LITERATURE SURVEY

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Team ID	PNT2022TMID30346
Project Name	Project – AI-Based Localization and Classification of Skin Disease with Erythema
Maximum Marks	4 Marks

AI-BASED LOCALIZATION AND CLASSIFICATION OF SKIN DISEASE WITH ERYTHEMA

ABSTRACT

Although computer-aided diagnosis (CAD) is used to improve the quality of diagnosis in various medical fields such as mammography and colonography, it is not used in dermatology, where non-invasive screening tests are performed only with the naked eye, and avoidable inaccuracies may exist. This study shows that CAD may also be a viable option in dermatology by presenting a novel method to sequentially combine accurate segmentation and classification models. Given an image of the skin, we decompose the image to normalize and extract high-level features. Using a neural network-based segmentation model to create a segmented map of the image, we then cluster sections of abnormal skin and pass this information to a classification model. We classify each cluster into different common skin diseases using another neural network model. Our segmentation model achieves better performance compared to previous studies, and also achieves a near-perfect sensitivity score in unfavourable conditions. Our classification model is more accurate than a baseline model trained without segmentation, while also being able to classify multiple diseases within a single image. This improved performance may be sufficient to use CAD in the field of dermatology.

PROBLEM STATEMENT

Now a day's people are suffering from skin diseases, More than 125 million people suffering from Psoriasis also skin cancer rate is rapidly increasing over the last few decades especially Melanoma is most diversifying skin cancer. If skin diseases are not treated at an earlier stage, then it may lead to complications in the body including spreading of the infection from one

individual to the other. The skin diseases can be prevented by investigating the infected region at an early stage. The characteristic of the skin images is diversified so that it is a challenging job to devise an efficient and robust algorithm for automatic detection of skin disease and its severity. Skin tone and skin colour play an important role in skin disease detection. Colour and coarseness of skin are visually different. Automatic processing of such images for skin analysis requires quantitative discriminator to differentiate the diseases.

To overcome the above problem we are building a model which is used for the prevention and early detection of skin cancer, psoriasis. Basically, skin disease diagnosis depends on the different characteristics like colour, shape, texture etc. Here the person can capture the images of skin and then the image will be sent the trained model. The model analyses the image and detect whether the person is having skin disease or not.

OBJECTIVE

The main objective is to the schematic flow of our study. We started with the original image. We pre processed this image by decomposing it into its haemoglobin and melanin constituents. These images were then input to the U-Net to generate the segmented output. We drew contours around each cluster and used a convex hull algorithm to draw rectangles around these clusters and crop them as individual images. These cropped images were used as input to the Efficient Net, which generated a prediction along with the confidence rate. The K-means clustering algorithm showed sub-optimal performance, owing to its limitations with noisy data. The SVM method showed a significant improvement in performance, that was attributed to the advantages of using SVMs to extract information from decomposition, rather than clustering algorithms. Even without the extra information, the U-Net trained without decomposition outperformed the previous two methods in terms of sensitivity. The U-Net model was also trained with decomposition and showed the highest sensitivity rate. In our results, we focused on the sensitivity metric because our objective was to assess the viability of using CAD with skin images. Although our U-Net model was not as good as the SVM model in terms of the specificity rate, it showed the best sensitivity rate, thus satisfying the objective of our study. In addition, we included the Dice coefficient and Hausdorff distance to demonstrate the performance of our methods with greater transparency. Our method showed clear improvements considering these alternative metrics. A major contributing factor7 to the underperformance of other methods is that performance of the SVM algorithm deteriorated when the images contained differences in lighting and shade. The K-

means clustering method3 was also affected by the lighting and shade in the images.

EXISTING SYSTEM

Our analysis model for localization and classification in the pseudocode . We decomposed the original image into its haemoglobin and melanin constituents using pre processing, to help our model extract valuable information from data that would have been otherwise unavailable. We provide these images as input to our segmentation model, the U-Net, which generated a segmented image. This segmented image was then analysed for clusters, which were subsequently cropped and input to our classification model, the Efficient Net, which then produced a classified label, thus completing our analysis model. The data for training and testing were obtained from Dermnet NZ, an archive of skin disease information launched and maintained by a group of dermatologists from New Zealand. The site provides open source images with labels.

PROPOSED SYSTEM

The main idea is to enable the main constituents of the skin that are visible to humans are melanin and haemoglobin. These constituents provide valuable information for the segmentation of abnormal skin. To ensure that our model can learn to use these features, we used independent component analysis (ICA) to extract the melanin and haemoglobin constituents.

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