TECHNIQUES SKIN CANCER PREDICTION USING DEEP LEARNING

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ABSTRACT- ***Skin Cancer is a disease affecting the skin. Skin cancer may appear as malignant or benign form. The correct identification of skin spots based on certain features is the key steps in detecting the skin cancer disease in advance. In the proposed work, include the features extraction and classification. The features extraction includes color features, shape and Texture features. Implement Convolutional neural network algorithm named as VGG16 model is used to classify the features as affected or normal. Provide the diagnosis information based on affected skin cancer types.***

Keywords: **Skin Cancer, malignant or benign , features extraction includes color features, shape and Texture features, Convolutional neural network algorithm, VGG16 model, features as affected or normal.**

INTRODUCTION

Prolonged exposure to UV radiation rays can cause melanoma, a type of skin cancer. Melanocytes are the cells that contain pigment. Melanoma most frequently originates from a mole. The pigmented area getting bigger, the borders not having jagged edges, a change in color, irritation, or skin disintegration are all signs of it. Along with benign skin-colored moles, melanoma is one of the most serious cancers and is categorized as a malignant tumor. Visual inspection of candidates, which are pigmented moles with irregular forms, is the most widely used diagnostic technique. The aggressiveness of lesions is evaluated using the "ABCDE" criteria in order to identify melanomas early. Nevertheless, it can be challenging for dermatologists to discern between cancerous and non-cancerous conditions.

When compared to a regular digital camera, they have low levels of noise but consistent background illumination. For use in particular pictures selected from the MIT collection on skin lesions, processing techniques are employed to evaluate and estimate chromatic and structural properties using decision-tree classification methodologies. The pigmented network of the skin lesion was classified using one of the most well-known machine learning algorithms, Decision Tree Classifier, as well as a multistage illumination technique for variation in skin lesion photographs. Using Monte Carlo non-parametric modelling to first calculate the illumination map for a picture, then using parametric modelling to estimate the illumination map using the non-parametric estimate as a prior, is a preliminary technique.

. The edited photo is used to create the anticipated final lighting map. In a sparse texture model using textural representations, the usage of rotational-invariant neighbourhood to define the image is examined. Weighted graphical modelling, which is produced from the frequency of occurrence across each pixel at a time, is used to quantify the statistical textural distinctiveness among typical atom pair properties. The macroscopic images' regions corresponding to skin lesions are segmented using stochastic area merging, which is then applied to a region until the limit of convergence condition is satisfied.

EXISTING WORK

High occurrence of skin cancer compared to other cancer types is a dominant factor in making it one of the most severe health issues in the world. Historically, melanoma is a rare cancer, but in the past five decades, the worldwide occurrence of melanoma has drastically risen. In fact, it is one of the prominent cancers in average years of life lost per death. Adding to the strain, the financial burden of melanoma treatment is also expensive. Detection of skin cancer in the earlier stage is very Important and critical. In recent days, skin cancer is seen as one of the most Hazardous forms of the Cancers found in Humans. The detection of Melanoma cancer in early

stage can be helpful to cure it. Computer vision can play important role in Medical Image Diagnosis and it has been proved by many existing systems. Skin cancer is found in various types such as Melanoma, Basal, Squamous cell Carcinoma, among which Melanoma is the most unpredictable. In existing system presented a method for the detection of Melanoma Skin Cancer using Image processing tools. The input to the system is the skin lesion image and then by applying image processing techniques, it analyses to conclude about the presence of skin cancer. The Lesion Image analysis tools checks for the various Melanoma parameters, Color, Area perimeter, diameter etc by texture, size and shape analysis for image segmentation and feature stages. The extracted feature parameters are used to classify the image as Non-Melanoma and Melanoma cancer lesion.

3 DISADVANTAGES

- Irrelevant features are extracted
- Difficult to classify dark skinned images
- Misclassification error can be occurred
- Manual segmentation can be needed

METHODOLOGY

This cancer cells are detected manually and it takes time to cure in most of the cases. Skin cancer is one of the most common types of cancer worldwide, with millions of new cases diagnosed every year. Early detection is critical for effective treatment and improved outcomes for patients. The use of machine learning techniques, particularly Convolutional Neural Networks (CNNs), is becoming increasingly popular for skin cancer detection due to their ability to accurately analyze and classify images. The diagnosis of the skin cancer is done by dermatologist where they can access the images of cancer patients and analyze the result whether the patient has cancerous cells or not. Because of having cancerous cells, dermatologist suggest it as malignant melanoma and benign on vice versa. The issue with this framework is, it sets aside a lot of time to process a ton of patients and furthermore it takes a great deal of labor to expand the rate of recognition which makes the cost go up. The developing computerized system can automate this skin cancer detection process that will assist the dermatologists, and makes their works easier and faster. This project proposed an artificial skin cancer detection system using image processing and deep learning method. The features of the affected skin cells are extracted after the segmentation of the dermoscopic images using feature extraction technique. A deep learning-based method convolutional neural network classifier is used for the stratification of the extracted features. Consequently, CNN became one of the most popular models in deep learning and computer vision. The key idea behind convolutional neural networks is to build partially connected layers. However, CNN can resolve this issue using partially connected layers. In CNNs, there are receptive fields to connect the input layer to a feature map.

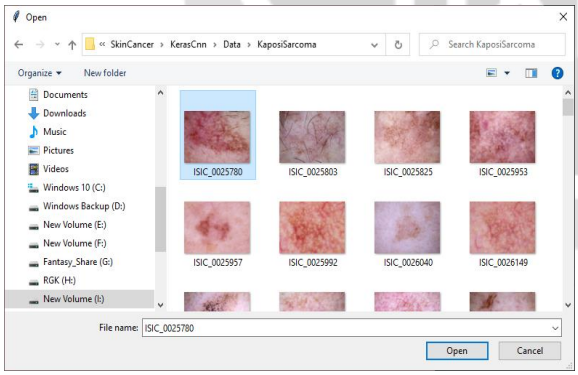
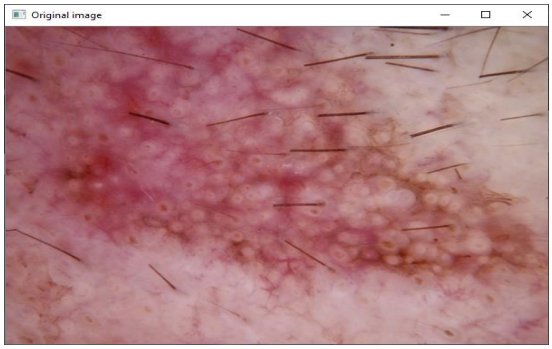
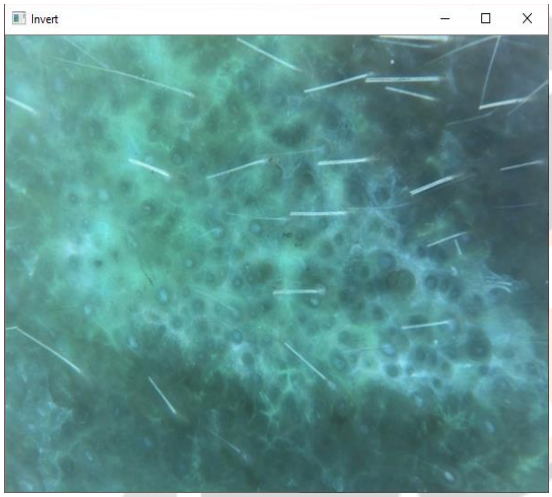


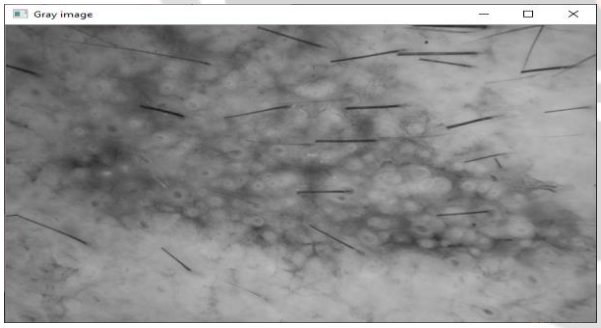
Image can be selected from datasets. The skin datasets are collected from KAGGLE source.



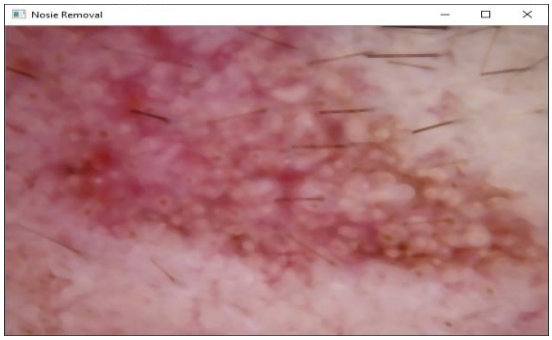
Original image can be shown in page. This dataset contains over dermoscopic images of skin lesions and is widely used for research in skin cancer detection and diagnosis.



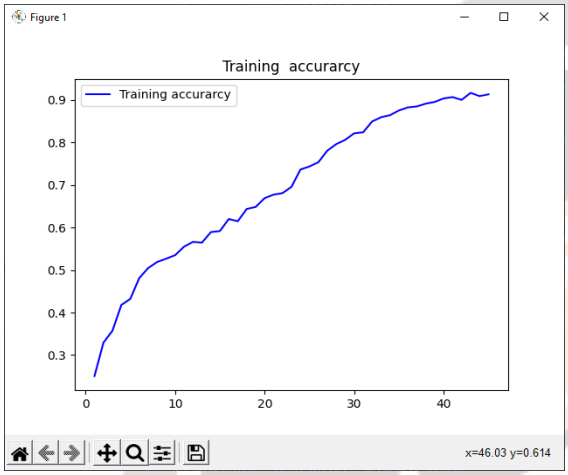
In image processing, the invert operation is a basic image manipulation technique that changes the intensity values of an image in such a way that bright regions become dark and dark regions become bright. This is achieved by subtracting the pixel values from the maximum value that can be represented by the image format.



In image processing, grayscale conversion is the process of converting a color image into a grayscale image, which is an image in which the only colours present are shades of Gray. This is achieved by removing the color information from the image while preserving the brightness information. Grayscale conversion is a common pre-processing step in many image processing applications, such as computer vision, machine learning, and medical imaging. It simplifies the image data and reduces the computational complexity of subsequent image processing algorithms.



Median filtering is a popular technique for removing noise from images. It works by replacing each pixel in an image with the median of its neighbouring pixels. This method is effective in removing noise while preserving the edges and details of an image.



Training accuracy is a measure of how well a machine learning model fits the training data. It is calculated by comparing the predicted output of the model to the actual output of the training data and determining the percentage of correct predictions. Training accuracy is an important metric in machine learning because it indicates how well the model has learned the patterns in the training data. A high training accuracy indicates that the model is able to accurately predict the output for the training data, which may be a sign of good performance on new, unseen data. However, a high training accuracy does not necessarily guarantee good performance on new data, as the model may have overfit to the training data and not generalized well to new data. The proposed system achieves 91% accuracy rate.

PROBLEM STATEMANT:

- Skin cancer poses a significant public health challenge, with early detection being crucial for successful treatment outcomes.
- However, the existing methods for skin cancer diagnosis often rely heavily on manual inspection by dermatologists, leading to subjective assessments and potential delays in identification.
- The lack of automated and accurate tools for skin cancer detection hampers the timely diagnosis of potentially malignant lesions, impacting patient outcomes and healthcare resources.

SYSTEM REQUIREMENTS

SOFTWARE EQUIPMENTS:

- Operating system : Windows OS
- Front End : PYTHON
- Back End : MYSQL
- Application : Web application

- Hardware Requirements
    - Processor : Intel processor 2.6.0 GHZ
    - RAM : 2GB
    - Hard disk : 160 GB
    - Keyboard : Standard keyboard
    - Monitor : 15 inch color monitor

MODULES

- DERMOTOLOGY IMAGES
- REMOVAL OF NOISES
- FEATURES EXTRACTION
- MODEL BUILD
- CLASSIFICATION
- CHAT APPLICATION

DERMOTOLOGY IMAGES

- In this module, we can input the dermoscopic skin images to analyze the diseases.
- Dermatoscopy is the examination of skin lesions with a dermatoscope.
- Also known as dermoscopy or epiluminescence microscopy, it allows for inspection of skin lesions unobstructed by skin surface reflections.

- **REMOVAL OF NOISE**
    - Pre-processing is a common name for operations with images at the lowest level of abstraction both input and output are intensity images.
    - In this module, resize the image and also implement median filtering algorithm to remove the noises in images
- **FEATURES EXTRACTION**
    - Feature extraction involves simplifying the amount of resources required to describe a large set of data accurately.
    - In this module implement color and texture features are implemented.
    - HSV color features are extracted and Texture features include statistical features.

MODEL BUILD

- The core of the model construction lies in the utilization of the VGG16 pre-trained architecture, renowned for its efficacy in image classification tasks.
    - The architecture comprises a stack of convolutional and fully connected layers, enabling robust feature extraction from complex patterns within the skin cancer images.
    - The final layers of the model are adjusted to accommodate the specific number of classes relevant to the skin cancer classification task.
    - Following model construction, the next steps involve training the model on the prepared dataset.
    - This training process entails adjusting the model's internal parameters using backpropagation and gradient descent to optimize its ability to accurately classify skin cancer images.

CLASSIFICATION

- The classification is the final step of the system.
- After analyzing the structure, each section individually evaluated for the probability of true positives.
- Skin diseases are classified using VGG 16 model in convolutional neural network model.
- So our proposed work overcomes irregular boundaries separation in skin image classification with improved accuracy

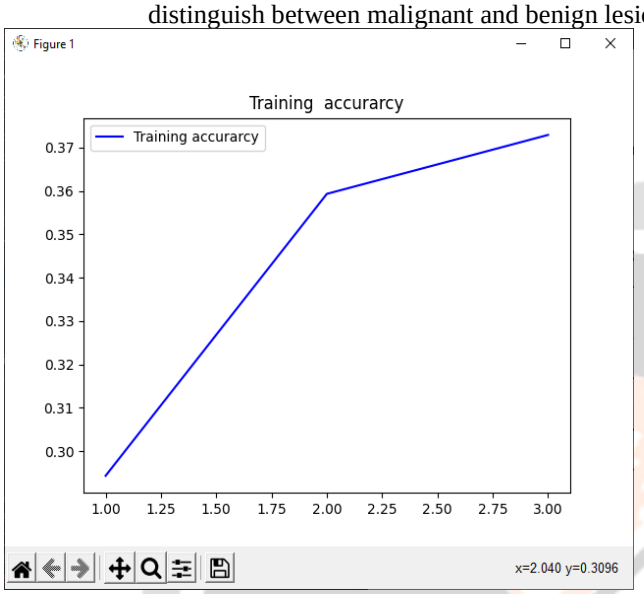
ADVANTAGES

- Extract the all features

- Dimensionality can be reduced
- Improve the classification accuracy
- Automated segmentation

RESULT AND DISCUSSION

- The results and discussion of a skin cancer detection system are pivotal for understanding the system's efficacy and its potential impact on healthcare.
- Beginning with performance evaluation metrics, the system's effectiveness is quantitatively assessed through sensitivity, specificity, accuracy, and other measures, providing insights into its ability to distinguish between malignant and benign lesions accurately



CONCLUSION

Many solutions regarding image processing using computer aided diagnosis (CAD) have been performed to aid dermatologists in their diagnoses. In summary, deep learning algorithm using the concept of Convolutional neural network is proposed. A CNN is introduced based on a learned model of normal skin and lesion textures. Representative texture distribution and color distributions are learned from the image itself and CNN algorithm is used to classify the skin cancer. The features are extracted based on HSV color and statistical features. The entire proposed framework is tested by using the illumination corrected images as the input to the segmentation algorithm. And classify the results with machine learning and deep learning algorithm. It is compared to state-of-art lesion classification algorithms, including SVM and CNN designed for lesion images. The proposed framework produces the highest accuracy using manually segmented images as ground truth. A larger data collection and annotation process, including additional testing on a wide range of images, will be undertaken as future work. While the experimental results show that the proposed method is able to segment the lesion in images of different scales and levels of quality, it is worth conducting a more comprehensive analysis on the impact of image quality and scale on the proposed method.

FUTURE ENHANCEMENT

In future work, we can extend the framework to implement various classification algorithms and also implement the framework to predict various diseases. Unfortunately, it is difficult to compare different classification methods because some approaches use nonpublic datasets for training and/or testing, thereby making reproducibility difficult. Future publications should use publicly available benchmarks and fully disclose methods used for training to allow comparability.

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