SKIN CANCER DETECTION

A MINI PROJECT REPORT

18CSC305J ARTIFICIAL INTELLIGENCE

Submitted by

Sanjay Krishnakumar[RA2011026010273]
Urvi Hirani[RA2011026010293]
Varsha S[RA2011026010286]

Under the guidance of
Dr.U.Sakthi
Assistant Professor, Department of Computer Science and Engineering

in partial satisfaction of the requirements for the degree of

BACHELOR OF TECHNOLOGY
in
COMPUTER SCIENCE ENGINEERING
with specialization in Artificial Intelligence & Machine Learning

SCHOOL OF COMPUTING

COLLEGE OF ENGINEERING AND TECHNOLOGY
SRM INSTITUTE OF SCIENCE AND TECHNOLOGY
KATTANKULATHUR - 603203

MAY 2023

SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

(Under Section 3 of UGC Act, 1956)

BONAFIDE CERTIFICATE

Certified that Mini project report titled **"Skin Cancer Detection"** is the bona fide work of **Sanjay Krishnakumar(RA2011026010273),Urvi Hirani(RA2011026010293),Varsha S(RA2011026010286)** who carried out the minor project under my supervision. Certified further, that to the best of my knowledge, the work reported herein does not form any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

SIGNATURE
Faculty In-Charge
Dr.U.Sakthi
Assistant Professor
Department of Networking and Communications
SRM Institute of Science and Technology
Kattankulathur Campus, Chennai

HEAD OF THE DEPARTMENT
Dr. R Annie Uthra
Professor and Head
Department of Computational Intelligence,
SRM Institute of Science and Technology
Kattankulathur Campus, Chennai

ABSTRACT

Now a day's skin cancer is a major problem human beings are facing, To recognize skin cancer new methodology for the diagnosing skin cancer by images of dermatologic spots using image processing presented. Currently in skin cancer one the most frequent diseases humans. This methodology based Fourier spectral analysis using filters such classic, inverse and to k-law nonlinear. The sample images are obtained by a specialist as an replacement spectral to technique is developed and quantitative measurement in the complex pattern found cancerous skin spots. Finally in which spectral index calculated get a variety spectral indices defined carcinoma . Our results show confidence of level in 95.4%. carcinoma mainly occurs thanks to exposure ofsunlight. Ozone is depletion and maintained chemical exposures in other factors involved precipitating carcinoma . Mutations of p53 gene involved UV- induced as carcinogenesis. P53 gene acts vital development in SCC.

Skin Cancer alarming is disease for mankind , the need early diagnosis the skin cancer are increased due to the rapid climb rate of Melanoma skin cancer , its high treatment Costs , and death rate. The cancer cells are detected manually and it takes time to cure in most of the cases. This project proposed a man-made carcinoma detection system using image Processing and machine learning method. The features of the affected skin cells are extracted after the segmetation of the pictures using feature extraction technique. A deep learning based method Convolutional neural network classifier is employed for the stratification of the extracted features..

Skin Cancer is an alerting issue and it must be detected as early as possible. The diagnostic is a manual process that is time consuming as well as expensive. But, today's world science has become advanced by using machine learning make easy detecting cancerous cells to the machine learning specially convolution neural network is employed to detect cancerous cell more in quickly , and to efficiently.

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LIST OF ABBREVIATIONS

CNN	Convolutional Neural Network
GLCM	Gray Level Co-occurrence Matrix
FFNN	Feed Forward Neural Network

INTRODUCTION

Cancer forms when healthy cells in change in and grow out control, forming an the called a the tumor. A tumor can cancerous r benign. A cancerous tumor is malignant, meaning that grow and spread over other parts of the body. As there bengun as a tumour means that tumor can be grow but won't spread.

Doctors diagnose carcinoma additional than 3 million Americans annually , making in foremost common sort of cancer. If carcinoma is found early, it can usually be treated with topical medications, procedures wiped out offic a dermatologist, or outpatient surgery. A dermatologist may doctor who focuses diseases and conditions of the skin. As an result, carcinoma is liable for but 1% all cancer deaths.

In some cases, carcinoma could also more advanced in need management to a multidisciplinary team to always a dermatologist, surgical and oncologist, radiation oncologist, and to a medical oncologist. These are in doctors meet there patient, and together they're going recommend the simplest path forward treat cancer. In such \\ instances, the surgical oncologist will recommenda surgery be performed operating room because the procedure treat the cancer too extensive for an office setting.

LITERATURE SURVEY

S.NO	PAPER TITLE	AUTHOR NAME	PUBLICATION DETAILS	ISSUES ADRESSED
1	Face Recognitio n	**Ahmad Tolba Ali El-Baz Ahmed A El-Harby**	January 2005	FACE RECOGNITION
2	Skin Disease Recognition Method Based on Image Color and Texture Features	**John Mitchell**	Received10 Apr 2018 Article ID 8145713	Disease recognition
3	Methodolog y for diagnosing of skin cancer in images of dermatologic sports by spectral analysis	**Josué Álvarez - Borrego**	DOI: 10.1364/BOE.6.003876	Diagnosing skin cancer
4	A REVIEW ON SKIN CANCER	**S. Ramya Silpa V. Chidvila**	DOI: 10.7897/2230-8407.04814	Review of skin cancer
5	Public Opinion Polls	**Rachel Macreadie**	July 2011 DOI: 10.13140/2.1.2546.4646 Affiliation: Parliament of Victoria	POLLS
6	Opinion research	**Paul J. Lavrakas**	2008 Encyclopedia in of Survey such Research Methods	public opinion

2.1 EXISTING SYSTEM

This project may be a method for the detection of Melanoma carcinoma using the Imageas processing tools.

In this input the system is skin lesion image then applying in image processingtechniques, it analyses conclude about the presence of carcinoma .

The Lesion is Image to analysis tools checks as varied Melanoma in parameters, Color,Area perimeter, diameter to texture, size to shape analysis for image segmentationand the feature stages.

The extracted feature parameters that are wont to classify image as Non Melanoma andalso Melanoma cancer lesion.

2.2 PROPOSED SYSTEM

- This project may be a method for the detection of Melanoma carcinoma using Imageprocessing tools.
- In this input the system is that skin lesion image then applying image processingtechniques, it analyses conclude about the presence carcinoma .
- In Lession to Image analysis tools checks in the varied Melanoma parameters, Color, Areaperimeter, diameter etc texture, size and shape analysis for image segmentation and the feature stages.
- The extracted to feature parameters wont of classify the image as Non Melanoma andMelanoma cancer lesion. Through poll we are getting to collect patient after treatment.

METHODOLOGY

3.1 DATA COLLECTION

- Dataset used for this are extracted from kaggle towards skin cancer Detection .
- It consists of 10000 images of skin cancer.
- The training data consists of 8000 images and testing data consists of 2000 images.

Fig 3.1 IMAGES OF SKIN CANCER DATASET

3.2 IMAGE PREPROCESSING :

Image preprocessing is done by using OPEN CV and NUMPY

3.2.1 OpenCV :

- OpenCV-Python library of Python bindings in designed unravel computer vision problems.
- OpenCV-Python makes use Num py, by which may highly

  optimized library numericaloperations a MATLAB-style syntax.
- All tin Open CV array are structures converted a and from Num py arrays.
- This also makes it easier to integrate other a libraries is that use Num py SciPy andMatplotlib.
- OpenCV to be capable image analysis and processing.

3.2.2 NumPy :

Import- numpy :as np

- NumPy, that stands Numerical Python, be a library consisting of multi_dimensional as arrayobjects and set a routines for processing those arrays.
- Using as Num Py, mathematical and logical on operations are arrays in often performed.
- The array object in NumPy is named ndarray, it provides tons of supporting functions thatmake working with nedarray very easy.
- NumPy is an open-source numerical Python library. Num Py a extension o Numeric and Numarray.
- Num py contains random number generators. NumPy may wrapper

around libraryimplemented in C.

- Pandas is objects reply heavily NumPy objects. Essentially, Pandas extends Numpy.

3.3 IMAGE SEGMENTATION & FEATURE EXTRACTION :

Image segmentation is a process of dividing image into regions or categories. In the dermoscopic images two types of fabric things first normal skin and second is lesion area so here we have donesegmentation with Otsu thresholding technique. Using Texture-Based segmentation extracting the features from the image. GLCM (Gray Level Co-occurrence Matrix) is the statistical method examining the spatial relationship between the pixel. This technique works by creating the co- occurrence matrix were to calculate the frequency of occurrence of a pixel with the grey-level value is adjacent to a pixel with grey-level value j in any given direction and selected separating distance The GLCM matrix gives four statistics Correlation, Contrast, Energy, Homogeneity. There some problem in segmentation of dermoscopic images due to the contrast of images like under segmentation and over-segmentation so we are concentrating on segmentation based on texture features.

3.4 IMAGE CLASSIFICATION :

Deep learning is one of the best techniques for image classification. Based on the texture featureswe are training the dataset for classification. Here first we are giving Extracted feature to the Neural network for checking performance of image classification then we are using CNN (Convolutional Neural Network) it is one of the deep learning techniques for classification, Dermoscopic images classification is done in 7 classes .Melanocytic nevi','Melanoma','Benign keratosis','Basal cell carcinoma', 'Actinic keratoses', 'Vascular lesions', ' Dermatofibroma ' it is done by using automated extracted features by CNN images. In this step, we are passing Preprocess Images to the CNN classification.

MODULES

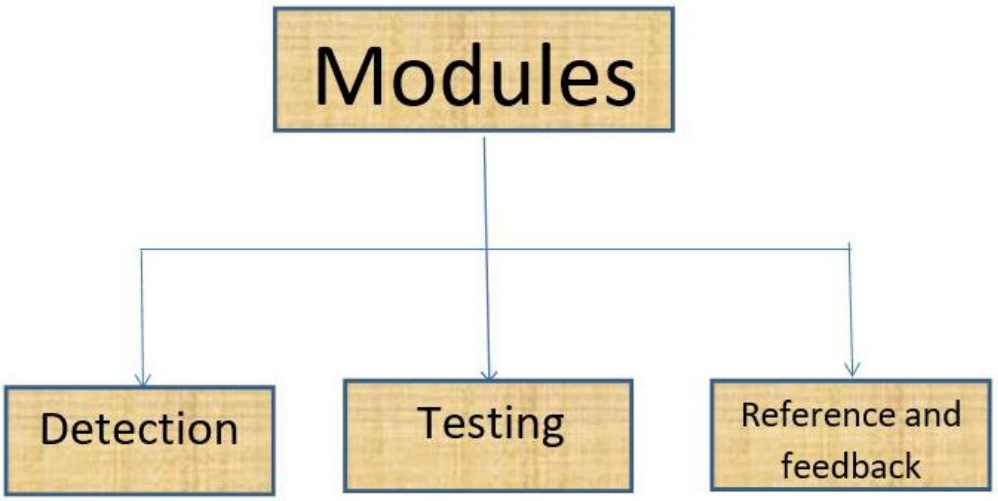


Fig 6 Modules

We have 3 modules in Skin Cancer Detection . They are :-

- Detection
- Testing
- Reference & Feedback

5.1 DETECTION :

Detection module used them detect the image of skin cancer. In this we detect images from skincancer by using " FEED FORWARD NEURAL NETWORK ALGORITHM " .

- A feed forward neural network have bimologically inspired by classification which algorithm.It consist of number of simple to neuron-like as processing in units, organized layers. Every unit in a layer connected with in the units in the previous layer. This is they
  are called feedforward neural networks.

- The feed forward neural network is the in first and simplest type of artificial neural network devised. In the network, the information in one direction—forward—from a input nodes, through the hidden to nodes and to the output nodes. There non cycles in loops inthe network.

- Two basic feed-forward neural networks (FFNNs) created using TensorFlow in deep learninglibrary in Python.

- Steps required build an simple feed-forward neural network to Tenso r Flow by explaining each step details. For before actual building an neural network, some preliminary steps recommended to discussed.

The summarized steps are as follows:

1. Reading the training data (inputs and outputs)
2. Building to connect an neural networks layers
3. Building a loss function to assess the prediction error
4. Create the training loop for training network and updating parameters
5. Applying some testing data to assess the network prediction accuracy

This module briefly introduces the core concepts employed in modern convolutional neural networks, with an emphasis on methods that have been proven to be effective for tasks such as object detection and semantic segmentation. Basic network architectures, common components and helpful tools for constructing and training networks are described.

5.2 TESTING :

Testing module is used to test and predict the image of skin cancer. For testing we used “ Evaluation function from keras “ .

- Evaluation a is process during development to the model check whether this model fit for given problem and corresponding data.

- Keras provides a function, evaluate which does evaluation of the model.

- There are three main arguments,

1. Test data

2. Test data label

3. verbose - true r false

Keras separate an portion of your training data to validation of dataset and evaluate that performance of your model on validation dataset to each epoch. You can do this by setting the validation_split argument on the fit() function to a percentage of the size of your training dataset .

5.3 REFERNCE & FEEDBACK *:*

We have used an website named as 'AidaForm' for creating feedback form.

- This helps to create an form and generates an hyperlink so that we can send it to our customersvia mail or we can directly paste in our website.
- AidaForm let do that is a blank template in we the add form elements with as simple ondrag-and-drop in motions. Plan with in out what to evaluate and fill custom.
- Review response in the summaries as if statistics with average to ratings in frequently yeschosen to options gain why insights and improve.
- Export responses to data sheets of Excel for deeper evaluation and there feedback dataefficiently.

SYSTEM ARCHITECTURE

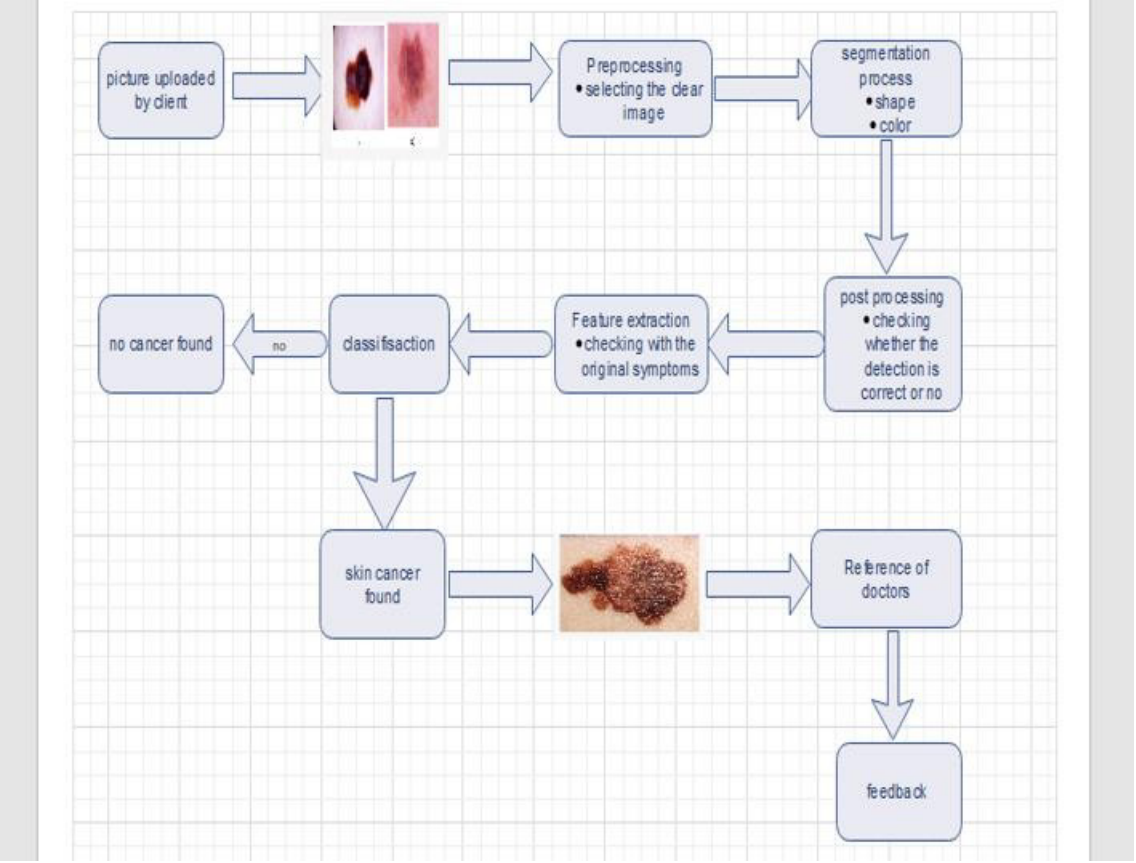
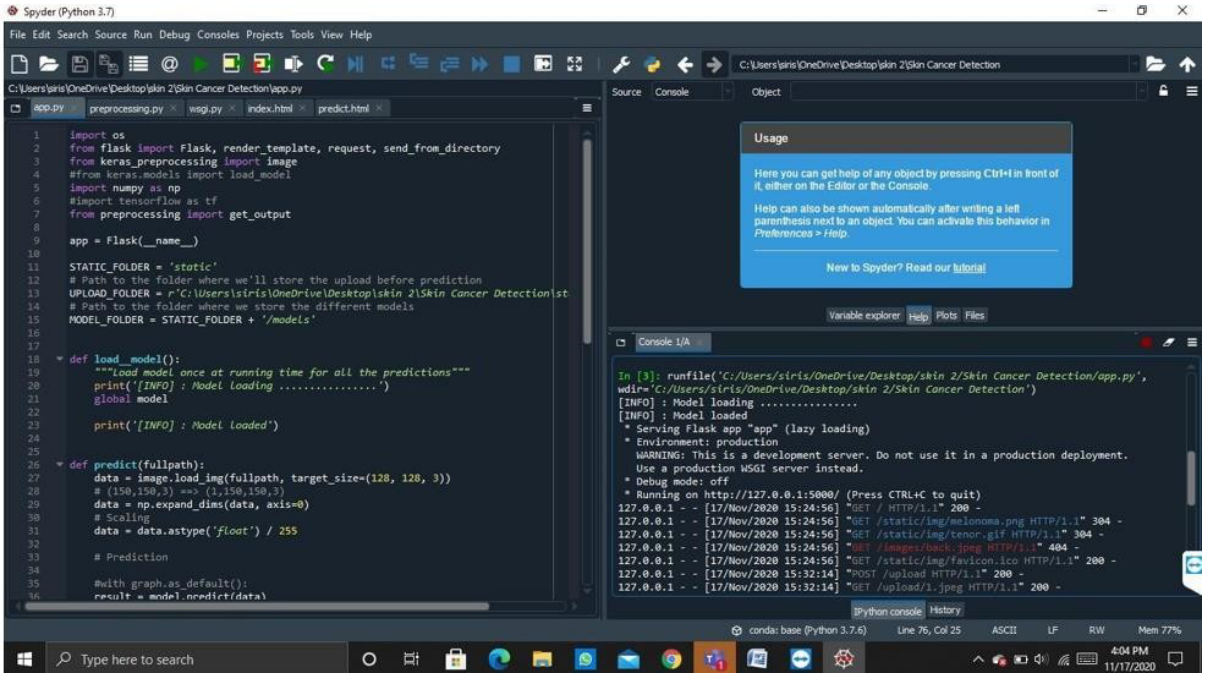
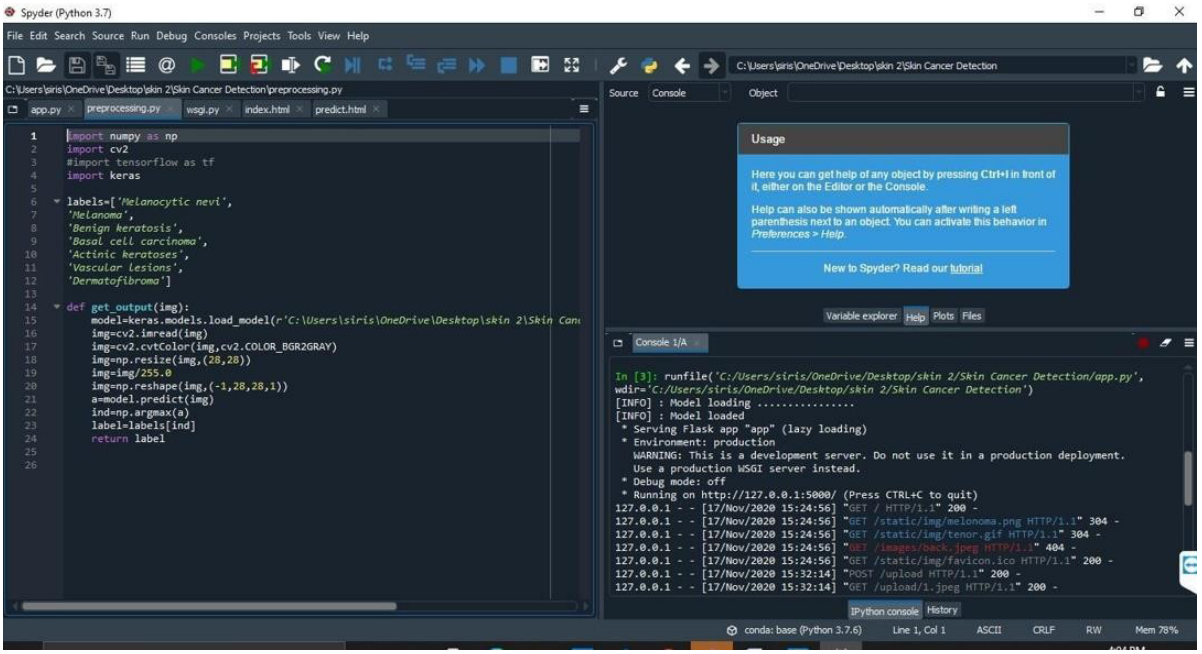


Fig 5 system architecture diagram

In this figure of system architecture diagram we have clearly explained the steps for detecting 7 types of skin cancer. First step comes here is taking picture from the client or customer for detecting. After this next step is preprocessing which is used to convert the picture to gray scale and reshaping is also done and the next step is segmentation process in which the shape and colorof the symptom or the patch will be identified. Next step is post processing in which the detectionsdone in the before steps are correct or not, after his feature extraction is done in which the symptoms given in the picture by client is compared with the original cancer symptoms. Next stephere comes is classification in which the website gives whether it is cancer or not.

CODING AND TESTING





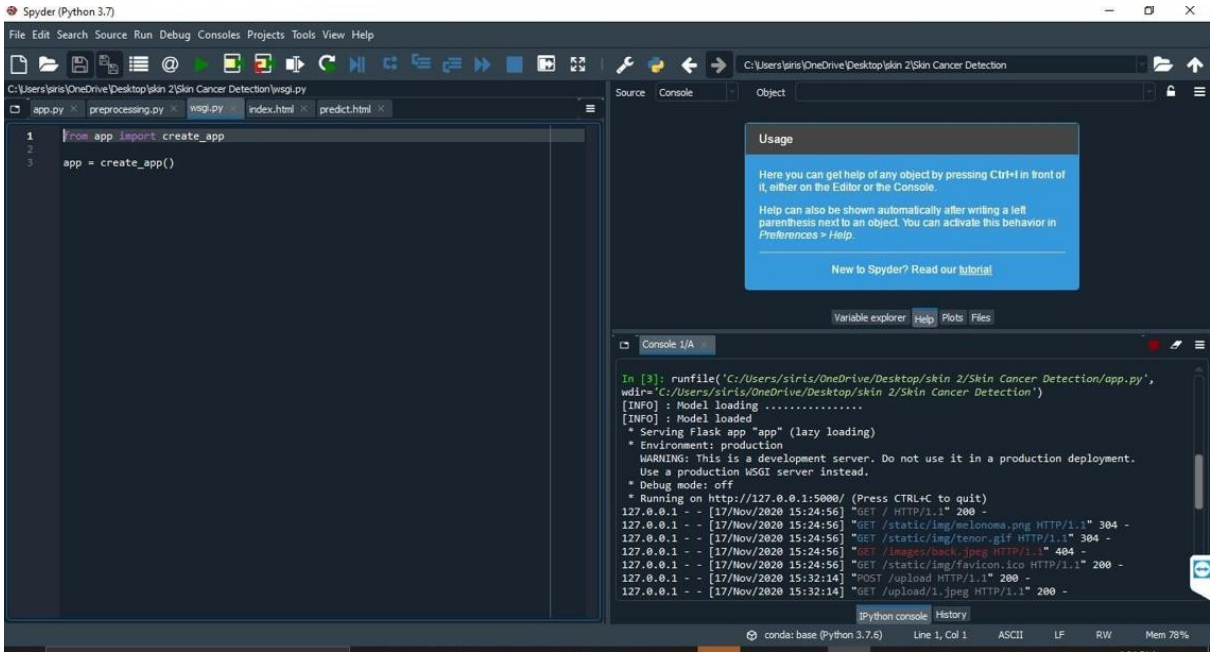


Fig :Sample Screens for various models

Code for detection

```
import os


from flask import Flask, render_template, request, send_from_directory
 from keras_preprocessing import image
#from keras.models import
load_model import num py as np
#import tensor flow as tf
from preproc essing import
get_output app = Flask(_name_)
STATIC_FOLDER = 'static'
# Path to the folder where we'll store the upload before prediction
 UPLOAD_FOLDER = r'C:\Users\siris\OneDrive\Desktop\skin 2\Skin Cancer
Detection\static\uploads' # Path to the folder where we store the different models
MODEL_FOLDER = STATIC_FOLDER + '/models'
```

```
def load model():
 """Load model once at running time for all the
 predictions""" print('[INFO] : Model loading      ')
global model
print('[INFO] : Model
loaded') def
predict(fullpath):
data = image.load_img(fullpath, target_size=(128, 128, 3))
# (150,150,3) ==> (1,150,150,3)
 data = np.expand_dims(data,
 axis=0) # Scaling
data = data.astype('float') /
255 # Prediction
#with graph.as_default():
 result =
model.predict(data)
return result
# Home
Page
@app.rout
e('/') def
index():
return
 render_template('index.html') #
 Process file and predict his label
@app.route('/upload', methods=['GET',
'POST']) def upload_file():
    if request.method == 'GET':
        return
    render_template('index.html') else:
        file = request.files['image']
```

```
fullname = os.path.join(UPLOAD_FOLDER,
file.filename) file.save(fullname)
label= get_output(fullname)
```

```
        return render_template('predict.html', image_file_name=file.filename,
label=label) @app.route('/upload/<filename>')
def send_file(filename):
    return send_from_directory(UPLOAD_FOLDER,
filename) def create_app():
    load_
    model()
    return
    app
if__name__== '_
    main_': app =
    create_app()
    app.run(debug=Fa
    lse)
```

Code for preprocessing:

```
import numpy
as np import
cv2
#import tensorflow as
tf import keras
labels=['Melanocytic
nevi', 'Melanoma',
'Benign keratosis',
'Basal cell
carcinoma',
```

```
'Actinic

keratoses',

'Vascular

lesions',

'Dermatofibroma

'] def

get_output(img):

    model=keras.models.load_model(r'C:\Users\siris\OneDrive\Desktop\skin       2\Skin Cancer Detection\static\models\cancer2.h5')

    img=cv2.imread(img)

    img=cv2.cvtColor(img,cv2.COLOR_BGR2GRAY)

    img=np.resize(img,(28,28))

    img=img/255.0

    img=np.reshape(img,(-1,28,28

    ,1)) a=model.predict(img)

    ind=np.argmax(a)

    label=labels[ind]

    return label
```

Code for app:

```
from app import

create_app app =

create_app()
```

Code for first webpage:

```
<!DOCTYPE html>

<html lang="en">

<head>

  <meta charset="UTF-8">

  <title>Skin Cancer Detection</title>

     <!-- Latest compiled and minified CSS -->
```

<link rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/bootstrap.min.css">

```
    <link rel="shortcut icon" href="{{ url_for('static', filename='img/favicon.ico')
        }}" type="image/x-icon">
    <script src="https://ajax.googleapis.com/ajax/libs/jquery/3.3.1/jquery.min.js"></script>
    <script src="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/js/bootstrap.min.js"></script>
</head>
<script>
    function showloading() {
        image =
        document.getElementById('loading_image');
        image.style.display = 'inline'
    }
</script>
<style>
    .img_holder img{
        max-width: 100%; max-height: 100%;
    }
    .btn-file {
    position:
    relative;
    overflow:
    hidden;
    }
    .down_buttons{
        padding-top:4
        0px ;
    }
    .btn-file
        input[type=file] {
        position: absolute;
        top: 0;
```

```
right: 0;
min-width: 100%;
min-height: 100%;
```

```
    font-size:
    100px;
    text-align:
    right;
    filter:
    alpha(opacity=0);
    opacity: 0;
    outline: none;
    background:
    white; cursor:
    inherit;
    display: block;
}
.main{
    background-color:
    blanchedalmond) ;
    background-repeat: no-repeat;
    background-size: 100% 100%;
}
h1
{
  text-align:
  center;
  margin: 0;
  font-size:
  25px;
  color:#1427
  4E;
}
body{
```

```
  background-color: #ebe5e5;
  background-image:url("images/back.jp
  eg"); background-size: 1500px
  1500px; background-repeat: no-repeat;
}
```

```
p{
  text-align:
  center;
  font-size:
  20px;
}
hr{
  border-style: none;
  border-top-style:
  dotted; border-color:
  #A6A6A4;
  border-width:5px;
  width: 100%;
}
h5{
  text-align:
  center;
  font-size:
  25px;
}
a{
  color: black;
}
h2{
  text-align:center;
}
.contact-us{
  text-align: center;
}
.middle-contai
```

```
ner{
text-align:
center;
}
```

```
</style>

<body class='main'>

<body>

    <h1>SKIN CANCER DETECTION</h1>

  <br />

    <div class="middle-container">

    </div>

    <br />

     <p>

      SKIN CANCER develop anywhere on body. They most develop areas that have exposure in a sun, such as your back, legs, arms and face.

      <br />

      Skin cancer also occur areas in that don't receive sun to exposure, such as a soles of your feet, palms hands and fingernail beds.

      <br />

      These hidden skin cancer are more common in people with darker skin.

      <br />

      Make sure u r save from melonama by trying our detection center

      </p>

      <br />

      <hr />

     </body>

<div class="container" style="margin: auto;width:40%; text-align: center; margin-top: 70px; text- transform: uppercase">

  <h3 style="margin: auto;width: 80%; text-align: center; margin-top: 40px; text-transform: uppercase">Skin Cancer Detection</h3>

   <div style="text-align: center; margin-top: 10px" >

     <img style="max-width: 300px" src="{{ url_for('static', filename='img/melonoma.png') }}"/>
```

```
  </div>

  <form action="/upload" method="post" class="down_buttons" enctype="multipart/form-data" style="margin-top: 50px; width: 60%; text-align: center; margin: auto;" onsubmit="showloading()">

     <span class="text-left btn btn-default

      btn-file"> Upload Image <input type="file"

      name="image">

    </span>

     <span class="text-right">

      <input type="submit" value="Predict" class="btn btn-primary">

     </span>

  </form>

    <div style="text-align: center">

       <img id="loading_image" style="display: none" src="{{ url_for('static', filename='img/tenor.gif')}}">

    </div>

          <br />

          <hr />

    <div class="contact-us">

       <h2>Please ask us if you have any queries</h2>

       <h2>Don't fight SKIN CANCER alone.</h2>

       </br>

       <a class="btn" href="mailto:chowdarya997@gmail.com">CONTACT US</a>

     </div>

     </br>

    <div class="bottom-container">

     <p class="copyright">© 2021 Avinash ,Balaji <br /><br />@Sathyabama institute of science and technology.</p>

    </div>

</div>
```

```
</body>
</html>
```

Code for second webpage:

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <title>Skin Cancer Detection </title>
   <link rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/css/bootstrap.min.css">
   <link rel="shortcut icon" href="{{ url_for('static', filename='img/favicon.ico') }}" type="image/x-icon">
   <script src="https://ajax.googleapis.com/ajax/libs/jquery/3.3.1/jquery.min.js"></script>
   <script src="https://maxcdn.bootstrapcdn.com/bootstrap/3.3.7/js/bootstrap.min.js"></script>
</head>
<st
 yle
 >
 h5
 {
     text-align:
     center;
     font-size:
     25px;
   }
       a{
       font-size:
     25px; color:
     black;
   }
```

```
    </style>
<body>
```

```
  <h4 style="margin: auto;width: 80%; text-align: center; margin-top: 20px;
text-transform: uppercase">Skin Cancer Detection </h4>

        <div style="width: 90%; margin: auto; text-align:
                                                    center">

    <img src="{{ url_for('send_file', filename=image_file_name)}}" style ="max-width:
500px; max-height: 450px; margin-top: 30px; margin-bottom: 10px">

<p style="font-style: italic">{{ image_file_name }}</p>

    <h3><b>We <span style="color: green;"> </span> Diagnosed that this is

        <span style="color: red;">{{ label }}</span></b></h3>

        <div style="width: 90%; margin: auto; text-align: center">

        </br>

        <h5>Reference of hospitals</h5>

        </br>

        <p>

        <a href="https://www.vaidam.com/hospitals/medanta-medicity-gurgaon">Medanta -
The Medicity Hospital</a>

        <br/>

        </br>

        <a
href="https://www.vaidam.com/hospitals/kokilaben-dhirubhai-ambani-hospital-
mumbai">Kokilaben Dhirubhai Ambani Hospital Mumbai</a>

        <br/>

        </br>

        <a href="https://www.vaidam.com/hospitals/blk-hospital-new-delhi">BLK Super
Specialty Hospital New Delhi</a>

        <br/>

        </p>

        <br/>

    <div    data-aidaform-widget="form-2019-12"
data-url="https://sirishma.aidaform.com/free- feedback-form" data-width="100%"
data-height="500px" data-do-resize></div>

    <script>(function(){var
r,d=document,gt=d.getElementById,cr=d.createElement,tg=d.getElementsByTagName,id="
aidaf orm-
```

```
embed";if(!gt.call(d,id)){r=cr.call(d,"script");r.id=id;r.src="https://embed.aidaform.com/embed.j s";(d.head || tg.call(d,"head")[0]).appendChild(r);}})()</script>

    <br/>

     <div class="contact-us">

       <h2>Please ask us if you have any queries</h2>

       <h2>Don't fight Melonoma alone.</h2>

       <a class="btn" href="mailto:chowdarya997@gmail.com">CONTACT US</a>

     </div>

   <div class="bottom-container">

     <p class="copyright">©2021 Avinash ,Balaji <br /><br />@Sathyabama institute of science and technology.</p>

   </div>

</div>

</br>

    <a href="/">Back to Home</a>

</div>

</body>

</html>
```

SCREENSHOTS AND RESULT

Here is the output screenshot where we can know whether a person has cancer or not This picture is for detecting Melanoma cancer which is one of the type of skin cancer.

Fig 8.1 detection of melanoma

This picture is for detecting Melanoma cancer which is one of the type of skin cancer.

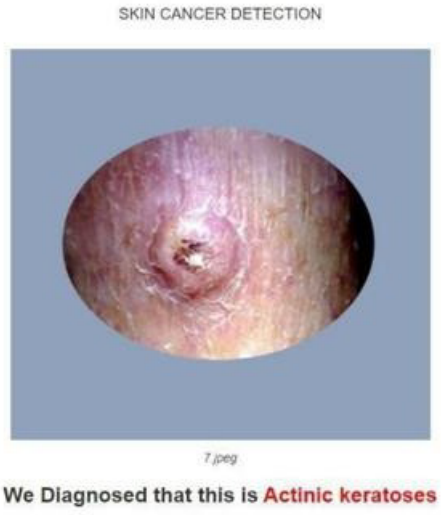


Fig 8.2 detection of actinic keratoses

These are the pictures where you can find the feedback form

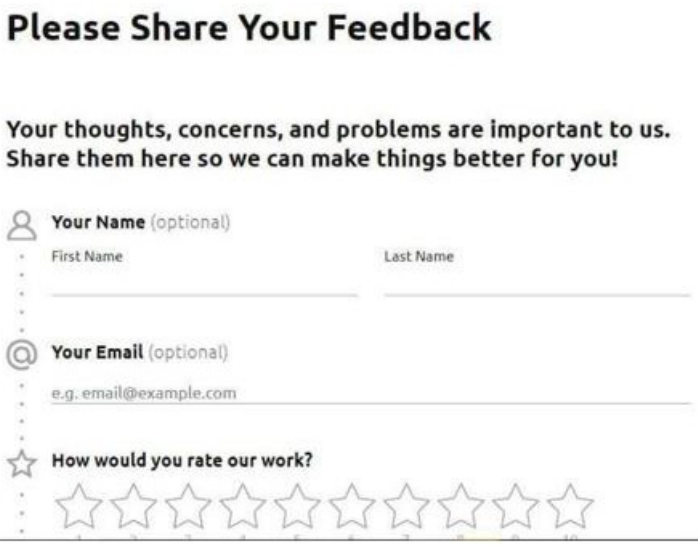
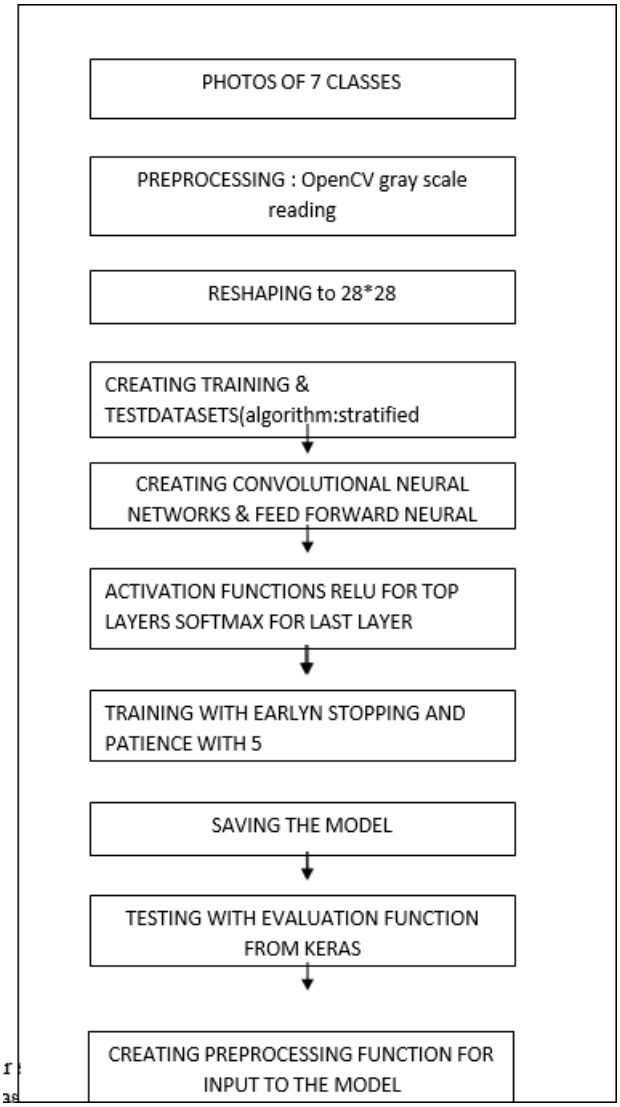


Fig 8.4 feedback form

This is the picture where we can find the reference of doctors

WORKING



CONCLUSION

In the proposed system, Image Pre-Processing, Image Segmentation and Image Classification steps are performed for categorizing skin lesion images into melanoma or benign. Data augmentation technique is used in Convolutional Neural Network for increasing the number of images which leads to better performance of proposed method. Experimental results show an accuracy of CNN algorithm developed with data augmentation is higher than the CNN algorithm created without data augmentation. The proposed method detects melanoma faster than the biopsy method. The proposed method can be extended to identify different types of skin related diseases.In this projectwe also designed for the reference of doctors and a feedback form which is used to know the experience of

the patients.

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