Project Planning Phase
Milestone and Activity List

Date	21 October 2022
Team ID	PNT2022TMID26076
Project Name	Project- AI Based Localization and Classification of Skin Disease with Erythema

TITLE	DESCRIPTION	DATE
LiteratureSurvey& Information Gathering	Literature survey on the selected project & gathering information by referring the, technical papers, research publications etc.	23 SEPTEMBER 2022
Prepare Empathy Map	Prepare Empathy Map Canvas to capture the user Pains & Gains ,Prepare list of problem statements	24 SEPTEMBER 2022
Ideation	List the by organizing the brainstorming session and prioritize the top 3 ideas based on the feasibility & importance.	25 SEPTEMBER 2022
Proposed Solution	Prepare the proposed solution document, which includes the novelty ,feasibility of idea, business model, social impact, scalability of solution, etc.	30 SEPTEMBER 2022
Problem Solution Fit	Prepare problem -solution fit document.	01 OCTOBER 2022
Solution Architecture	Prepare solution architecture document.	02 OCTOBER2022

Customer Journey	Prepare the customer journey maps to understand the user interactions & experiences with the application (entryto exit).	07 OCTOBER 2022
Functional Requirement	Prepare the functional requirement document.	08 OCTOBER 2022
Data Flow Diagrams	Draw the data flow diagrams and submit for review.	09 OCTOBER 2022
Sprint Delivery Plan	Allocate time for each and every functions	20 OCTOBER 2022
Prepare Milestone & Activity List	Prepare the milestones & activity list of the project.	21 OCTOBER 2022
Project Development-Delivery of Sprint-1,2,3&4	Develop &submit the developed code by testing it.	INPROGRESS..

MILESTONE & ACTIVITY LIST

INTRODUCTIONI :

Composed of epidermis,dermis,andsubcutaneoustissues, skin is the largest organ of human body, containing blood vessels, lymphatic vessels, nerves, and muscles, which can perspire, perceive the external temperature, and protect the body. Covering the entire body, the skin can protect multiple tissues and organs in the body from external invasions including artificial skin damage, chemical damage, adventitious viruses, and individuals' immune system. Currently, there are three main typesof skin diseases appearing in human body, including viral skin diseases, fungal skin diseases, and allergic skin disease. Despite the fact that these types of skin diseases canbe cured at present, these diseases indeed have brought trouble to patients' life. Nowadays, the majority of conclusions on the patients' existing symptoms are drawn mainly based on doctors' years of experience or their own subjective judgments, which may lead to misjudgments and consequently delay the treatment of these. Therefore, it is of great theoretical significance and practical value to study how to extract symptoms of diverse skin diseases on the basis of modern science and technology.

PRELIMINARIES :

The main steps of proposed methodology to skin disease recognition are shown in Figure 1. The flow chart contains three phases: (1) processing of the original image; (2) feature extraction; and (3)classification based on SVM.

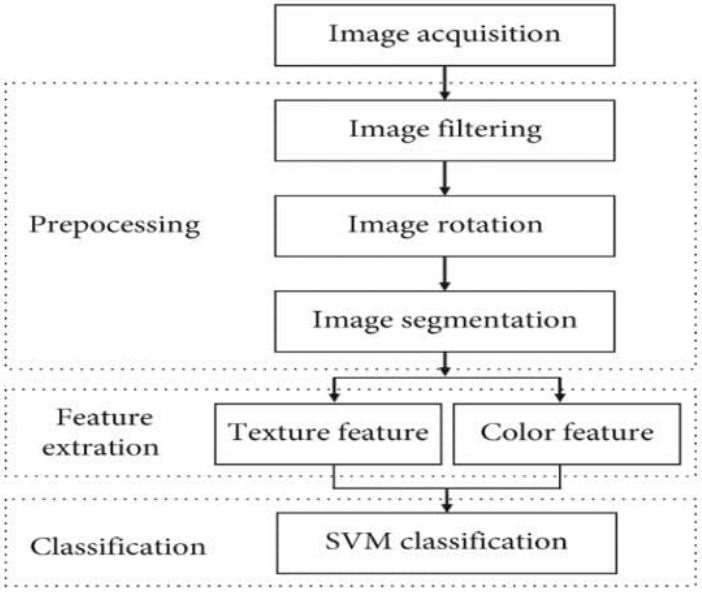


IMAGE PREPOCESSING :

Three common skin diseases are selected in this paper as the main research objects, which are herpes, paederus dermatitis, and psoriasis, respectively. Due to differences in ways of acquiring the source images of skin epidermis and in resolution and size, image preprocessing, computational and mathematical Methods in Medicine. The used formula is as follows;

Firstly, considering that noise constantly exerts a negative impact on acquired samples of skin epidermis's source images, it is necessary to denoise through median filtering for the reduction of the impact on skin segmentation and identification brought by irrelevant background in the images.

$$F'(x_0, y_0) = \left[\underset{(x,y)\in S}{\operatorname{sort}} F(x, y) \right]_{(N+1)/2}, \quad (1)$$

$$N \geq 0,$$

Secondly,denoise

images are rotated in order to get the medical axis to segment the images. The denised skin epidermis's source are processed via neighborhood sampling with the intension of better obtaining the highlight line through the transformation of Euclidean distance.

$$\begin{aligned} \text{width}_{\text{new}} &= 2 \times \left(\left| \left(\frac{\text{width}}{2 \times \cos\,\theta} \right) \right| \right. \\ &\quad \left. + \left| \left(\frac{\text{height}}{2 \times \sin\,\theta} \right) \right| \right), \\ \text{height}_{\text{new}} &= 2 \times \left(\left| \left(\frac{\text{height}}{2 \times \cos\,\theta} \right) \right| \right. \\ &\quad \left. + \left| \left(\frac{\text{width}}{2 \times \sin\,\theta} \right) \right| \right), \end{aligned} \tag{2}$$

The corresponding coordinates of image I and image Ic is as follows:

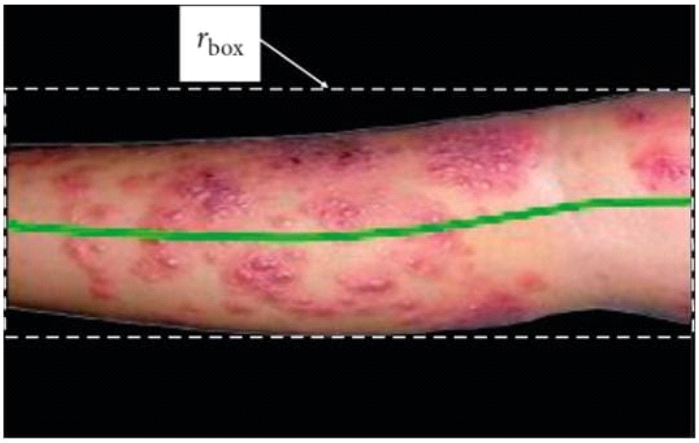
$$\begin{aligned} (x_0 - x_{r1}) &= (x_1 - x_{r2}) \times \cos\,\theta \\ &\quad - (y_1 - y_{r2}) \times \sin\,\theta, \\ (y_0 - y_{r1}) &= (x_1 - x_{r2}) \times \sin\,\theta \\ &\quad - (y_1 - y_{r2}) \times \cos\,\theta, \end{aligned} \tag{3}$$

As a result,the shortest distance from a random point Px,y to calculated through Equation(4).

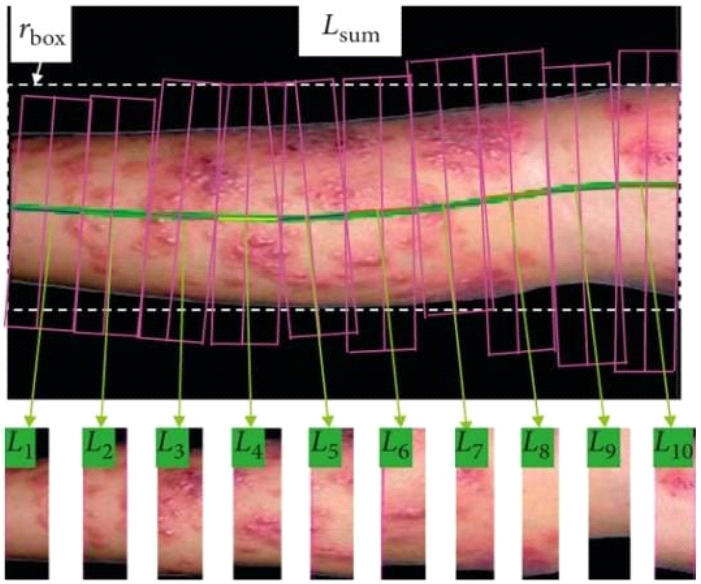
$$d\left(p_{x,y},\ b_{m,n}\right) = \sqrt{(x-m)^2 + (y-n)^2}, \quad (4)$$

IMAGE :

Finally, Medical axis of the segmented region is located and divided into ten vertical segments. It is necessary to create a bounding rectangle rBox on this image Ic in to order to limit the image zone that is dotted with white line.



After the ten vertical segment images are determined, we will deal with these local images to recognize the images L1, L2, . . . , L10 of skin disease.



TEXTURE FEATURE EXTRACTION :

Compared with the traditional way, GLCM is an effective tool to analyze the features of texture. The textures of different diseases in the skin epithelial image can be obtained, such as contrast, correlation, entropy, uniformity, and energy. In this paper, three common skin diseases are selected as the main research objects, which are herpes, paederus dermatitis, and psoriasis,

respectively.

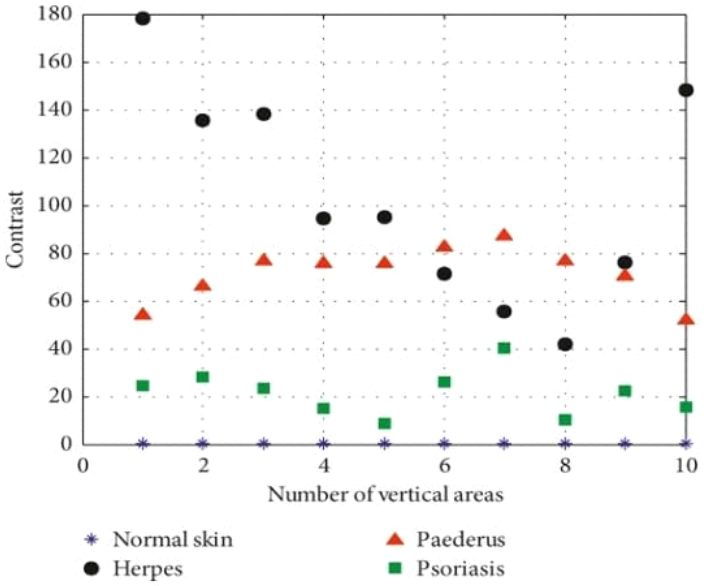
(a)

(a)

(b)

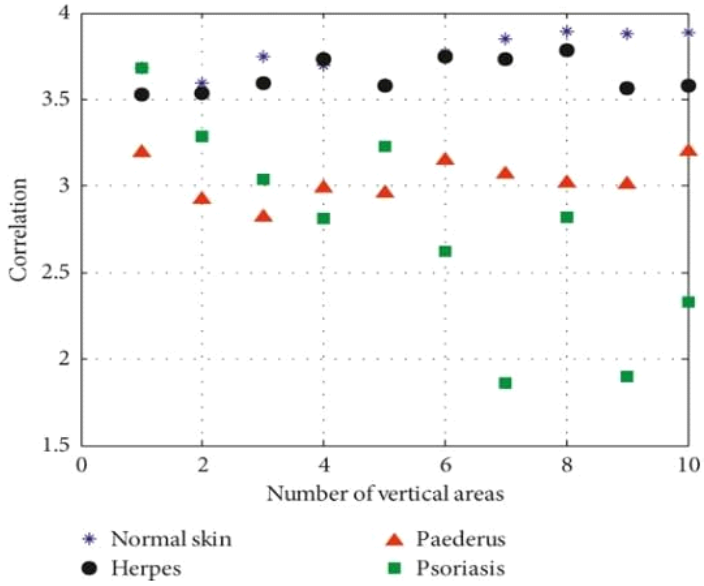
$$A_1 = \sum_{i}^{L-1} \sum_{j}^{L-1} (i-j)^2 G(i,j), \qquad (5)$$

CONTRAST :



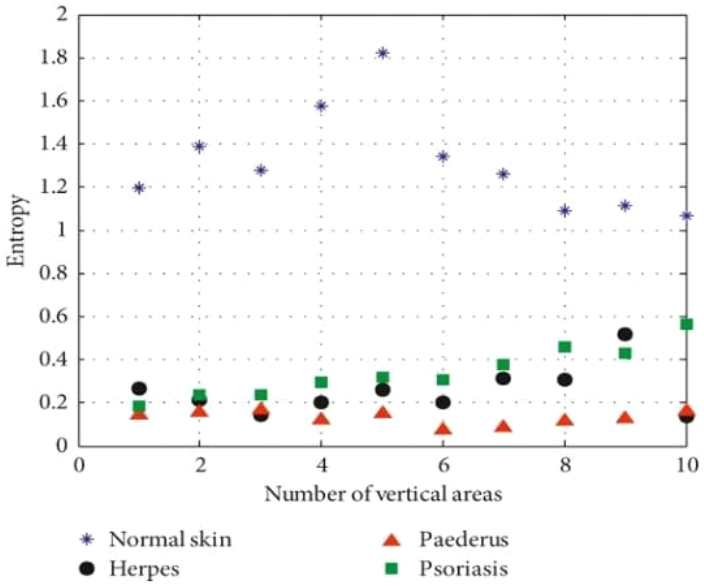
$$A_2 = \frac{\sum_i^{L-1} \sum_j^{L-1} (i - \overline{x})(j - \overline{y}) G(i, j)}{\sigma_x \sigma_y}, \quad (6)$$

CORRELATION :



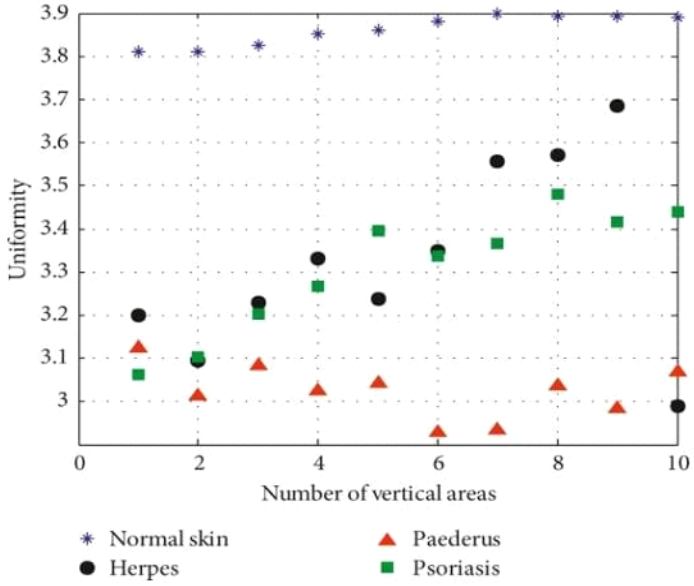
ENTROPY :

$$A_3 = -\sum_{i}^{L-1}\sum_{j}^{L-1}\left[G(i,j)\cdot \log\ G(i,j)\right], \tag{7}$$



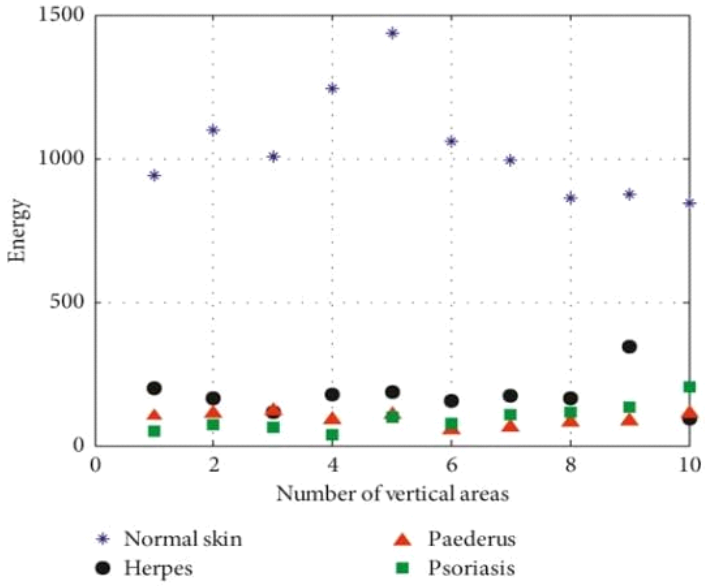
$$A_4 = \sum_{i}^{L-1}\sum_{j}^{L-1}\frac{1}{(i-j)^2+1}G(i,j), \tag{8}$$

UNIFORMITY :



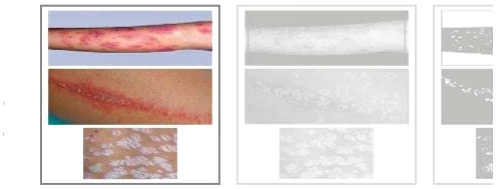
ENERGY :

$$A_5 = \sum_{i}^{L-1} \sum_{j}^{L-1} G^2(i,j), \qquad (9)$$



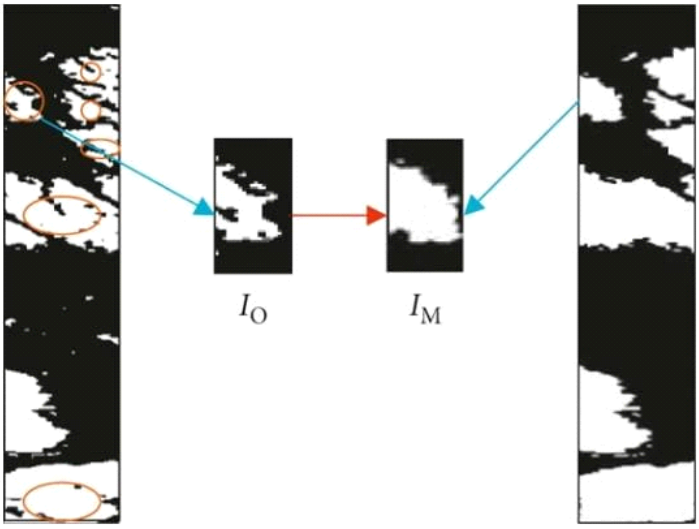
COLOR FEATURE EXTRACTION :

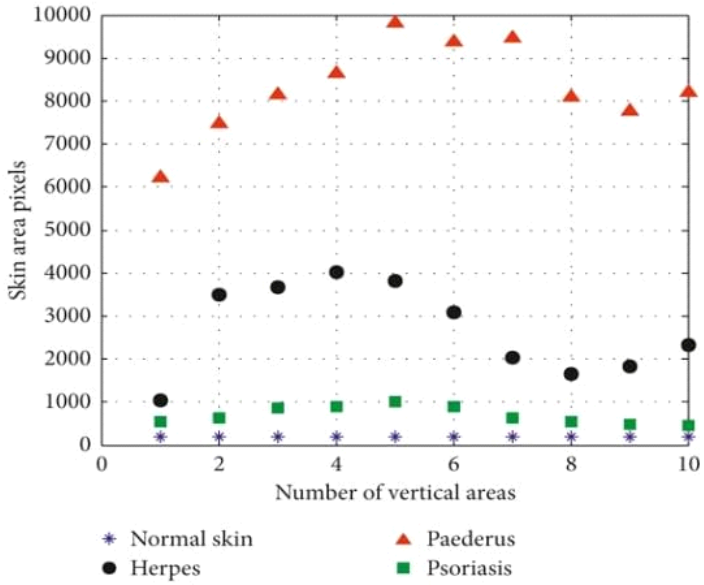
(a)



(a) (b)

The variation of different skin disease can be recognized by means of calculating the pixel area.





CONCLUSION :

The analysis method of vertical image segmentation is employed to identify three common skin diseases. A number of irrelevant variables can be reduced through image filtering, image rotation, and Euclidean distance transformation applied in image preprocessing. Then, the perpendicular line for each point on the main axis can be determined. And, the epithelium can be divided into ten vertical image regions. Based on this, the grey-level co-occurrence matrix is adopted to extract the texture feature, and the area pixel method is applied to extract the characteristics of the lesion area. Finally, the support vector machine is utilized to classify the data of three different skin diseases according to the features of the texture and the lesion area, achieving a more ideal accuracy of recognition. Nevertheless, the paper concentrating on herpes, dermatitis, and psoriasis does not consider the different symptoms caused by the same kind of skin disease. For instance, eczema, herpes, and rubella all belong to the same series. Therefore, it will be the focus of next step to recognize different types of skin diseases of the same kind of series by using image processing technique.