A Synopsis on

Automated Skin Lesion Analyzer

Submitted in partial fulfillment of the requirements
of the degree of

Bachelor of Engineering

in

Information Technology

by

Hrithik Prasad (18104038)
Aslam Pathan (18104057)
Zubair Mangral (17104072)

Under The Guidance of

Prof. Ganesh Gourshete
Prof. Vidya shet

Department of Branch Name
A.P. Shah Institute of Technology
G.B.Road,Kasarvadavli, Thane(W), Mumbai-400615
UNIVERSITY OF MUMBAI
2019-2020

CERTIFICATE

This is to certify that the project Synopsis entitled ***"Automated Skin Lesion Analyzer"*** Submitted by ***"Hrithik Prasad (18104038),Aslam Pathan (18104057),Zubair Mangral (17104072)"*** for the partial fulfillment of the requirement for award of a degree ***Bachelor of Engineering*** in ***Information Technology*** to the University of Mumbai,is a bonafide work carried out during academic year 2021-22

(Prof. Vidya Shet)
Co-Guide

(Prof. Ganesh Gourshete)
Guide

Prof. Kiran Deshpande
Head Department of Information Technology

Dr. Uttam D.Kolekar
Principal

External Examiner(s)

1.

2.

Place:A.P.Shah Institute of Technology, Thane
Date:

Declaration

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

_____

(Hrithik Prasad 18104038)

_____

(Aslam Pathan 18104057)

_____

(Zubair Mangral 17104072)

Date: 20/10/2021

Abstract

Dermatology is one of the most unpredictable and difficult terrains to diagnose due its complexity. In the field of dermatology, many a times extensive tests are to be carried out so as to decide upon the skin condition the patient may be facing. The time may vary from practitioner to practitioner. This is also based on the experience of that person too. So, there is a need of a system which can diagnose the skin diseases without any of these constraints.We propose an automated image based system for recognition of skin diseases using machine learning classification.This system will utilize computational technique to analyze, process, and relegate the image data predicated on various features of the images. Skin images are filtered to remove unwanted noise and also process it for enhancement of the image. Feature extraction using complex techniques such as Convolutional Neural Network (CNN), classify the image based on the algorithm of softmax classifier and obtain the diagnosis report as an output. This system will give more accuracy and will generate results faster than the traditional method, making this application an efficient and dependable system for dermatological disease detection.

Introduction

Our proposed system for this project is to use a deep learning architecture which is more suitable for mobile and embedded based vision applications where there is lack of computation power and then convert the whole model into tensorflow.js format to deploy in the production environment so that users can access the end product any where around the world.

Our application also considers user's privacy concerns as our model runs locally and any data that user submits never leaves his mobile or personal computer.Diagnosis of skin diseases is a problem on which research is going on since last 5-10 years. People have tried so many approaches to solve this problem.

This problem using image processing techniques by feature extraction and segmentation.since this is method is related to fine tuning it is not so reliable process to detect skin diseases as the relation between skin and its diseases can not be catched with fine tuned models. Using 3 layer neural network model which takes inputs as colour, area, shape and other hard typed properties. which also need human assistance to get reliable inputs so this lacks for complete automated system for diagnosis

Objectives

We have identified following as our objectives:

- To classify three types of cancer like melanoma, Basal-skin, Squamous-skin cell using CNN
- To implement a deep learning model that predicts with high accuracy.
- To design a model that reduces human efforts, cost and time.

Literature Review

In literature [1] The author Initially the images are preprocessed and converted to a standard size (120X120). In order to have a large number of images in the dataset, the images are rotated in all the directions(each differing by 90 degrees) and also flipped. Then the image is given as an input to the first layer of the network. Then as shown above, Convolutional Neural Network is applied onto it until high-level features such as border, edge and colour are obtained from it. This is done with the help of the different operations of the ConvNet such as Convolution, Max Pooling,etc till the image flattens out into a image vector. These are the vectors with which classification can be done as these vectors contain the information leading to the determination of high level features. The initial batch size is taken to be 20 while epoch size is taken to be 25. After feature extraction model is saved into the dataset. This data gets updated after each epoch. After the model is trained, test images are used in order to check the results

In literature [2], the author focuses on Deep learning algorithm that includes convolutional neural network and residual network and to minimize the loss function of algorithm with respect to time we have used adaptive learning strategy so that w can obtain global minima of the loss function in comparatively less time

In literarture [3] the author focuses on 1.Computational technique to analyse, process, and relegate the image data 2.Skin images are filtered to remove unwanted noise. 3.Feature extraction using CNN 4.Classify the image based on the algorithm of softmax classifier and obtain the diagnosis report as an output

In literature [4] The authors acquire skin lesion images from affected people and classify skin disease with a 95 percent accuracy. But our application is only limited to 6 skin diseases and we have worked on only 5000 images for each disease so this may have bad prediction accuracy after few years. We have only used single architecture for this model as we are limited from limitation power. In future this can be enhanced with ensembling of various machine learning models with much more skin disease classes and vast data

Problem Definition

- Complexity in skin disease detection in rural area.
- Lack of knowledge about dangerous skin disease.
- Time requirement to visit dermatologist.

Proposed System Architecture/Working

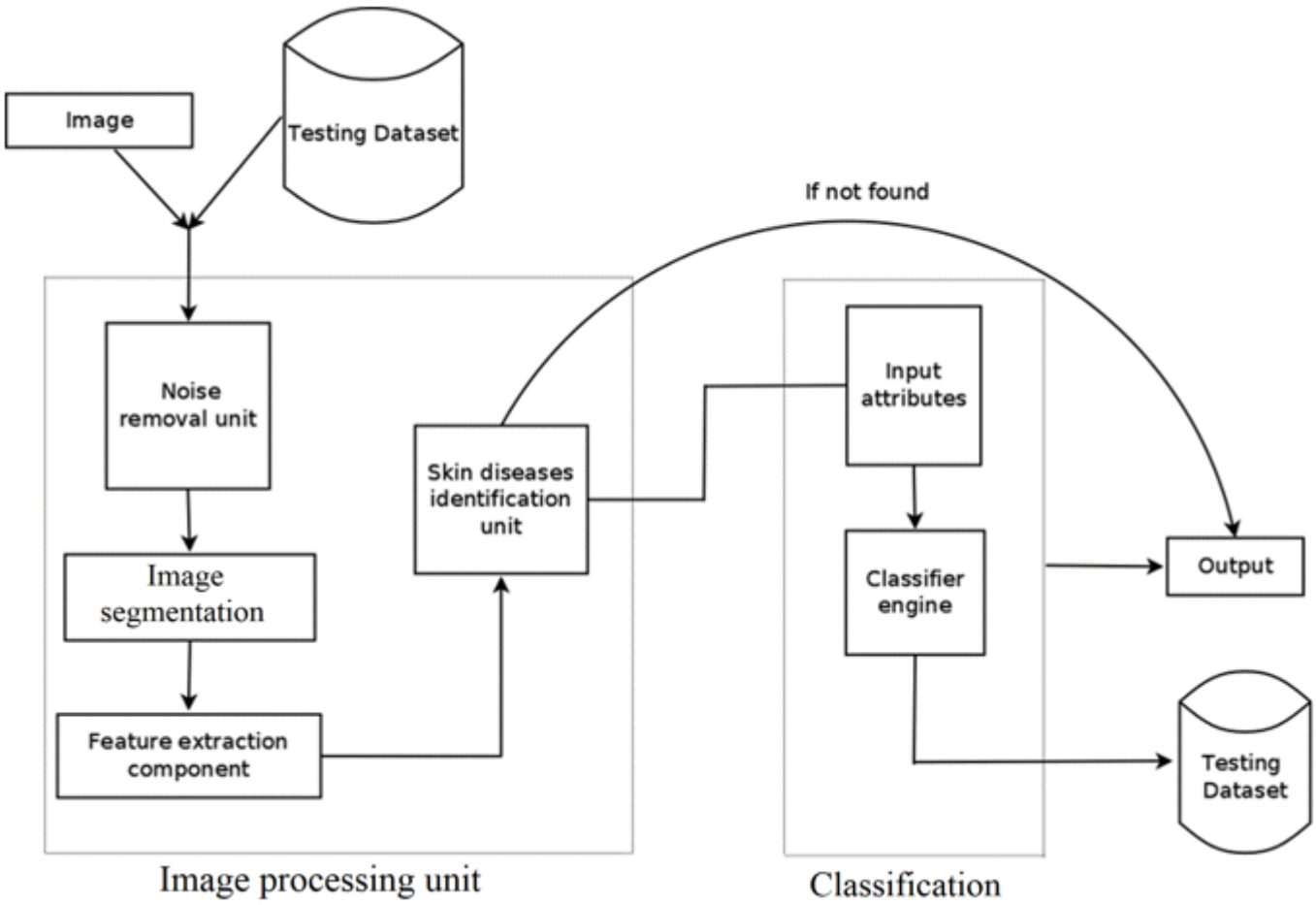

Figure 1: System Architecture

Design and Implementation

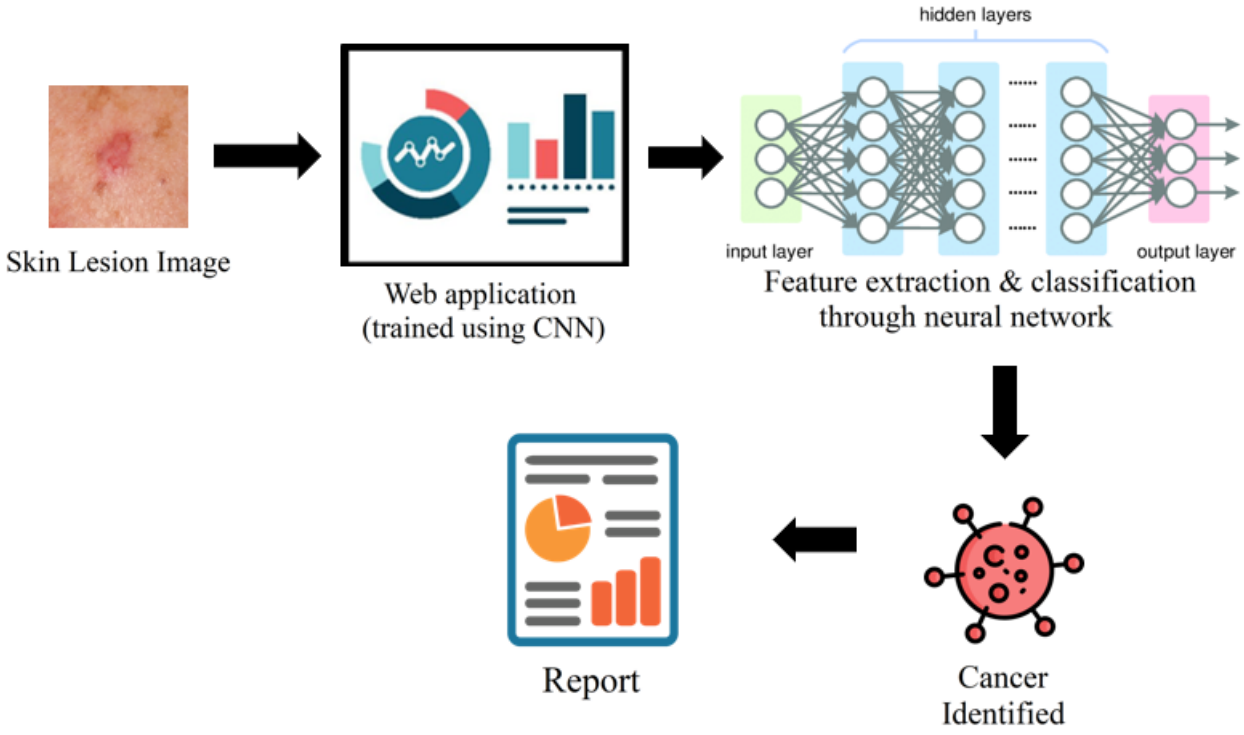

Figure 2: Detection System

- The user will upload image through web application.The noise in the image will be removed by the bilateral blur which is in the OpenCV libraray.
- Image segmentation will be done by U-net architecture.which is an arrangement of deep learning tools like convolution layer,maxpooling etc.
- Image segmentation and feature extraction we will be oure CNN model.
- As we have 7 type of disease it will go through dense layer and softmax for further classification.

Summary

To, Summarize,We proposed system for this project is to use a deep learning architecture which is more suitable for mobile and embedded based vision applications where there is lack of computation power and then convert the whole model into tensorflow.js format to deploy in the production environment so that users can access the end product any where around the world. Our application also considers user's privacy concerns as our model runs locally and any data that user submits never leaves his mobile or personal computer.

References

[1] Cristiano Andre da Costa Andr ´ e Henrique Mayer. ´ Electronic health records in a Blockchain: A systematic review - Andre Henrique Mayer, Cristiano ´ Andre da Costa, Rodrigo da Rosa Righi, 2020 ´ . URL: https : / / journals . sagepub . com / doi / full / 10 . 1177 / 1460458219866350.

[2] Suveen Angraal, Harlan M. Krumholz, and Wade L. Schulz. "Blockchain Technology". In: Circulation: Cardiovascular Quality and Outcomes 10.9 (2017), e003800. DOI: 10 . 1161 / CIRCOUTCOMES . 117 . 003800. URL: https:// www. ahajournals.

[3] Gaby G. Dagher et al. "Ancile: Privacy-preserving framework for access control and interoperability of electronic health records using blockchain technology". In: Sustainable Cities and Society 39 (2018), pp. 283– 297. ISSN: 2210-6707. DOI: https://doi.org/10.1016/j. scs.2018.02.014. URL: https://www.sciencedirect.com/ science/article/pii/S2210670717310685.

[4] T. K. Dasaklis, F. Casino, and C. Patsakis. "Blockchain Meets Smart Health: Towards Next Generation Healthcare Services". In: 2018 9th International Conference on Information, Intelligence, Systems and Applications (IISA). 2018

[5] H. Guo et al. "Access Control for Electronic Health Records with Hybrid Blockchain-Edge Architecture". In: 2019 IEEE International Conference on Blockchain (Blockchain). 2019, pp. 44–51. DOI: 10 . 1109 / Blockchain.2019.00015.

[6] Dinh C. Nguyen et al. "Blockchain for Secure EHRs Sharing of Mobile Cloud Based E-Health Systems". In: IEEE Access 7 (2019), pp. 66792–66806. DOI: 10.1109/ access.2019.2917555.

[7] K. Rabah. "Challenges Opportunities for Blockchain Powered Healthcare Systems: A Review". In: (2017).

1 Publication

Paper entitled **“Automated Skin Lesion Analyzer”** is presented at **“ICPCSN 2022 ”** by **“Hrithik Prasad,Aslam Pathan,Zubair Mangral ”.**