**LITERATURE SURVEY**

**Title:** "Comparative Analysis of Gaussian Filter, Median Filter and Denoise Autoenocoder,"

**Abstract:** Images can be enhanced and denoised with the help of filters. In this paper, we use a Gaussian filter, a Median Filter and a Denoising Auto encoder for noise removal. Gaussian filter is a linear type of filter which is based on Gaussian function. But the median filter is a non-linear type of filter. It preserves edge while removing noise. Deep Convolutional neural network (CNN) is able to handle Gaussian denoising at a certain noise level. We compare these three types of noise removers with the help of four types of evaluation techniques. We use time performance, Peak signal-to-noise ratio (PSNR), Structure Similarity (SSIM) and Normalization mean square error (NMSE) evaluation techniques for finding the best filter for removing noise from the image on different situations. We found that sometimes a Gaussian filter is better and sometimes the median filter is better depending on the iteration of the filter. Sometimes a denoise autoencoder is also better but it takes more time with respect to a Gaussian filter and a median filter. When we consider only the time parameter, then the Median filter gives better results in less time in comparison to a Gaussian filter and a denoise autoencoder filter.

**Title:** "The melanoma skin cancer detection and classification using support vector machine,"

**Abstract:** Melanoma skin cancer detection at an early stage is crucial for an efficient treatment. Recently, it is well known that, the most dangerous form of skin cancer among the other types of skin cancer is melanoma because it's much more likely to spread to other parts of the body if not diagnosed and treated early. The non-invasive medical computer vision or medical image processing plays increasingly significant role in clinical diagnosis of different diseases. Such techniques provide an automatic image analysis tool for an accurate and fast evaluation of the lesion. The steps involved in this study are collecting dermoscopy image database, preprocessing, segmentation using thresholding, statistical feature extraction using Gray Level Co-occurrence Matrix (GLCM), Asymmetry, Border, Color, Diameter, (ABCD) etc., feature selection using Principal component analysis (PCA), calculating total Dermoscopy Score and then classification using Support Vector Machine (SVM). The results show that the achieved classification accuracy is 92.1%.

**Title:** "Melanoma Detection Using an Objective System Based on Multiple Connected Neural Networks,"

**Abstract:** Melanoma is a common form of skin cancer that dangerously affects many people around the world. Detection of melanoma with the naked eye by dermatologists may be subject to errors. Therefore, the implementation of image processing devices equipped with artificial intelligence can act as a support for the dermatologist in examination and decision making. However, due to the various characteristics of this type of lesions and the presence of noises and artifacts in the images, it is difficult to distinguish melanomas from benign lesions. In this article, we propose a new type of intelligent system which is based on several neural networks connected on two levels of classification. The first level contains five classifiers (subjective classifiers): the perceptron coupled with color local binary patterns, the perceptron coupled with color histograms of oriented gradients, the generative adversarial network (for segmentation) coupled with ABCD rule, the ResNet, and the AlexNet. They are chosen experimentally and consider the following features of melanomas: texture, shape, color, size, and convolutional pixel connections. At the second level (objective level), one classifier (perceptron-type) decides whether the lesion is a melanoma, based on learning-adjusted weight and the decisions at the first level. The second level is based on back-propagation perceptron that provides the final decision (melanoma or non-melanoma). The subjective and objective levels undergo two separate training phases. This approach allows an easier transition of the system from one database to another. This study shows that the use of the objective classifier brings an accuracy of 97.5% and an F1 score of 97.47%. These results are better than those of the individual classifier and those of the previous literature mentioned in References.

**Title:** "Skin Cancer Detection using Machine Learning Techniques,"

**Abstract:** As increasing instant of skin cancer every year with regards of malignant melanoma, the dangerous type of skin cancer. And the detection of skin cancer is difficult from the skin lesion due to artifacts, low contrast, and similar visualization like mole, scar etc. Hence Automatic detection of skin lesion is performed using techniques for lesion detection for accuracy, efficiency and performance criteria. The proposed algorithm applies feature extraction using ABCD rule, GLCM and HOG feature extraction for early detection of skin lesion. In the proposed work, Pre-processing is to improve the skin lesion quality and clarity to reduce artifacts, skin color, hair, etc., Segmentation was performed using Geodesic Active Contour (GAC) which segments the lesion part separately which was further useful for feature extraction. ABCD scoring method was used for extracting features of symmetry, border, color and diameter. HOG and GLCM was used for extracting textural features. The extracted features are directly passed to classifiers to classify skin lesion between benign and melanoma using different machine learning techniques such as SVM, KNN and Naïve Bayes classifier. In this project skin lesion images were downloaded from International Skin Imaging Collaboration (ISIC) in which 328 images of benign and 672 images of melanoma. The classification result obtained is 97.8 % of Accuracy and 0.94 Area under Curve using SVM classifiers. And additionally the Sensitivity obtained was 86.2 % and Specificity obtained was 85 % using KNN.

**Title:** "Active Contour Based Segmentation Techniques for Medical Image Analysis",

**Abstract:** Image processing is a technique which is used to derive information from the images. Segmentation is a section of image processing for the separation or segregation of information from the required target region of the image. There are different techniques used for segmentation of pixels of interest from the image. Active contour is one of the active models in segmentation techniques, which makes use of the energy constraints and forces in the image for separation of region of interest. Active contour defines a separate boundary or curvature for the regions of target object for segmentation. The contour depends on various constraints based on which they are classified into different types such as gradient vector flow, balloon and geometric models. Active contour models are used in various image processing applications specifically in medical image processing. In medical imaging, active contours are used in segmentation of regions from different medical images such as brain CT images, MRI images of different organs, cardiac images and different images of regions in the human body. Active contours can also be used in motion tracking and stereo tracking. Thus, the active contour segmentation is used for the separation of pixels of interest for different image processing.

**Title:** "Segmentation and Classification of Skin Cancer Melanoma from Skin Lesion Images,"

**Abstract:** Melanoma, one type of skin cancer is considered o the most dangerous form of skin cancer occurred in humans. However it is curable if the person detects early. To minimize the diagnostic error caused by the complexity of visual interpretation and subjectivity, it is important to develop a technology for computerized image analysis. This paper presents a methodological approach for the classification of pigmented skin lesions in dermoscopic images. Firstly, the image of the skin to remove unwanted hair and noise, and then the segmentation process is performed to extract the affected area. For detecting the melanoma skin cancer, the meanshift algorithm that segments the lesion from the entire image is used in this study. Feature extraction is then performed by underlying ABCD dermatology rules. After extracting the features from the lesion, feature selection algorithm has been used to get optimized features in order to feed for classification stage. Those selected optimized features are classified using kNN, decision tree and SVM classifiers. The performance of the system was tested and compare those accuracies and get promising results.

**Title:** Automated skin lesion segmentation of dermoscopic images using GrabCut and k-means algorithms.

**Abstract:** Skin cancer is the most common type of cancer in the world and the incidents of skin cancer have been rising over the past decade. Even with a dermoscopic imaging system, which magnifies the lesion region, detecting and classifying skin lesions by visual examination is laborious due to the complex structures of the lesions. This necessitates the need for an automated skin lesion diagnosis system to enhance the diagnostic capability of dermatologists. In this study, the authors propose an automatic skin lesion segmentation method which can be used as a preliminary step for lesion classification. The proposed method comprises two major steps, namely preprocessing and segmentation. In the preprocessing step, noise such as illumination, hair and rulers are removed using filtering techniques and in the segmentation phase, skin lesions are segmented using the GrabCut segmentation algorithm. The k-means clustering algorithm is then used along with the colour features learnt from the training images to improve the boundaries of the segments. To evaluate the authors' proposed method, they have used ISIC 2017 challenge dataset and PH2 dataset. They have obtained Dice coefficient values of 0.8236 and 0.9139 for ISIC 2017 test dataset and PH2 dataset, respectively.

**Title:** "Comparison of Texture Feature Extraction Method for COVID-19 Detection With Deep Learning,"

**Abstract:** This paper describes research on texture feature extraction for COVID-19 detection. Fractal Dimension Texture Analysis (FDTA) and Gray Level Co-occurrence Matrix (GLCM) were used for feature extraction. A dense neural network is used for classification. Three classes were used for classification to classify Normal, COVID-19, and Other pneumonia. The data entered in the texture feature extraction is a chest x-ray (CXR) image that is grey scaled and resized into 400x400 pixels. Performance analysis of the model uses a confusion matrix. The best performance feature extraction method for detecting COVID-19 is FDTA, with an accuracy testing of 62.5%

**Title:** "Textural Features for Image Classification,"

**Abstract:** Texture is one of the important characteristics used in identifying objects or regions of interest in an image, whether the image be a photomicrograph, an aerial photograph, or a satellite image. This paper describes some easily computable textural features based on gray-tone spatial dependancies, and illustrates their application in category-identification tasks of three different kinds of image data: photomicrographs of five kinds of sandstones, 1:20 000 panchromatic aerial photographs of eight land-use categories, and Earth Resources Technology Satellite (ERTS) multispecial imagery containing seven land-use categories. We use two kinds of decision rules: one for which the decision regions are convex polyhedra (a piecewise linear decision rule), and one for which the decision regions are rectangular parallelpipeds (a min-max decision rule). In each experiment the data set was divided into two parts, a training set and a test set. Test set identification accuracy is 89 percent for the photomicrographs, 82 percent for the aerial photographic imagery, and 83 percent for the satellite imagery. These results indicate that the easily computable textural features probably have a general applicability for a wide variety of image-classification applications.

**Title:** "Active contours without edges,"

**Abstract:** We propose a new model for active contours to detect objects in a given image, based on techniques of curve evolution, Mumford-Shah (1989) functional for segmentation and level sets. Our model can detect objects whose boundaries are not necessarily defined by the gradient. We minimize an energy which can be seen as a particular case of the minimal partition problem. In the level set formulation, the problem becomes a "mean-curvature flow"-like evolving the active contour, which will stop on the desired boundary. However, the stopping term does not depend on the gradient of the image, as in the classical active contour models, but is instead related to a particular segmentation of the image. We give a numerical algorithm using finite differences. Finally, we present various experimental results and in particular some examples for which the classical snakes methods based on the gradient are not applicable. Also, the initial curve can be anywhere in the image, and interior contours are automatically detected.