

# SKIN CANCER ANALYSIS USING IMAGE PROCESSING TECHNIQUES

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## ABSTRACT

In recent days, melanoma is seen collectively of the foremost dangerous variety of the Cancers found in Humans. Melanoma is found in numerous sorts like malignant melanoma, Basal and epithelial cell malignant neoplastic disease among that malignant melanoma is that the most unpredictable. The detection of malignant melanoma cancer in early stage are often useful to cure it. PC vision will play vital role in Medical Image diagnosing and it's been evidenced by several existing systems. During this paper, we tend to gift a pc motor-assisted methodology for the detection of malignant melanoma melanoma victimisation Image process tools. The input to the system is that the skin lesion image then by applying novel image process techniques, it analyses it to conclude concerning the presence of melanoma. The Lesion Image analysis tools checks for the assorted malignant melanoma parameters like imbalance, Border, Colour, Diameter, etc. by texture, size and form analysis for image segmentation and have stages. The extracted feature parameters square measure wont to classify the image as traditional skin and malignant melanoma cancer lesion.

**Keywords:** PCNN- Pulse Coupled Neural Network

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## 1. INTRODUCTION

Today, skin cancer has been more and more known together of the key causes of deaths. Analysis has shown that there area unit various sorts of skin cancers. Recent studies have shown that there area unit roughly 3 common sorts of skin cancers. These embrace malignant melanoma, basal cell cancer and epithelial cell melanomas. However, malignant melanoma has been thought-about together of the foremost dangerous sorts within the sense that it's deadly, and its prevalence has slowly inflated with time. Malignant melanoma may be a condition or a disorder that affects the epidermal cell cells thereby preventive the synthesis of animal pigment. A skin that has inadequate animal pigment is exposed to the chance of sunburns furthermore as harmful ultra-violet rays from the sun. Researchers claim that the un-wellness needs early intervention so as to be ready to determine precise symptoms that may build it straightforward for the clinicians and dermatologists to stop it. This disorder has been well-tried to be unpredictable. it's characterised by development of lesions within the skin that adjust in form, size, color and texture.

### 1.1 CLASSIFICATION ALGORITHM IN SKIN CANCER ANALYSIS

The task of recognition happens in big selection of act. the matter of recognition worries with the development of a procedure which will be applied to differentiate things, within which every new item should be assigned to at least one of a group of predefined categories on the premise of discovered attributes or options. consequently, image analysis or pc vision is employed within the recognition of human melanoma to predefined categories. The predefined categories square measure the feature or attributes square measure computed from melanoma pictures. These discovered options of melanoma were accustomed decide the category or the kind of melanoma. Hence, during this analysis the most interest is to differentiate the kind of melanoma varieties by victimization image analysis technique so as to maximise the characteristic of the sickness. If we have a tendency to determine the kind of melanoma wherever it belongs to in its early stage it's terribly easy to cure the sickness otherwise it's troublesome.

## 1.2 MELANOMA

Melanoma, conjointly referred to as melanoma, may be a sort of cancer that develops from the pigment-containing cells referred to as melanocytes. Melanomas usually occur within the skin however might seldom occur within the mouth, intestines, or eye. In ladies they most ordinarily occur on the legs, whereas in men they're commonest on the rear. typically they develop from a mole with regarding changes together with a rise in size, irregular edges, amendment in color, haptic sensation or skin breakdown.

the first reason for malignant melanoma is ultraviolet illumination (UV) exposure in those with low levels of skin pigment. The ultraviolet radiation| ultraviolet illumination |UV| actinic radiation | actinic ray} light is also from either the sun or from tanning devices. Regarding twenty fifth develop from moles. Those with several moles, a history of affected members of the family, and World Health Organization have poor immune operate square measure at larger risk. Variety of rare genetic defects like xerodermic pigmentosum conjointly increases risk. Diagnosing is by diagnostic assay of any regarding skin lesion.

Avoiding ultraviolet radiation |ultraviolet illumination | UV | actinic radiation | actinic ray} light and also the use of sun blocker might stop malignant melanoma. Treatment is often removal by surgery. In those with slightly larger cancers, near body fluid nodes is also tested for unfold. the majority square measure cured if unfold has not occurred. In those in whom malignant melanoma has unfolded, therapy, life medical care, radiation, or therapy might improve survival. With treatment the five-year survival rates within the us is ninety eight among those with localized sickness and terrorist organization among those in whom unfold has occurred.

## 2. EXISTING SYSTEM

Naïve Bayes - This classification algorithm is based on Bayes theorem with the independence assumption between predictors. It is simple to build a Naïve Bayesian model as there is no iterative parameters estimation. It is very much useful when the number of images is larger. Due to its simple nature, Naïve Bayesian algorithm gives better results in solving sophisticated problems. The posterior probability is calculated by Bayes theorem. Naive Bayes classifier adopts that the result of the value of a predictor (x) on a given class (c) is independent of the values of other predictors. This statement is known as class conditional independence.

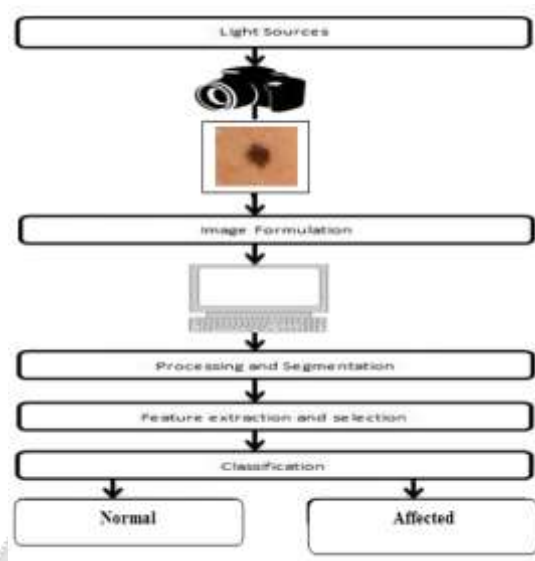
Decision Tree - A decision tree is the flowchart representation of attributes in the form of a tree where each attribute acts as a node. The tree is formed with the best attribute as the root node and then passes through each attribute following the way down to the leaf node i.e. its respective class. This results in the formulation of decision rules against which the test samples or records are classified. In decision trees, the instances are classified by sorting them using a top-down approach from root to a leaf node. Then test each attribute of this node and moving down to remaining of the tree branch corresponding to the attribute value. The same process is repeated for the sub-tree rooted at the new node.

### 2.1 DISADVANTAGES

- It makes a strong assumption in the shape of the data
- The accuracy of the result is low.
- Time taken for result generation is high.

## 3. PROPOSED SYSTEM

PCNN is used for the automatic detection of skin cancer. It uses a series of powerful convolution filters that examines the various input image structures. Generally, PCNNs consists of multiple convolution and pooling layers, and the last layer is a fully connected layer. These layers filter the input image with a set of filter kernels, and pooling layers have the role of selecting the maximum or the average values in each window, reducing the size of the feature map. This size reduction is very important because the general patterns of the original image are more perceptible in the resized image. The neural network used in experiments consists of two layers o with a 3x3 kernel, followed by a layer of max pooling, then another two layers of convolution with a 3x3 kernel and a layer of max pooling. The result of these operations is flattened and then applied to two fully connected layers with 128 neurons and 1 neuron respectively. This last layer, with only one neuron, performs the final diagnosis with a sigmoid function.



### 3.1 ADVANTAGES

- In machine learning, Pulse Coupled Neural Networks (PCNN) square measure advanced feed forward neural networks. PCNNs square measure used for image classification and recognition due to its high accuracy.
- There principally used for police investigation edges in a picture. The Layer a pair of can attempt to offer additional info than initial. It detects the corners. The PCNN learns to try and do this on its own.
- There square measure tons of algorithms that folks used for image classification before PCNN became common. Individuals accustomed produce options from pictures so feed those options into some classification algorithmic rule
- A PCNN model will be thought as a mixture of 2 components: feature extraction half and therefore the classification half. The convolution + pooling layers perform feature extraction.

## 4. MODULE DESCRIPTION

### PRE-PROCESSING

Medical pictures are usually vulnerable to noise primarily thanks to unhealthy illumination, hair and air bubbles. This inclusion of noise in pictures leads to the formation of artefacts. Thanks to such artefacts, the segmentation results might get affected inflicting inaccurate detection results. Therefore, noise removal could be a vital step before applying any segmentation or feature extraction technique for a correct identification. To smoothen the image, Gaussian filter is much suggested because it removes the speckle noise side throughout the method of acquisition. Gaussian kernels coefficients are sampled from the second Gaussian operate.

### IMAGE ENHANCEMENT

Image Enhancement is that the procedure of up the standard and also the data content of original information before process. The common practices embody distinction sweetening, spatial filtering, density slicing. Distinction sweetening or stretching is performed by linear transformation increasing the first vary of grey level. Spatial filtering improves the present linear options like fault, shear zones and lineaments. Density slicing converts the continual grey tone vary into a series of density intervals marked by separate color or image to represent totally different options.

## GAUSSIAN FILTER

In image process, a Gaussian blur (also called Gaussian smoothing) is that the results of blurring a picture by a Gaussian operate (named when scientist and individual Carl Friedrich Gauss). It's a wide used result in graphics software system, generally cut back | to scale back | to cut back} image noise and reduce detail. The visual result of this blurring technique may be a swish blur resembling that of viewing the image through a clear screen, clearly completely different from the bokeh result created by AN out-of-focus lens or the shadow of AN object beneath usual illumination. Gaussian smoothing is additionally used as a pre-processing stage in laptop vision algorithms so as to boost image structures at completely different scales—see scale area illustration and scale area implementation.

## SEGMENTATION

K-mean clustering is a common machine learning technique that is extensively used in many applications such as data mining, image processing, and pattern recognition. K-mean is considered as one of the basic methodologies for grouping and clustering of data-points into K number of clusters. It works by splitting the image into non-overlapping groups of pixels based on their intensity levels. The process initiates by selecting the centroids from the data-points either randomly or through a certain criterion. The pixels or data-points are clustered based on their minimum distance from the selected centroids. After each iteration, the mean values of the formed clusters are found and are set as the centroids for the next iteration.

## REGION GROWING

The first step in region growing is to pick a collection of seed points. Seed purpose choice is predicated on some user criterion (for example, pixels during a bound grayscale vary, pixels equally spaced on a grid, etc.). The initial region begins because the actual location of those seeds. The regions are then mature from these seed points to adjacent points reckoning on an area membership criterion. The criterion may well be, for instance, intensity, grayscale texture, or colour.

Since the regions are mature on the premise of the criterion, the image data itself is vital. for instance, if the criterion were an intensity threshold worth, data of the bar graph of the image would be of use, in concert might use it to see an acceptable threshold worth for the region membership criterion.

Here during this example we tend to use 4-connected neighbourhood to grow from the seed points. We will conjointly select 8-connected neighbourhood for our pixels adjacent relationship. And therefore the criteria we tend to build here is that the same worth. That is, we tend to keep examining the adjacent pixels of seed points. If they need identical intensity worth with the seed points, we tend to classify them into the seed points. It's AN iterated method till there isn't any amendment in 2 consecutive unvarying stages. Of course, we will build alternative criteria, however the most goal is to classify the similarity of the image into regions.

## FEATURE EXTRACTION

Once the lesion is divided out of the background skin, it's then classified as malignant or benign. For higher classification results, it's needed to use the simplest feature descriptors for machine learning modelling. The rise within the variety of options will increase the procedure price, exalting the outline of precise call boundaries. Thus, it's ensured that a particular feature set is employed.

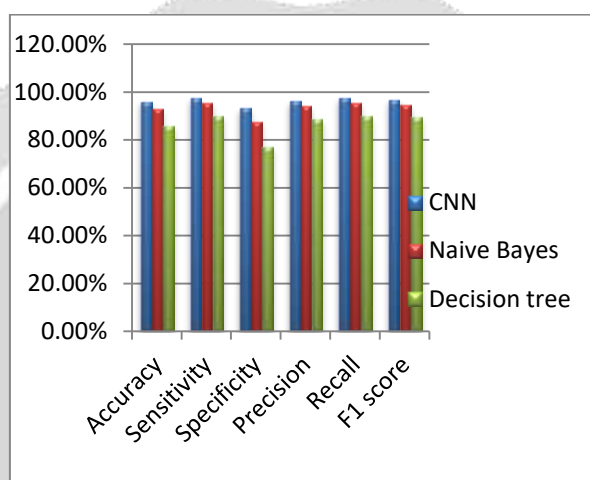
A lesion is characterised by its texture and its color during this analysis work 3 completely different options mistreatment native Binary Pattern (LBP), grey Level Co-occurrence Matrix (GLCM) and RGB color channel options, area unit extracted from the ROI of skin lesion. The techniques area unit used to extract the textural and colour-based options from the input skin lesion.

## CLASSIFICATION

After segmentation and feature extraction, the hybrid feature Extraction is then provided to classifiers to identify the melanoma. Classification algorithms are trained and tested at their default parameter settings to achieve high accuracy.

## 5. RESULT AND DISCUSSION

Finally, the classification process provided the result. Considering algorithmic optimization for various stages for melanoma cancer detection, the image had to undergo pre-processing. Unlike conventional approaches for pre-processing, this research employed the Gaussian filter for image filtering. This helped better the image by ignoring edge effects and boundary conditions. Next, an external morphological enhancement was done during which a hair removal scheme is applied. A modified quadratic transformation based Radon transform was used for hair detection and removal. The curves were retrieved which implies hair detection and this was then removed. A pixel wise interpolation technique was then employed for optimal melanoma segmentation and accurate feature extraction. Since optimal segmentation is of utmost importance for feature extraction, the technique incorporated here was global threshold based segmentation schemes. Moreover, an enhanced carried out for melanoma segmentation. The MATLAB software and image processing toolbox based implementation model was tested. The obtained results confirmed that the combined features (melanoma colour, shape and texture)-based classification using exhibits better classification accuracy.



## 6. CONCLUSION

In the past few decades, the incidence of skin cancer as a deadly variety of melanoma has up significantly. Skin cancer is that the deadliest kind of melanoma that, however, will be treated with success, if detected early. Early intervention can cause higher survival rates. Since clinical observation of skin cancer is subject to human error, early detection will be increased by utilizing an automatic method. Though there square measure several developments in imaging technology like dermoscopy, they need limitations. A physician's diagnosing is looked upon as a primitive entranceway for patients from medicine department. Since the diagnosing of skin cancer isn't a straightforward method in its early stages, the skin doctor ought to be trained as AN skilled. Moreover, since visual examination might not offer precise results, laptop based mostly diagnosing systems square measure helpful for each specialists and physicians with less expertise. It will be helpful to require the data received by the pc under consideration for a final and precise call. For this purpose, physicians want this automatic system to be additional reliable and correct than what has been bestowed to date. during this thesis, a extremely sturdy and economical system for laptop assisted diagnosing has been developed for skin cancer cancer detection. not like typical approach of skin cancer cancer detection, the optimized systems or algorithms for every step of detection like, pre-processing, segmentation, feature choice and classification, has been optimized.

The planned system introduces a completely unique system for pre-processing wherever increased filtering theme, hair removal schemes and image smoothing etc. were all studied and incorporated into the system. moreover, taking into thought the wants for a higher and precise skin cancer detection, a depth estimation paradigm has been introduced; here the skin cancer was processed for a 3 dimensional reconstruction in dermoscopic pictures. Playacting these processes, variety of options are retrieved victimisation feature choice schemes. They embrace color and form options, and each two-dimensional and three-dimensional option is used for additional classification.

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