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DETECTION OF DIFFERENT TYPES OF SKIN DISEASES USING RASPBERRY PI

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Abstract- To diagnosing the different types of skin diseases is an exigent process even for better-experienced skin doctors, while there are several reasons for an increase in such conflicts, foremost among them is the reduction of these types of diseases. This paper proposed Deep learning. Nowadays diagnosing diseases through modern technology becomes easy to access and convenient. Due to the emergence of smartphone analysis and providing results in less time. This system will utilize computational techniques to analyze, process, and relegate the image data predicated on various features of the images. Skin images are filtered to remove unwanted noise and process it for enhancement of the image. Using a machine-learning algorithm (Convolutional Neural network) can predict the type of disease and show in the output to the IOT page of the predicted disease.

KEYWORDS: IoT Protocol, Skin diseases classification images, Wi-Fi Image Processing, Noise Removal in the given image

1. INTRODUCTION:

Medical Image Processing is used widely in the diagnosis of various diseases. It can use to identify various types of skin diseases. In the current work transfer, learning was used to identify the skin diseases melanoma, vitiligo, and vascular tumors. Melanoma is a skin cancer that occurs from the pigment-producing cells, melanocytes [7]. Most melanomas are asymmetrical with an uneven border. The color of melanoma may have a different shade of brown. A small pencil eraser-shaped lesion is the warning sign for melanoma.[4] It is not easy for patients to recognize melanoma. Melanoma is a serious type of skin cancer. Diagnosed timely and treated suitably, it can very often cure with comparatively small surgery alone [8]. An avascular tumor is a tumor that occurs at the vascular origin. It is a growth of soft tissue that can be either begin or malignant. It developed from blood vessels or lymph vessels. It is a massive and complex type of lesion, especially for doctors with no or little experience in this field. Vascular tumors can happen in any part of the body and can be of type being (not cancer) or malignant (cancer). They may form on the skin, in the tissues below the skin, and/or in an organ [10]. They may be found in the tissues below the skin or on the skin. Vitiligo is a disease in which the skin loses its color because of the loss of its pigment cells (melanocytes). Melanocytes are responsible for the color of our skin. Loss of melanocytes may result in discolored patches on the skin. The discolored patches usually increase with time [9]. The disease can affect the skin on any part of the body. This disease is non-fatal but it will affect the patient's mental state. A Convolutional Neural network or CNN is a very popular Machine-learning algorithm in the area of computer vision. Training time and the amount of data required for CNN are more than traditional machine learning algorithms. People develop CNN with great performance and share the details to use in the future. Interesting use of a convolutional neural network is that this pre-trained network can be reused for a related task in another new task [5]. Humans can transfer knowledge learned from one task. The new task will not be learned from scratch instead previously acquired knowledge would use to learn a new task. Transfer learning is a very popular approach in recent days [9]. It is a process of using gained knowledge of one network on other related problems. It is used in a situation where your dataset has too little data to train a model from first. The process of learning knowledge and applying it to a similar and different problem is called Transfer learning. There are two steps to be followed Pre-training, Fine Tuning. Pre-Training: In this process, the training of the network will do with a large data set [1]-[3]. All the parameters of the network are trained and, in this way, the model is learned. Fine Tuning: The new dataset can give to fine-tune the pre-trained CNN. The new data set may be similar or different from the original data set. If the new data set is similar and the size of the data set is, less then only the final layer of the model will train to keep all other layers fixed to avoid overfitting. If the size of the data set is big then the whole model may be retrained with the initial weights of the pre-trained model. If the new data set is not the same as the old data set, then if the size of the data set is less the initial layer can be fixed and the remaining layer can be retrained. In the case where the size of the data set is big, the whole network can be retrained with the initial weight of the pre-trained network [6]. The Internet of things (IoT) is an everlastingly growing network spanning a gathering of devices, sensors, actuators, and even smartphones connected to the internet. These devices sense and assemble data for combination and analysis for better decisions applications. The system of the Internet of Things (IoT) contains an extensive diversity of heterogeneous devices, reaching from wireless sensors to smart home uses connected to the global IP network, and is predictable to include many other types of technologies that are classically not connected so far. The interactive devices in IoT, forced in terms of memory and power, must agree on different

features of the exchanged data for real transmission depending on specific protocols

2. EXISTING SYSTEM:

Skin Cancer is the most common cause of death, including colon cancer, lung cancer, breast cancer, cervical cancer, etc. skin cancer is one cancer that increases every year. Considering and analyzing features of cancer images, it includes asymmetry, border irregularity, compact index, fractal dimension, edge abruptness, color variation, and changes in the diameter, is a popular technique for analyzing patients with skin cancer. To extract and analyze such features, image segmentation plays an important role in automatic skin cancer detection systems. In this process, we propose the image segmentation scheme based on a support vector machine (SVM) and snake active contour. SVM is used to help find the appropriate parameter for the snake algorithm.

3. PROPOSED SYSTEM:

3.1. Dataset collection:

The lack of proper dermatoscopic data in terms of size and diversity has been a setback for training neural networks. The dataset used here is the dataset released by the Harvard Data verse. The dataset consists of 10015 dermatoscopic images with a 600x450-pixel resolution. It is a collection of 7 distinct classes. Actinic Keratosis (AKIEC) is beign but potentially malignant and can turn into a malignant lesion. Basal cell carcinoma (BCC) and melanoma (MEL) are malignant. Benign Keratosis (BKL), Dermatofibroma (DF), Vascular Skin Lesion (VASC), and Melanocytic Nevi (NV) are benign. Fig. 1 depicts the images of these classes. Half of the dataset was confirmed by histopathology. Few other techniques to confirm ground truth were reflectance confocal microscopy, follow-up, or expert consensus. On examination of the metadata, it has been found that there are only 7470 distinct skin lesions out of the 10015 images. NV, the largest class, has 6705 images while DF, the smallest, has only 115 images.

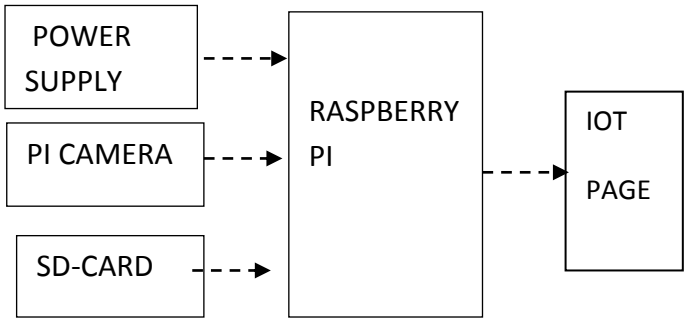


Fig no 1: PROPOSED SYSTEM

3.2. Data preprocessing:

After an initial exploratory data analysis, duplicate images have been identified. After the removal of duplicate images, a validation set has made with a split ratio of 83:17. After this process, the training set has 9077 images and the validation set has 938 images. Later data augmentation in the form of flipping, cropping, and rotating have been applied with the final target image size set to 224x224 pixels. Stratified sampling has been used to maintain the inter-class ratio. The training set images later passed through a unique pre-process function concerning the model architecture used. Each architecture requires input to the model in a certain format and the preprocess function helps us transform our data into such required format.

3.3. Transfer learning technique and training:

Transfer learning has been used as a technique to train neural networks as they are data-hungry and we only have limited data despite having additional data through data augmentation. After taking this architecture as a base model, the top layer has been removed and a Global average pooling layer, dropout, and dense layers have been added. Different thresholds of dropout have been tried in this study. The training has been implemented on Google Collab using an NVIDIA Tesla T4 provided. Four different architectures namely ResNet50, InceptionV3, Exception, and Mobile Net have been used. Class weights have been computed based on the individual class frequency to tackle class imbalance. While training, the weights of the base layers have frozen. We trained each neural network on 30 epochs and categorical accuracy has used as a measure for validation.

3.4. Evaluation metrics:

Several evaluation metrics could use for a classification task but here we take into consideration accuracy, precision, and recall. The recall is the most important measure here it represents True Positives and True Negatives. Similarly, and represent False Positives and False Negatives respectively.

Fig no 2: Raspberry pi connected with Pi Camera

4. RESULTS AND DISCUSSION:

At first, we have to Open the VNC viewer

Connect the raspberry PI with the desktop Open the file manager in the VNC viewer in the file manager, we have to open the RPI vision And in the RPI vision folder, we have to open the skin diseases The code will run and we have to execute the code and the last step we have to press enter two times The PI Camera will be on, the diseases will be shown to the pi camera, and the diseases will be detected which would show on the desktop.

CLASSIFICATION RESULTS:

The image classifier that has built in the VNC Viewer has a Precision of 100%, a Recall of 100%, and an Average Precision (AP) of 100%. The result that will send will be the output of the IoT Page

(a) (b)

Fig no 3: Skin diseases images name: a) wheal b) Skin cancer

IN IoT PAGE Fig no 4: Psoriasis skin diseases:

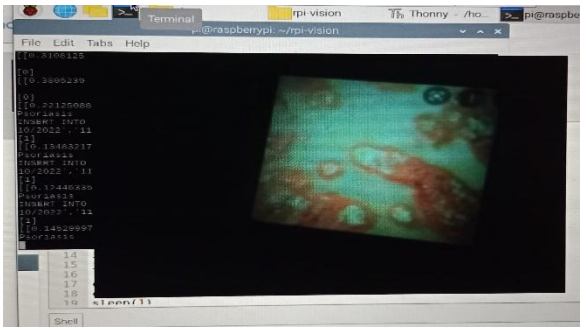
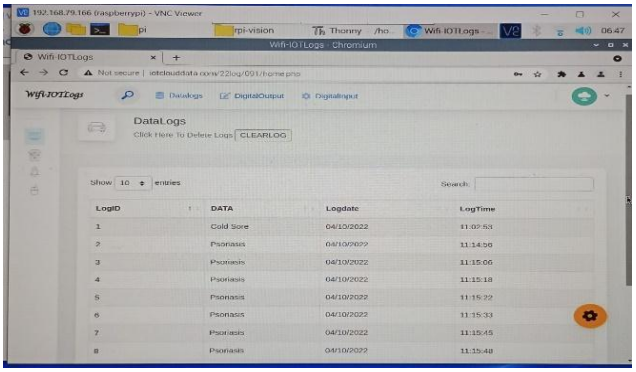


Fig no 5: Wheal skin diseases:

Fig no 6: IoT page output:



5. CONCLUSION:

Skin disease is a common and frightening kind of disease in the whole world. The new development of deep learning in medical imaging gives us the motivation to diagnose skin disease from digital images. Transfer learning is a very popular and emerging technology in the field of medical image processing. We developed a model to classify three skin diseases. Transfer learning is a very popular and emerging technology in the field of medical image processing. We developed a model to classify three skin diseases melanoma, vitiligo, and vascular tumor. To make the dataset, many data pre-processing and data augmentation methods were applied. The proposed model used the inception V3 model as a base model that gave a very good accuracy for training

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