

SKIN DISEASE DETECTION USING COMPUTER VISION AND MACHINE LEARNING TECHNIQUE

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ABSTRACT

Skin types of diseases are most common among the globe, as people get skin disease due to inheritance, environmental factors. In many cases people ignore the impact of skin disease at the early stage. In the existing system, the skin disease are identified using biopsy process which is analyzed and medicinal prescribed manually by the physicians. To overcome this manual inspection and provide promising results in short period of time, we propose a hybrid approach combining computer vision and machine learning techniques. For this the input images would be microscopic images i.e histopathological from which features like color, shape and texture are extracted and given to convolutional neural network (CNN) for classification and disease identification. Our objective of the project is to detect the type of skin disease easily with accuracy and recommend the best and global medical suggestions.

This paper proposes a skin disease detection method based on image processing and machine learning techniques. The patient provides an image of the infected area of the skin as an input to the prototype. Image processing techniques are performed on this image and feature values are extracted and the classifier model predicts the disease. The proposed system is highly beneficial in rural areas where access to dermatologists are limited. For this proposed system, we use Pycharm based python script for experimental results.

Keywords: Computer vision, machine learning, convolutional neural network

1. INTRODUCTION

Skin disease is one of the most common and difficult disease for diagnosis because of its lack of awareness and ignorance. In many developing countries also people consult dermatologist for skin disease and prevention measures. The people are uncertain of the medicinal prescriptions provided by the dermatologist and there is no justification in the current system. Importance of skin disease without ignoring at the early stage is very important as skin plays a major role in protecting the human body against fungal and harmful bacterial infections. Many people get skin disease through their inheritance, job, lack of nutrition, regular habitats, exposed to chemicals etc. Environmental factors also influence the existence of skin disease like climate, summer season, winter season. Thus identifying skin disease and diagnosis at the early stage is very crucial.

Thus to provide feasible and efficient system and due to the emergence of smart phones, image processing based disease analysis is more demandful as this could provide promising results in less time. Utilization of camera technique, the people can provide the input and integration of image processing and machine learning techniques the respective skin disease is identified and diagnosis is recommended. The input analysis are performed using two staged approach to address this problem. The first approach is the image processing technique and second approach is the machine learning technique to train the model. This trained model is kept on training to predict different types of skin diseases. As the characteristics and

features of different skin disease are different, the machine algorithm needs to be trained for efficient prediction [1].

Skin disease are mostly ignored and provided less importance at the early stages. Some ignorance among people might lead to skin cancer. In existing approach, the increased skin disease are identified at the later stage using biopsy only. The inspection is performed manually by considering many histopathological features. Thus this process is performed manually which can lead to human errors and takes 1-2 days for providing the biopsy results. Also the physician find it difficult to identify the type of skin disease and the stage of disease at the analysis stage. Thus making the medicine prescription difficult. This concern can be addressed by usage of machine learning and deep learning techniques by analyzing the microscope image. This proposed machine learning based approach can be an effective tool to identify the clinical data and provide the results in a short period of time. This approach can provide a promising results by combining computer vision and machine learning techniques [2].

The identification of skin disease from the microscope images are provided to image processing model. Pre-processing, feature extraction are performed in the image processing stage. In the image processing model, color, texture and share of the features are extracted and analyzed. Then processed to the classifier model. This classifier model predicts whether its normal, benign and malignant skin type of diseases.

2. RELATED WORKS

[3] In this paper, the authors proposed a model to use medical imaging to detect skin lesion in input skin images. They used methodology to create a prototype system to detect skin disease. The objective of this project is to identify skin lesion based on the input skin images texture analysis based on thresholding and neural network to detect and diagnose skin disease.

[4] In this research paper, the input images obtained from the user is processed to predict skin disease presence or absence from a new input image. The input image of a user would be obtained using android application. In this system, the application would ask the user with many questions and disease type is predicted using the end user answers. At last the proposed system, suggests medicinal descriptions, surgery and medicinal drug based on the skin disease trained model. Skin diseases like Eczema, Fungal infection and Urticaria are been analyzed in this project. This question and answer based application doesn't provide promising results every time.

[5] This research paper predicts different types of skin diseases in which user can take the skin photo images and provide into the system which could process and provide variety of skin disease absence or presence. This proposed system used matlab tool for identifying different type if skin diseases like normal, melanoma, psoriasis or dermo case based on the extracted image features. This system would provide an alert to the nearby medical team if any abnormality is detected. This methodology suffers from the issues with segmentation issue thus making classification model less accuracy[7].

[6] This paper briefs importance of skin disease as skin diseases are most common now a days as skin allergies are keep on increasing because of the environmental changes. In this paper, both image processing and data mining techniques has been proposed. Experimental results are performed using matlab tool. The input images are obtained from the dataset.

3. METHODOLOGY

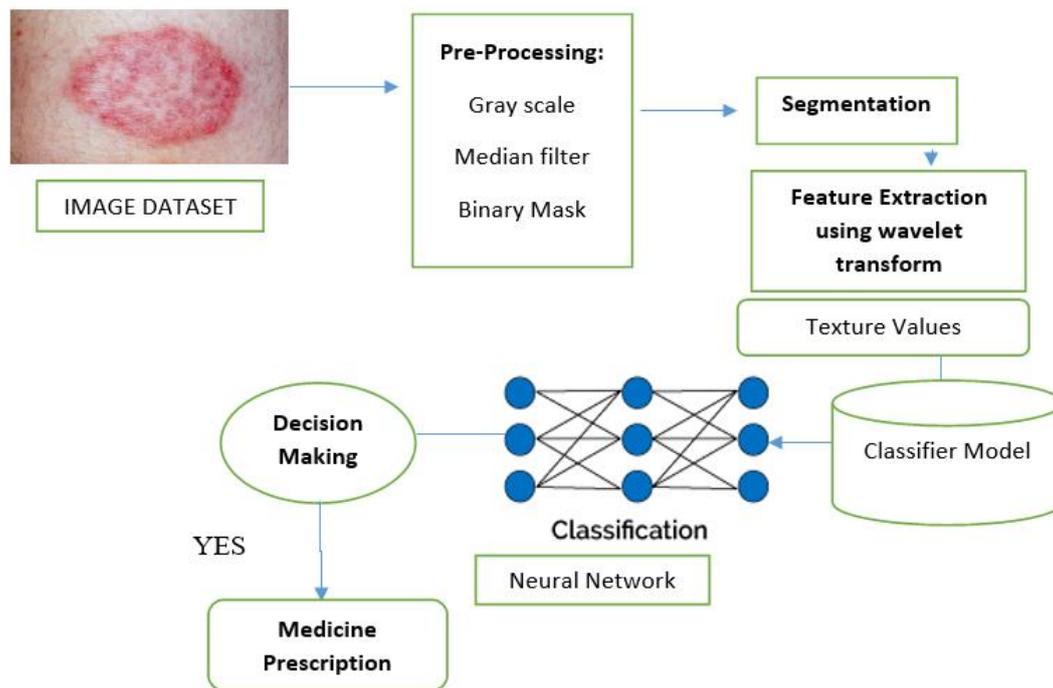


Fig 1. Methodology

Fig 1 explains the overall experimental approach for skin disease detection using image processing and computer vision techniques. In this the skin images are given into the system for processing. The input image is subjected to image processing process like pre-processing, feature extraction and machine learning based classifier to predict skin disease or not and recommend medicinal guidance based on the skin disease stage.

The Proposed methodology is an effective tool which can analyze the people input skin disease to predict skin disease. In this proposed system, hybrid architecture with image processing and machine learning techniques are used to predict type of disease with promising accuracy in a short period of time. The image processing phase invokes preprocessing, segmentation, feature extraction steps. The machine learning phase invokes 3 steps: processing, training and detection steps. The proposed system uses 2D Wavelet Transform algorithm for feature extraction in which color, texture and shape features are extracted from the skin input images. The correlation values are also been extracted from the input image. These values are passed onto classifier model. For classification the proposed system uses convolutional neural network (CNN). The classifier model detects common skin diseases like Psoriasis, Lichen Planus, Pityriasis Rosea. Integration of neural network provides good accuracy results. The proposed system act as a Common knowledge base for skin disease detection and medicinal prescription. This proposed system analyses different type of skin disease can be analyzed saving user time and cost. For this proposed system, we use Pycharm based python script for experimental results.

4. EXPERIMENTS AND RESULTS

Fig 2 explains that in the proposed system accepts user input images by developing an UI through which the user can provide the respective skin images for analysis. The UI is developed using HTML.

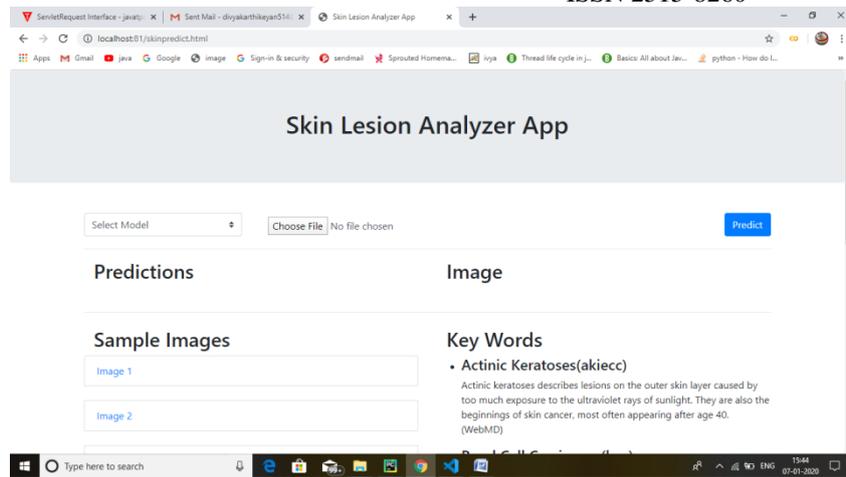


Fig 2. Input image for proposed model

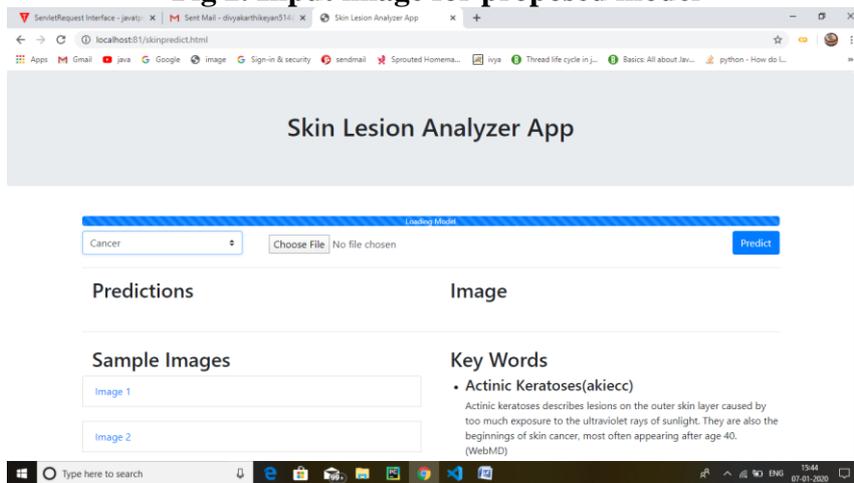


Fig 3. Image processing and machine learning algorithm is performed at the backend.

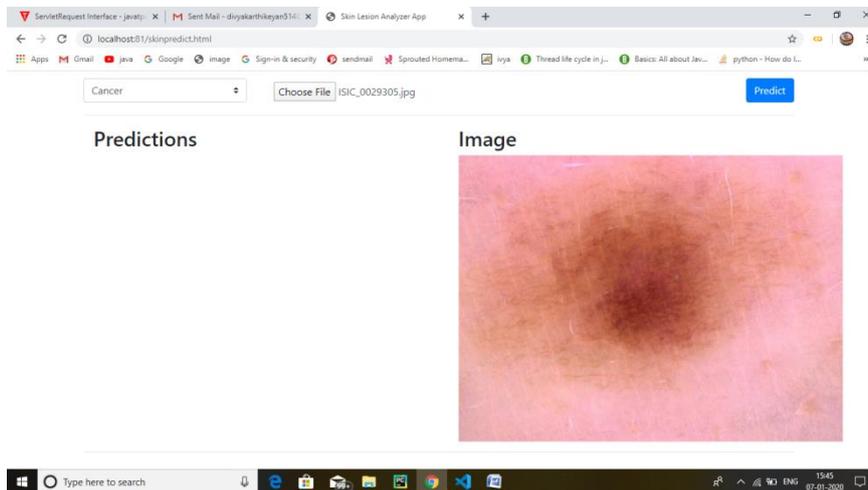


Fig 4. After processing, the image is displayed.

Fig 4 explains the user has provided the skin image input and pre-processing steps are performed on the input images and after pre-processing steps like image enhancement, edging the processed image is shown in fig 4.

Fig 5 briefs the input image is subjected to feature extraction and machine learning based classifier trained at the backend and based on the input image provided by the user, feature extraction and classifier steps are performed. Finally the prediction along with medicinal recommendation is suggested.

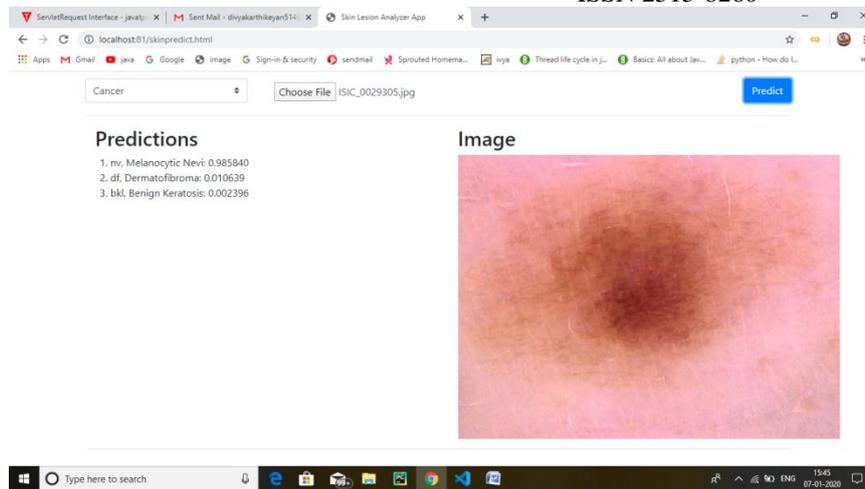


Fig 5. Skin type of disease is predicted

5. CONCLUSION

The proposed system is able to detect the skin disease with promising results combining computer vision and machine learning techniques. It can be used to help people from all over the world and can be used in doing some productive work. The tools used are free to use and are available for the user, hence, the system can be deployed free of cost. The application developed is light-weight and can be used in machines with low system specifications. It has also a simple user interface for the convenience of the user. The image processing and machine learning algorithms were successfully implemented.

6. REFERENCES

- [1] Damilola A. Okuboyejo, Oludayo O. Olugbara, and Solomon A. Odunaike, "Automating Skin Disease Diagnosis Using Image Classification," Proceedings of the World Congress on Engineering and Computer Science 2013 Vol II, WCECS 2013, 23-25 October, 2013, San Francisco, USA.
- [2] R. Yasir, M. A. Rahman and N. Ahmed, "Dermatological disease detection using image processing and artificial neural network," 8th International Conference on Electrical and Computer Engineering, Dhaka, 2014, pp. 687-690, doi: 10.1109/ICECE.2014.7026918.
- [3] Ambad, Pravin S., and A. S. Shirat, "A Image Analysis System to Detect Skin Diseases," IOSR Journal of VLSI and Signal Processing (IOSR-JVSP), Volume 6, Issue 5, Ver. I (Sep. - Oct. 2016), PP 17-25.
- [4] R S Gound, Priyanka S Gadre, Jyoti B Gaikwad and Priyanka K Wagh, "Skin Disease Diagnosis System using Image Processing and Data Mining," International Journal of Computer Applications 179(16):38-40, January 2018.
- [5] V. B. Kumar, S. S. Kumar and V. Saboo, "Dermatological disease detection using image processing and machine learning," 2016 Third International Conference on Artificial Intelligence and Pattern Recognition (AIPR), Lodz, 2016, pp. 1-6, doi: 10.1109/ICAIPR.2016.7585217.
- [6] M. Shamsul Arifin, M. Golam Kibria, A. Firoze, M. Ashraful Amini and Hong Yan, "Dermatological disease diagnosis using color-skin images," 2012 International Conference on Machine Learning and Cybernetics, Xian, 2012, pp. 1675-1680, doi: 10.1109/ICMLC.2012.6359626.
- [7] Raja, K.S., Kiruthika, U. An Energy Efficient Method for Secure and Reliable Data Transmission in Wireless Body Area Networks Using RelAODV. Wireless Pers Commun 83, 2975–2997 (2015). <https://doi.org/10.1007/s11277-015-2577-x>