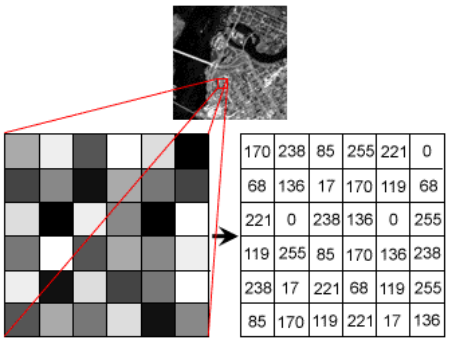

Figure 1 Gray Scale Image Pixel Value Analysis

The primary goal of the paper is to use convolutional neural networks [4-6] to detect skin diseases. The primary goal of the study is to use deep learning to identify skin diseases in the facial skin. The goal is to locate any skin conditions that affect the face and can be seen on the skin there. It has potential for medical usage.

2. Block Diagram:

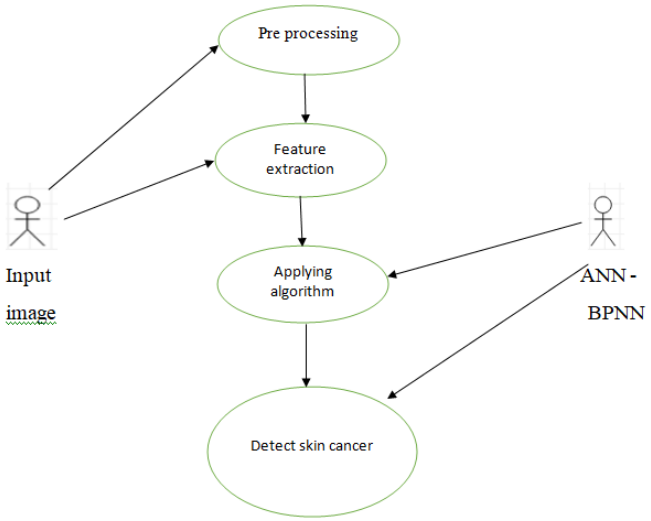

Figure 2 Block Diagram

3. Existing System and Proposed Solution

Existing Systems

- Principal Component Analysis
- Local binary pattern and shape features
- KNN and FNN classifier

Disadvantages:

- Less accuracy
- Feature analysis is less using LBP

Proposed method:

- Convolution neural network
- Segmentation
- Feature extraction

Advantages:

- Accuracy is more by using algorithm
- More training process

4. MODULES in Proposed Method

- Input video
- Preprocessing
- GLCM feature extraction
- CNN

➢ Preprocessing

Image Pre-processing is a term used to describe actions taken on photographs at their most basic level. Images of intensity are the input and output of it. Pre-processing aims to improve the image data by reducing undesirable distortions or enhancing certain elements that are crucial for subsequent processing.

➢ Feature Extraction

All surfaces have an innate quality called texture that specifies visual patterns and gives them all homogeneity. It contains crucial details about the surface's structural organization, including clouds, leaves, brickwork, cloth, etc. Additionally, it specifies how the surface interacts with its surroundings. It is, in essence, a trait that identifies a surface's unique physical makeup.

➢ Convolution Neural Network

Convolutional neural networks may sound like an odd blend of biology, math, and computer science with a dash of CS, but these networks have been some of the most important developments in the area of computer vision. In 2012, Alex Krizhevsky used neural networks to win the Image Net competition, lowering the record for classification error from 26% to 15%, an incredible improvement at the time. This was the first year that neural networks gained popularity. Since then, deep learning has become a key component of many businesses' services. For its automatic tagging algorithms, Face book employs

neural networks, whereas Google, Amazon and Instagram are used for their search infrastructure and product recommendations, respectively.

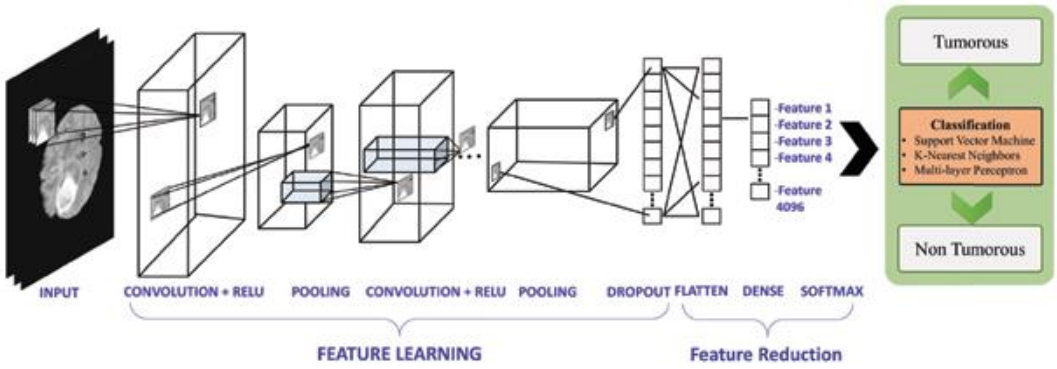

Figure 3 Tumor Detection using CNN

5. Simulation Results

Figure 4 (a) and (b) shows two different skin cancer images which are identified through the program developed using python on open CV platform using conventional neural networks. Figure 4 (a) shows the result of 'Healthy skin' whereas figure 4 (b) shows the result of 'Skin disease'.

(a)

(b)

Figure 4 Simulation Results

6. Conclusion

The project's goal is to determine whether a person has a skin illness or not. Convolutional neural network algorithm is being used in this instance to train the data set and input image. Getting the features of the supplied image through feature analysis and pre-processing. The primary goal of the study is to use convolutional neural networks to identify skin diseases. The primary goal of the study is to use deep learning to identify skin diseases in the facial skin. It has potential for medical usage. We employed LBP to extract the texture-based features as well as symmetry detection, border detection, colour detection, and diameter detection in the feature extraction process for digital image processing.

The system's performance findings indicate that the suggested model is promising for usage as a current tool for medical professionals to employ in making a skin cancer diagnosis. Systems for categorizing the many types of skin cancer and other skin illnesses can be developed with more research. The majority of skin cancer detection research focuses on determining if a particular lesion image is malignant. However, the most recent research is unable to respond to a patient's question about whether a certain skin cancer symptom manifests itself elsewhere on their body. The research has thus far been confined to the particular issue of classifying the signal picture. Full-body photography may be used in future studies to help find the solution to this topic. The image acquisition process will be automated and accelerated via autonomous full-body photography. Deep learning has lately given rise to the concept of auto-organization. The method of unsupervised learning known as "auto-organization" seeks to recognize features and find relationships or patterns in the dataset's image samples. Auto-organization methods improve the level of features representation that is retrieved by expert systems under the aegis of convolutional neural networks. Auto-organization is still a paradigm that is being researched and developed at this time.

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