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Skin Cancer Segmentation from Skin Lesion Analysis towards Melanoma Detection

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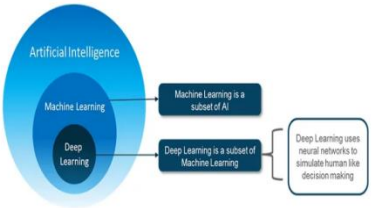
Abstract: ***Melanoma is well-known skin cancer that cause fatal. Therefore, detection of melanoma at early stage are essential to enhance the successful of survival rate. For the detection of melanoma, proper analysis is carried out on the skin lesion according to a set of specific clinical characteristics. This skin lesion clinically diagnosed begin with primary clinical screening and dermoscopic analysis, a biopsy and histopathological examination. Lastly, this skin lesion is classified as either "potential melanoma" or "non-melanoma".However, detection of skin cancer in the early stages is a difficult and expensive process. Typically, the analysis to checks for the various Melanoma are using pre-defined thresh-olds in classification stage such as Asymmetry, Border, Colour, Diameter and Evolution (ABCDE) where color, texture, size and shape are being analysis for image segmentation and feature stages. Accuracy for this method was encourage and reach up to 95.45%.The proposed method DL shows best accuracy when compared with other methods. To our best knowledges, we are not aware of any previous work proposed for this task. The proposed deep learning frameworks were evaluated on the ISIC 2017 testing set.***

I. INTRODUCTION

Deep learning can be considered as a subset of machine learning. It is a field that is based on learning and improving on its own by examining computer algorithms.. Deep learning models can recognize complex patterns in pictures, text, sounds, and other data to produce accurate insights and predictions. The term Deep Learning was introduced to the machine learning community by Rina Dechter in 1986, and to artificial neural networks by Igor Aizenberg and colleagues in 2000, in the context of Boolean threshold neurons. Deep learning uses neural networks to learn useful representations of features directly from data. For example, you can use a pretrained neural network to identify and remove artifacts like noise from images.



Techniques Of Ml

Deep learning

Deep learning is a subfield of machine learning that focuses on using artificial neural networks to model and solve complex tasks. The term "deep" refers to the use of deep neural networks, which are neural networks with many layers (deep architectures).

Supervised Learning

Supervised machine learning, It is defined by its use of labeled datasets to train algorithms that to classify data or predict outcomes accurately.

Unsupervised Learning

UL Detects hidden patterns or internal structures in unsupervised learning data. It is used to eliminate datasets containing input data without labeled responses.

Convolutional Neural Networks (CNN):

CNN usually refers to Convolutional Neural Networks. Convolutional Neural Networks are a type of deep neural network that are particularly effective in image recognition and processing, but they can also be applied to other types of data

Convolutional Layers:

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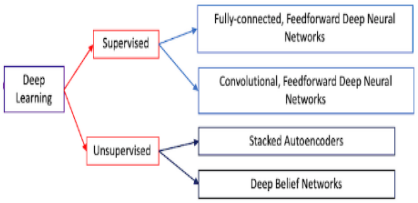
Convolutional layers are the core building blocks of CNNs. They are responsible for scanning the input data (such as an image) using small filters or kernels.



Techniques of ML

1.2 APPLICATIONS

Deep learning has found applications in a wide range of fields, transforming industries and enhancing various processes. Here are some notable deep learning applications.

Virtual assistance

Virtual assistance in deep learning is applied across various domains to create intelligent, interactive systems

Autonomous vehicles

In autonomous vehicles, deep learning applications enable cars to operate independently by understanding their environment, making decisions, and ensuring safe navigation.

Face recognition

Face recognition in deep learning involves training neural networks to identify and verify individuals based on facial features.

Chatbots

Chatbots in deep learning are intelligent computer programs designed to engage in natural language conversations with users. They leverage deep learning techniques to understand and respond to user inputs in a way that simulates human-like conversation.

Sound Addition

To Silent FilmsAdding sound to silent films using deep learning involves generating realistic and synchronized audio tracks for movies that were originally produced without sound.

Correlation of black and white images

In the context of black and white (grayscale) images in deep learning, the term "correlation" typically refers to how convolutional neural networks (CNNs) learn and utilize patterns and features within these images.

DL in Various Applications

ML CHARACTERISTICS

Hierarchy of Features:

Deep learning models learn a hierarchy of features from the data. In neural networks with multiple layers, each layer captures increasingly complex and abstract representations of the input data..

End-to-End Learning:

Deep learning models are capable of end-to-end learning, meaning they can learn directly from raw data without the need for manual feature engineering.

Scalability:

Deep learning models can scale with the increasing amount of data and computational resources. Larger datasets and more powerful hardware.

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Ability to Handle High-Dimensional Data:

Deep learning is well-suited for high-dimensional data, such as images and sequences, where traditional methods may struggle.

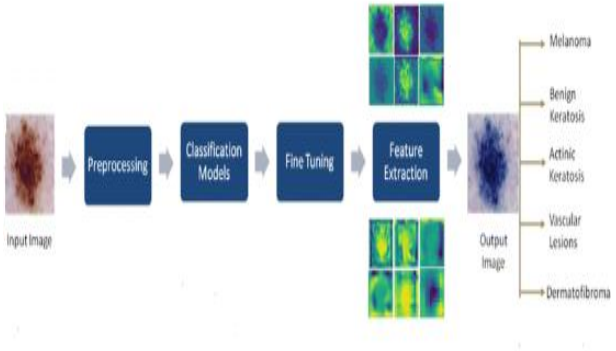
Representation Learning:

Deep learning excels at representation learning, where the model learns to represent data in a meaningful way.

ADVANTAGES

- Extraction & Selection of most relevant features that will improve classification accuracy.
- The overall system should take minimum execution time.
- It perform high accuracy.
- Effcient of handling a data.

II. SYSTEM ARCHITECTURE



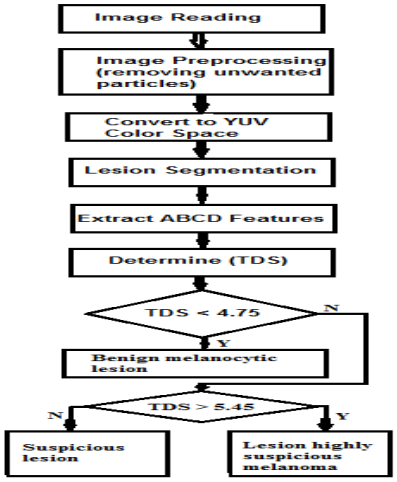
MODULES

- Data Collection
- Image Pre-Processing
- Image Segmentation
- Train and test accuracy Module

MODULES DESCRIPTION

DATA COLLECTION

Data collection in the context of skin cancer involves the systematic gathering and recording of information related to the disease. Image processing involves manipulating or enhancing digital images to extract meaningful information, improve image quality, and facilitate analysis. In skin cancer diagnosis, image processing techniques are applied to dermatoscopic images or other skin lesion images to enhance specific features, remove noise, and highlight relevant details.



Data Collection

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IMAGE PREPROCESSING

The original ISIC skin lesion dataset contains 2000 images of different resolutions. The resolutions of some lesion images are above 1000 x 700, which require high cost of computation. It is necessary to rescale the lesion images for deep learning network

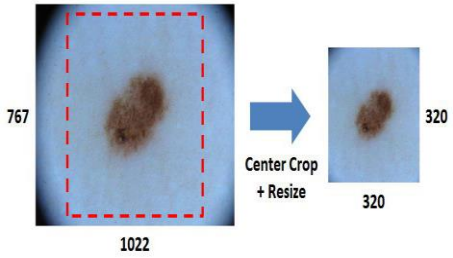

Image Pre-Processing

IMAGE SEGMENTATION

The most important stage when analyzing the lesion properly is the segmentation since the accuracy of all the subsequent steps depend on its. However, perfect segmentation is difficult due to the great verities of the lesion shapes, sizes, and colors along with different skin types and textures. We proposed segmentation process based on the DL networks.

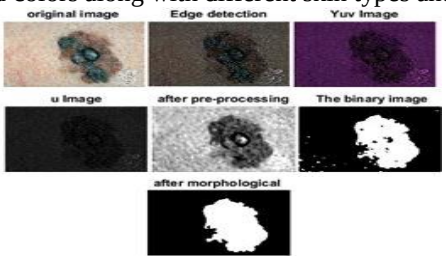

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Image Segmentation.

TRAIN AND TEST ACCURACY MODULE:

To make sure a computer can accurately detect skin cancer, it goes through a few steps. First, it looks at lots of skin pictures, some with cancer and some without, to learn the differences. Then, it cleans up the pictures and adds some variations to help it understand different situations. Using a smart architecture, it trains itself on these pictures. After training, it checks its accuracy on new pictures it has never seen before. We measure how well it does using terms like accuracy and precision. People also help make sure the computer's decisions make sense. It's a bit like training the computer to be a reliable helper in spotting skin issues, and we keep an eye on it to make sure it stays good at its job over time

III. CONCLUSION

In this paper we have discussed a computer-aided diagnosis system for melanoma skin cancer. It can be concluded from the results that the proposed system can be effectively used by patients and physicians to diagnose the skin cancer more accurately. This tool is more useful for the rural areas where the experts in the medical field may not be available. Since the tool is made more user friendly and robust for images acquired in any conditions, it can serve the purpose of automatic diagnostics of the Skin Cancer. For future study, researcher can perform additional contrast or correlation in various techniques in detecting skin cancer. Consequently, evaluation of the efficiency can be used for further levels of detection system. We can conclude automated diagnosis of skin cancer its efficient methods, in which it caters all essential steps generally use in computational system for diagnosing skin lesions. Therefore, this paper is beneficial to new researcher working further on detection of skin cancer.

FUTURE ENHANCEMENT

For future study, researcher can perform additional contrast or correlation in various techniques in detecting skin cancer. Consequently, evaluation of the efficiency can be used for further levels of detection system. We can conclude automated diagnosis of skin cancer its efficient methods, in which it caters all essential steps generally use in computational system for diagnosing skin lesions. Therefore, this paper is beneficial to new researcher working further on detection of skin cancer.

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