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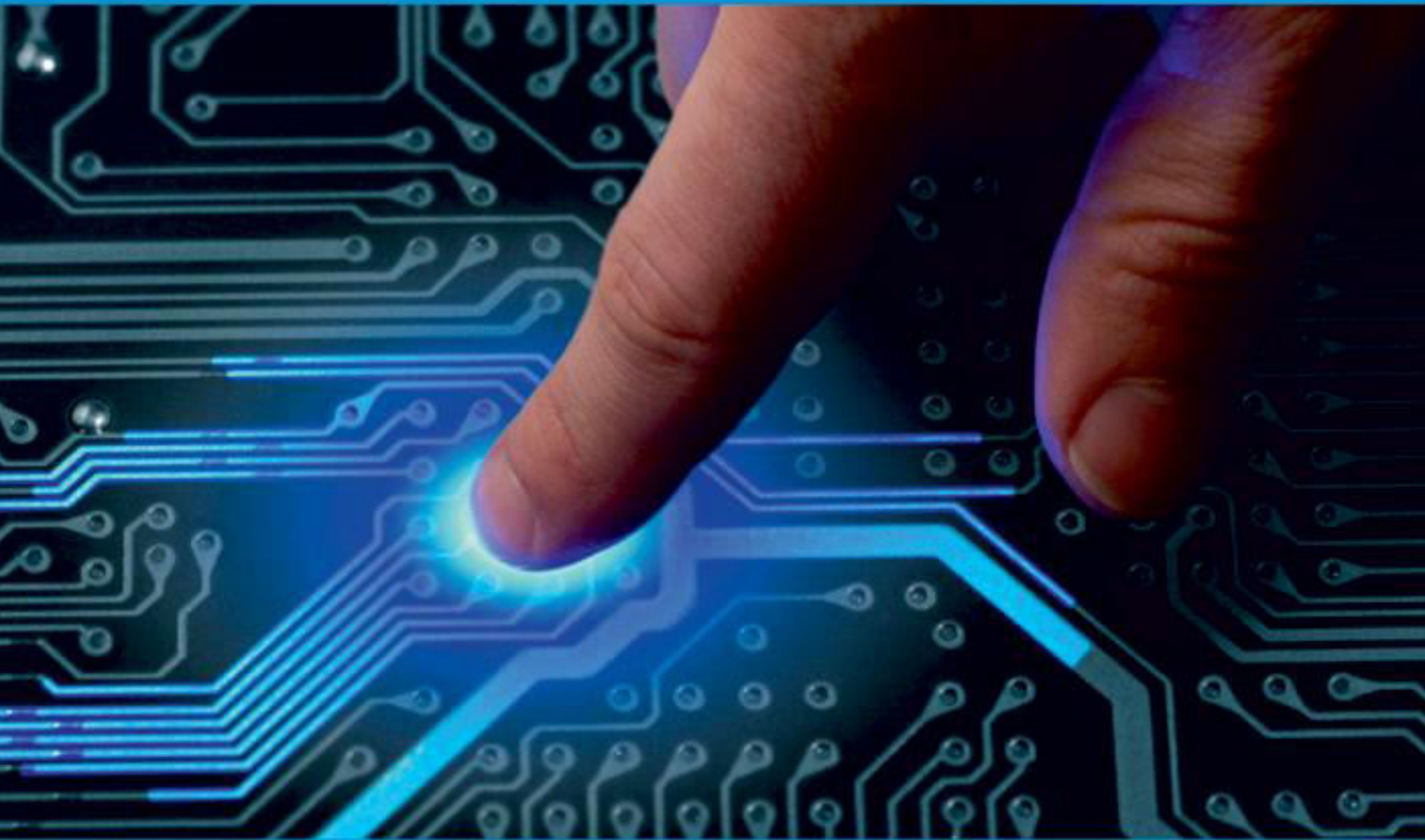

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Skin Disease Detection Using Image Processing

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ABSTRACT: According to statistics, cancer, one of the skin diseases, results in 8.2 million annual deaths and 14.1 million new diagnoses worldwide. An efficient automated system that can achieve the objective of early referral for patients with skin disorders is desperately needed. A skin disease module that classifies skin cancer lesions was developed for this project. In this session, seven skin lesions—including benign keratosis and melanoma—are classified using deep learning methods. The convolutional neural network Mobile Net, which uses Kera's architecture for training, is used by the skin disease detector to classify skin lesions. To take a picture and get an estimate of the final image, the user can upload an existing photograph or use the camera on their smartphone. Mobile Net CNN uses 8–9 times less processing power than traditional convolution to implement depth-wise separable convolution. This Skin Disease Detector might be able to assist dermatologists with skin disease detection. Also, it will be simpler for the typical user to access oneself in advance in order to get the right early referral for medical care to diagnose and treat the illness.

KEYWORDS: Benign Keratosis, Melanoma, Convolutional neural network.

I. INTRODUCTION

The skin of a person's body serves as both an organ and a protective covering. The skin is the largest organ inside the human integumentary system. The skin is regarded as one of the five sense organs in humans and serves to cover and safeguard the body's internal organs. Epidermis, dermis, and hypodermis are its three layers. The top layer of skin, or epidermis, acts as a waterproof barrier and is largely responsible for determining the colour of the skin. The dermis, or middle layer of the skin, is made up of sweat glands, stiff connective fibres, and hair follicles. The hypodermis, the innermost layer of fat and other connective tissues commonly referred to as subcutaneous tissue, is the last layer of skin. The skin performs metabolic, sensory, protective, and thermoregulatory functions.

Skin continuously acts as an infection-defence barrier. With its function as an immune system component, it protects the body from viruses and subsequent water loss that could cause dehydration. It contributes to vitamin D synthesis and vitamin B float protection. Many factors, including frequent facial motions and sun exposure, can cause skin damage. From sunburn to skin cancer, the skin is susceptible to serious harm. The barrier becomes stronger when our skin is moisturised. The damaged skin will repair itself by generating tissue that is both discoloured and lacks pigment.

The major goal of this project is to develop a tool that can instruct medical professionals, lab technicians, and patients to find the seven medical diagnoses with the highest likelihood for a certain skin lesion. As a result, their workflow will be sped up and they will be able to swiftly identify high priority patients who can be treated right away. Less than 10 seconds should pass before the programed returns a result. The photos must be pre- processed to preserve privacy. Because data is the foundation of every project and both locally evaluated and sent to an external server. A skin lesion is typically defined as an anomaly that affects the appearance, texture, and functional aspects of skin. Skin lesions can have a variety of origins, including skin cancer.

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II. SKIN LESIONS AND IT'S TYPES

Skin lesions are frequently described as abnormal skin growths. It generally develops on skin that is exposed to the elements. Yet, skin cancer can also develop on parts of the body that are not exposed to the sun. The type of skin cancer is identified by looking at the area where the cancer first appears.

i. Actinic Keratoses and intraepithelial carcinoma/Bowen's disease
ii. Basal cell carcinoma
iii. Benign keratosis-like lesions melanoma/seborrheic keratoses
iv. Melanocytic nevi
v. Vascular lesions
vi. Dermatofibroma
vii. Melanoma

III. ACTINIC KERATOSES AND INTRAPITHELIAL CARCINOMA / BOWEN'S DISEASE

It includes the full range of keratinizing tumors, both benign and malignant. The dermoscopic characteristics of these lesions, which are primarily non-pigmented keratinizing tumors, are less well known than the dermoscopic criteria for pigmented tumors, which are well documented. The case series is the foundation for the majority of the stated dermoscopic patterns. The evaluation of the vascular patterns serves as the foundation for the dermoscopic diagnosis of these malignancies. A lesion's architectural layout, vascular distribution, and correlation with the clinical evaluation (such as texture and stiffness) may be able to increase specificity.

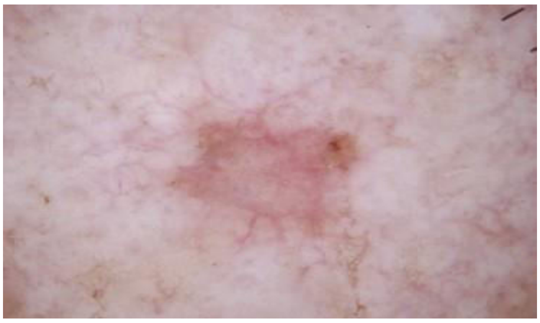

Fig.1 Actinic keratoses and intraepithelial carcinoma

2. BASAL CELL CARCINOMA

BCC is frequently observed in people with fair skin. Pinkish patches of skin and flesh-colored spherical growths are two of the symptoms of BCC that are routinely treated. Indoor tanning or continuous sun exposure are the main culprits. BCC can penetrate the bones and pierce the nerves, harming and disfiguring them. They also have the capacity to grow deeply.

Fig.3 Basal cell carcinoma

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3. BENIGN KERATOSES-LIKE LESIONS MELANOMA/SEBORRHEIC KERATOSES

The lesion's asymmetrical nature and polychromic appearance are due to the presence of several asymmetric pigmented globules, noises, or spots on the skin's surface and around the lesion's perimeter, as well as an apparent blue-whitish veil in the lesion's highlighted center. One method for identifying suspicious follicular openings is to look at the relationship between the lesions raised and most pigmented area.

Fig.3 Benign Keratoses

4. MELANOCYTIC NEVI

Melanocytic nevi are the most common cutaneous melanocytic lesions in people. On the epidermal layer, they often take the form of small (0.6 cm), hyper pigmented macules that are present practically everywhere. Three varieties have been recognized based on the location and distribution of the proliferating melanocytes: functional nevi (restricted to the dermal-epidermal junction), dermal nevi, and compound nevi (dermis and epidermis).

Fig.4. Melanocytic Nevi

5. VASCULAR LESIONS

Vascular lesions, which are visible and have a range of forms, are frequently found in the head, neck, and hand. The majority of these lesions are congenital, even though some of them may be acquired and malignant, which are less dangerous. At the newborn to infant stage, these minor flow lesions have a unique flat pink skin tone that usually darkens over time to take on a dark or deep purple colour. The skin type and texture of these lesions with unusual hues may gradually change, possibly taking on a stone-like look. Muscular difficulties, as well as expansion of the underlying bone and soft tissues, may also be present.

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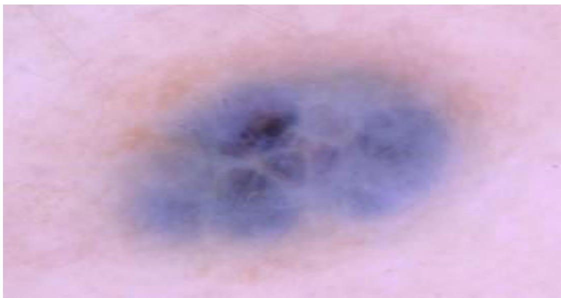


Fig.5. Vascular lesions

6. DERMATOFIBROMA

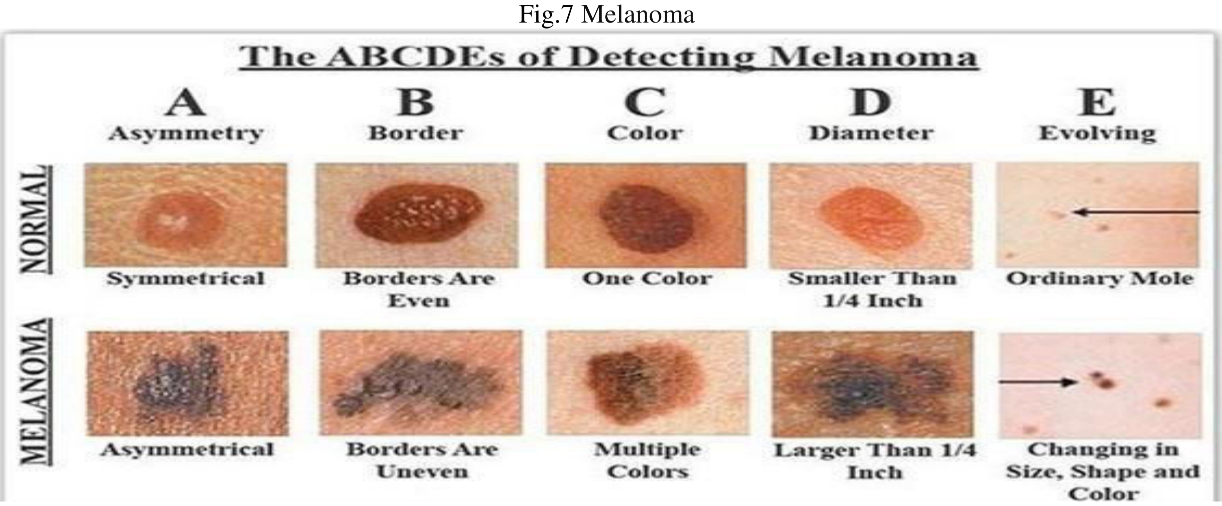
The very firm, frequently larger than.5 cm in radius lump that itch just below the skin's surface and feels like a small rubber button. They occasionally appear in purple to light pink hues and light brown or grey tones. A dermatofibroma may become dimpled when pinched or rubbed. Although they can appear anywhere on the body, young to middle-aged people and females are more likely to have them on their upper arms and shoulder region.

Fig.6 Dermatofibroma

7. MELANOMA

The strong propensity for spreading makes melanoma "the most dangerous skin cancer" in medical terminology. A mole that already exists on the skin might grow into melanoma, as can a sudden dark area that stands out from the surrounding skin. Early melanoma diagnosis aids in the patient's survival. For dermatologists, identifying melanoma in its last stages is a difficult challenge. Early detection is aided by the ABCDE (Asymmetry, Border, Color, Diameter, Evolving) warning indicators.

Fig.7 Melanoma



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IV. METHODOLOGY

The authors claim unequivocally that a variety of segmentation algorithms can be used to process the image and get accurate results. In his publications, the author clearly explains how a picture is processed, segmented, and classified using a limited number of classifiers. By drawing comparisons between skin disorders and AIDS and tuberculosis, the author of this article explains why skin diseases should be treated as soon as possible. The first step in pre-processing an image is to use individual component analysis on the data sets to pre-process the image. The other uses computer tomography techniques to identify skin cancers, psoriasis, and vascular dermatosis. The other writers put processes in place to prevent edges, eliminate noise, and remove unwelcome hair. The algorithm is used to improve the ability of pixels with known properties such as RGB, HSV, chrominance, and brightness to recognize skin. The technique utilized in this project is primarily focused on identifying skin lesions including psoriasis, eczema, and chicken pox. This method integrates adaptive thresholding, edge detection, k-means, and morphology-based segmentation, four algorithms, to get superior results by utilizing the most crucial segmentation approaches. The preprocessing step in this system's methodology preserves the image's color contrasts, brightness, and other properties. Following picture segmentation, the author used edge detection to find the edges of the lesion area and applied a Gaussian filter to do so. By doing so, we were able to identify ringworm.

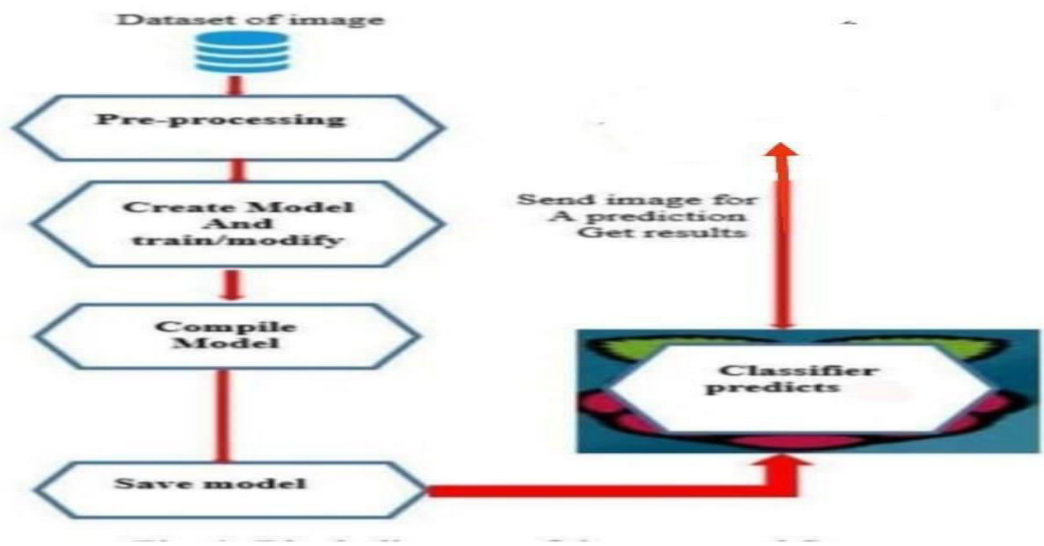

Fig.8 Block Diagram

By Adaptive threshold we can detect chicken pox this works by identifying the clear region of lesion by identify the pixels. Similarly, K-means is used for finding the cluster points by using centroids by this eczema is identified. Morphological is method used by implementing points to input image and data sets and compare them by this psoriasis is identified accurately. It effectively makes use of signal to noise ratio. This system is extremely accurate and provides precise results regarding the particular defined region and the presence or absence of disease. Following picture segmentation, the author used edge detection to find the edges of the lesion area and applied a Gaussian filter to do so. By doing so, we were able to identify ringworm. In order to detect chicken pox using adaptive threshold, one must first identify the clear zone of the lesion.pixels. Similar to this, K-means is employed to identify the cluster spots by employing centroids in this manner. Psoriasis is correctly recognised using the morphological technique, which uses implementation points to enter image and data sets and compare them. It effectively makes use of signal to noise ratio. This system is extremely accurate and provides precise results regarding the particular defined region and the presence or absence of disease.

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V. EXISTING SYSTEM DRAWBACKS

Python is the programming language used by this system to run the MobileNet CNN on Tensor It integrates flow. A number of libraries were loaded, including the Keras library, which houses the MobileNet CNN framework. The development platform is Visual Studio. Because this strategy requires memory for the model's training.

The current system has the following shortcomings.

i. Big Training Sets Are Necessary.
ii. Slow pace of convergence.
iii. High Complexity Computation.
iv. The lesion location requires high contrast.

VI. PROPOSED SYSTEM

In the proposed system, we're going to use architecture of convolution neural networks called Mobile net, where we'll train our data set, perform image augmentation techniques, preprocess the images, and then train the model. Because Mobile net is a pre-trained model, we can do transfer learning, which involves using a pre-trained model as a base and modifying the pre-trained model in accordance with the user's requirements.

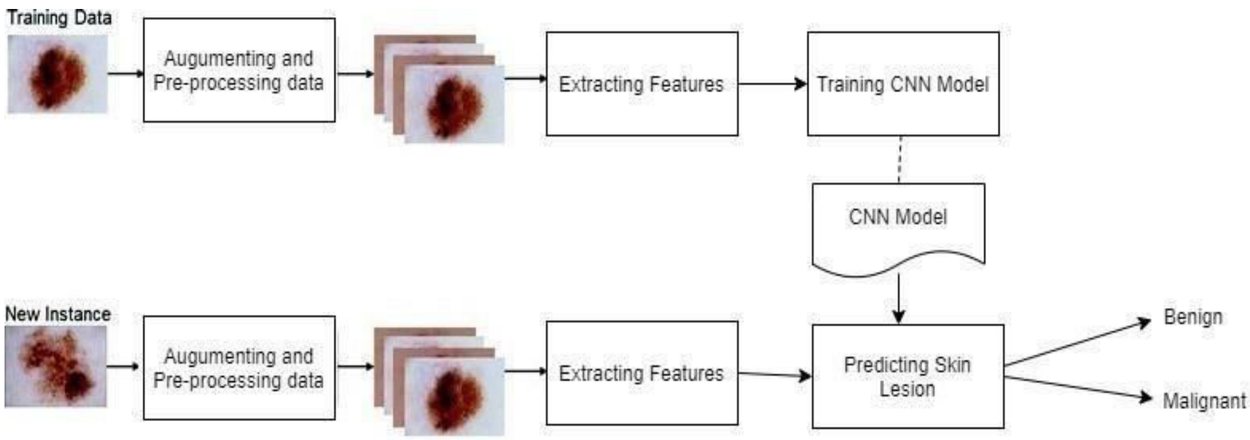

Fig.9 The proposed system

VII. RESULT & CONCLUSION

Skin cancer has grown to be a severe issue, and there are numerous tools and techniques that can help predict and categorize skin lesions. The overall goal of the research was to create a technique that, when compared to current methodologies could predict and categorize skin cancer with a higher degree of accuracy and less complexity. The initiative is also designed in a way that ensures improved communication between doctors and patients. This was accomplished by combining transfer learning with the mobile net model, a Convolution Neural Networks model that has already been trained, and different Python programmes.We currently have 85% accuracy on the model, which is still in the development stage. There is still room for further research in this area of neural networks. As a result of this experiment, we were able to predict skin lesions with the best accuracy. The initiative is also designed in a way that ensures improved communication between doctors and patients. This was accomplished by combining transfer learning with the mobile net model, a Convolution Neural Networks model that has already been trained, and different Python programmes. We currently have 85% accuracy on the model, which is still in the development stage. There is still room for further research in this area of neural networks. As a result of this effort, we have data that are as accurate as feasible in predicting skin lesions.

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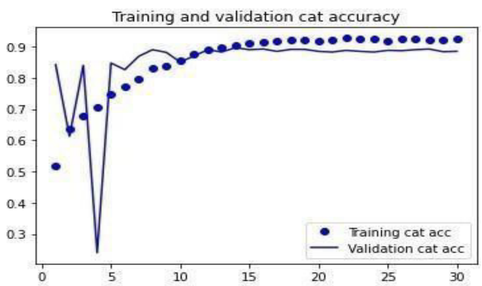
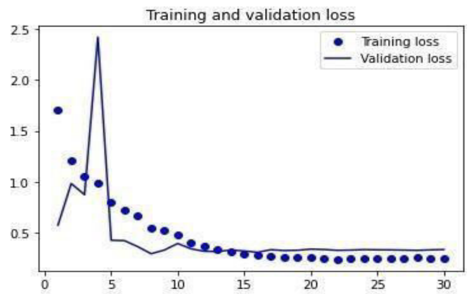
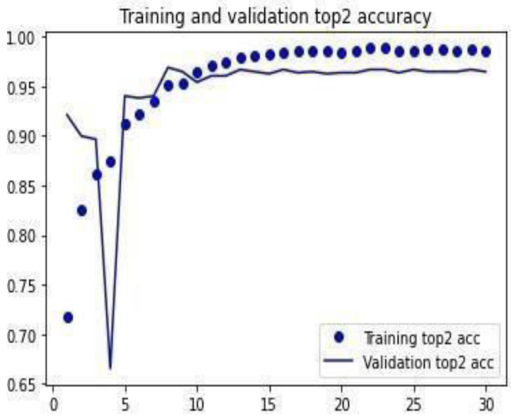


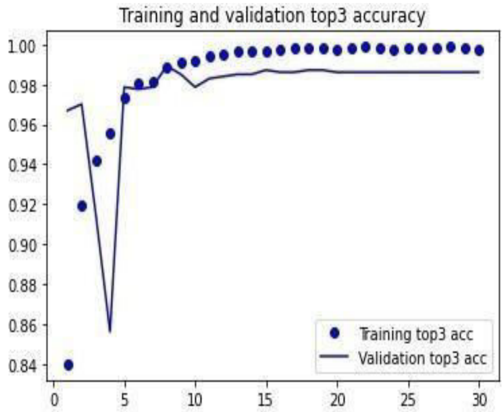
Training and validation loss



Training and validation cat accuracy



Training and validation Top2 accuracy



Training and validation Top3accuracy

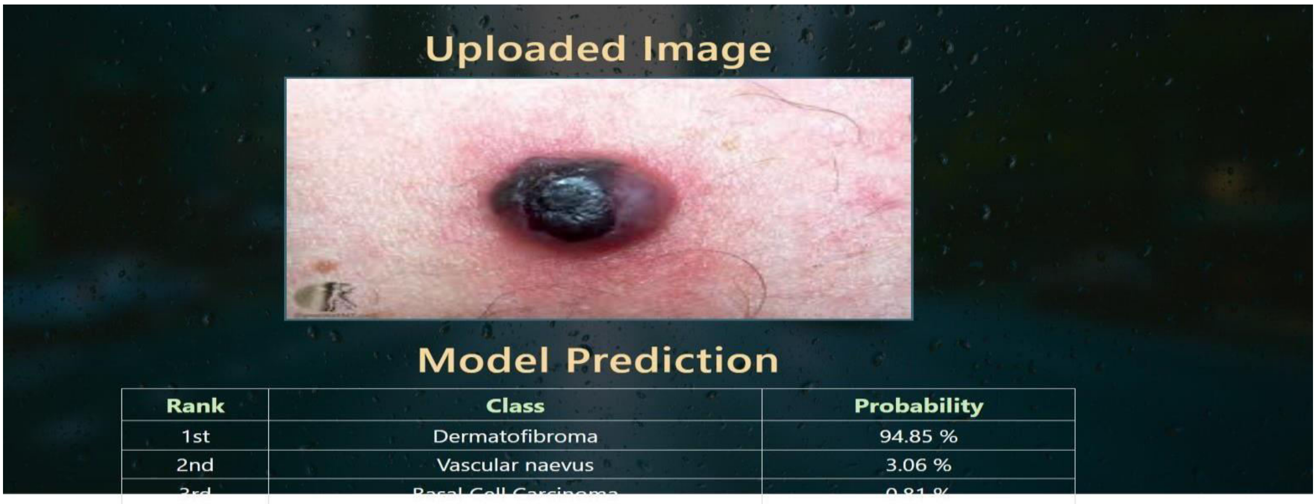


Fig.10 Dermat of ibroma

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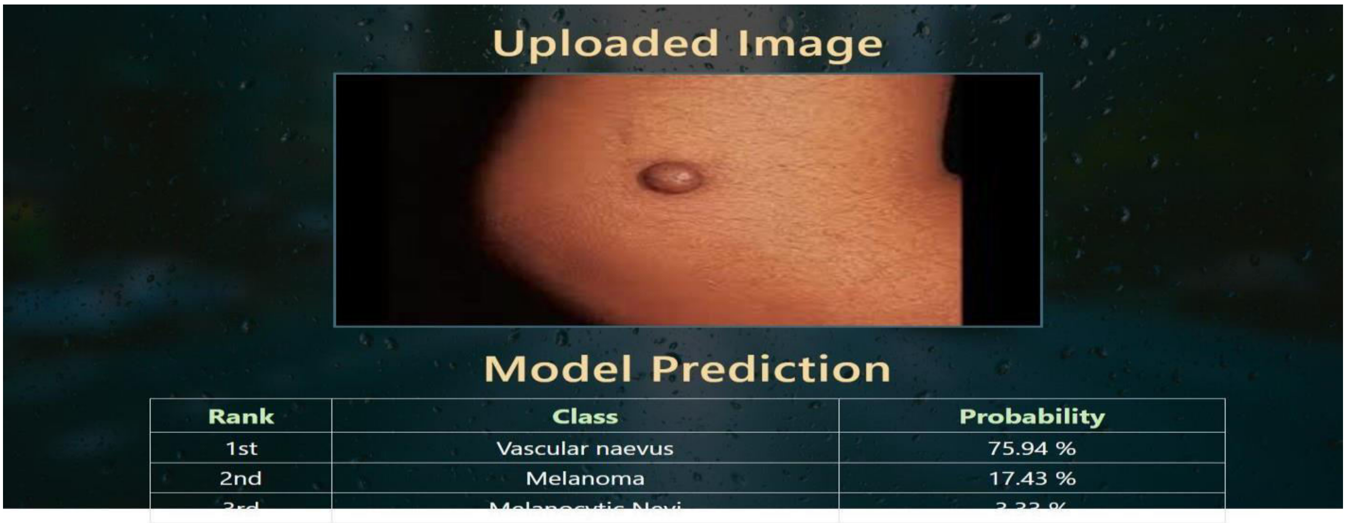

Fig.11 Vascular naevus

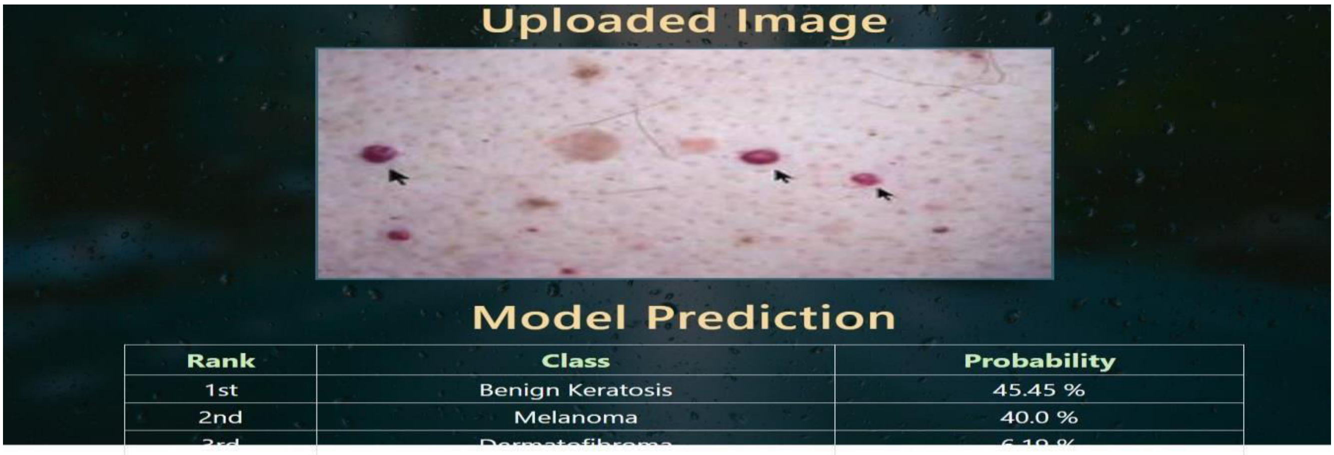

Fig.12 Benign Keratosis

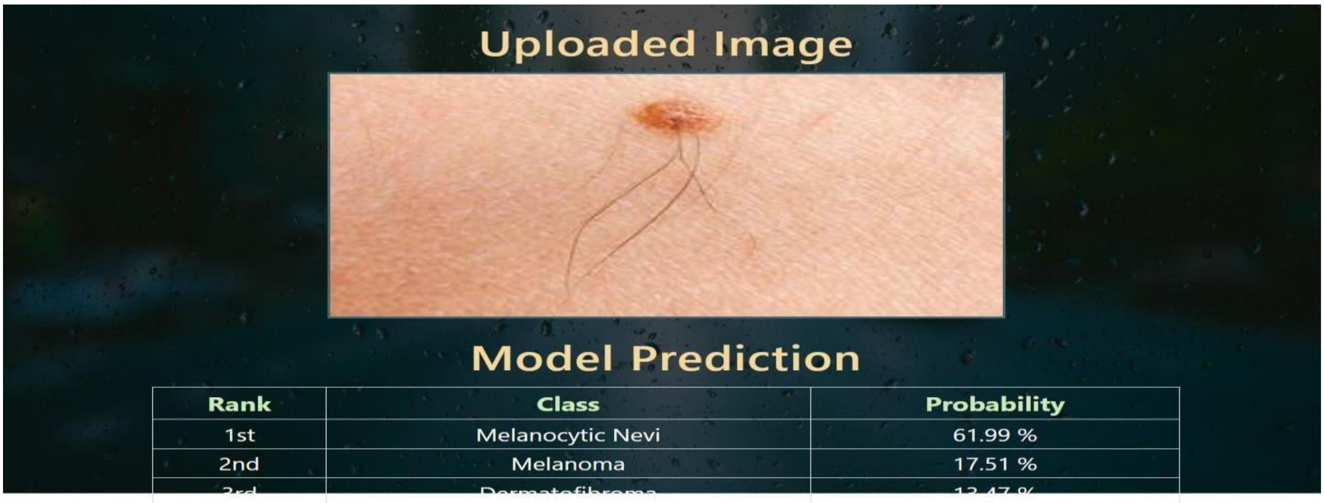

Fig.13 Melanocytic Nevi

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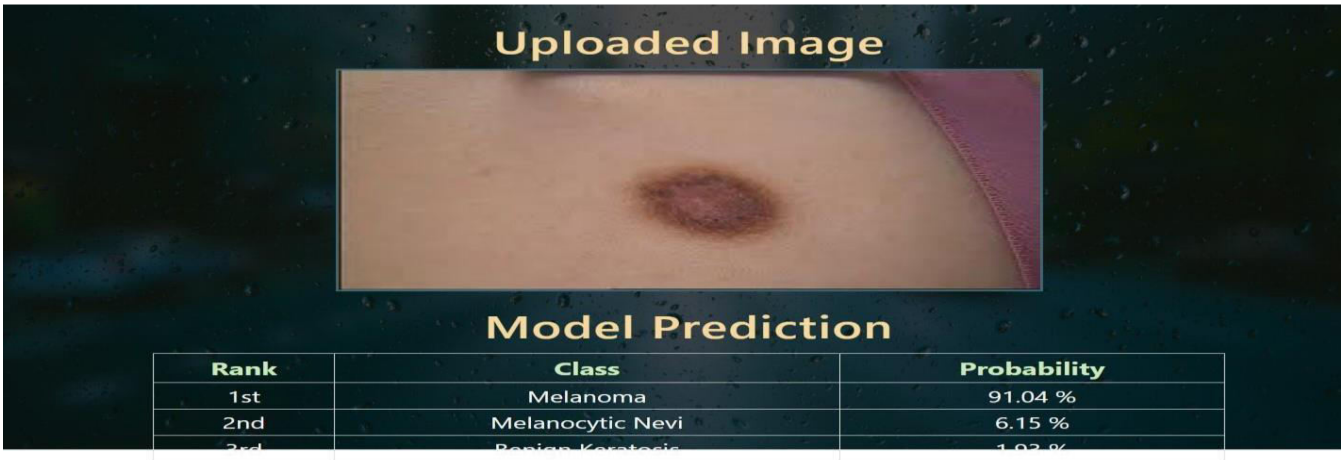

Fig.14 Melanoma

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