SKIN CANCER DETECTION (SCAM-D)

By

GC Syed Mohsin Abbas

GC Salman Malik

GC Ali Nadeem

GC M. Fasih Kiani

Supervised by:

Dr. Hammad Afzal

Submitted to the faculty of Department of Computer Software Engineering,
Military College of Signals, National University of Sciences and Technology, Islamabad,
in partial fulfillment for the requirements of B.E Degree in Software Engineering.

June 2022

In the name of ALLAH, the Most benevolent, the Most Courteous

CERTIFICATE OF CORRECTNESS AND APPROVAL

This is to officially state that the thesis work contained in this report

"Skin Cancer Detection"

is carried out by

GC Salman Malik

GC Syed Mohsin Abbas

GC Ali Nadeem

GC M. Fasih Kiani

under my supervision and that in my judgement, it is fully ample, in scope and excellence, for the degree of Bachelor of Software Engineering in Military College of Signals, National University of Sciences and Technology (NUST), Islamabad.

Approved by

Supervisor

Dr. Hammad Afzal

Date: ___________

DECLARATION OF ORIGINALITY

We hereby declare that no portion of work presented in this thesis has been submitted in support of another award or qualification in either this institute or anywhere else.

ACKNOWLEDGEMENTS

Allah Subhan'Wa'Tala is the sole guidance in all domains.

Our parents, colleagues and most of all supervisor, Dr. Hammad Afzal without your guidance.

The group members, who through all adversities worked steadfastly.

Plagiarism Certificate (Turnitin Report)

This thesis has 7% similarity index. Turnitin report endorsed by Supervisor is attached.

GC Syed Mohsin Abbas
00000278714

____

GC Salman Malik
00000278709

____

GC Ali Nadeem
00000278720

____

GC M. Fasih Kiani
00000278715

____

Signature of Supervisor

ABSTRACT

Melanoma is defined as a cancer that is incurable in its advanced stages, emphasizing the need of early detection and treatment. Various procedures and tools have been employed to diagnose this type of cancer early, practically all of which needed a visit to the doctor and were not available to the general public. This work presents an automated and accurate approach for distinguishing between benign skin pigmented lesions and malignant melanoma that may be used by the general population and does not require special imaging equipment or conditions. After preprocessing the input photos, the region of interest is segmented using the Otsu method in this study. Then, on the segmented image, a new feature extraction is used to mine the advantageous qualities. The method is then completed by categorizing the data using an optimized Deep Believe Network (DBN) into two classes: normal and melanoma cases. To achieve improved efficacy in different terms, the optimization procedure in DBN was carried out by a developed version of the recently presented Defense Test and evaluation Organization (DTEO) method. The method's performance is compared to 7 distinct procedures from the literature to demonstrate its superiority.

Table of Contents

List of Figures

CHAPTER 1: INTRODUCTION

Deep learning is a type of artificial neural network (ANN) that employs mathematical approaches to create a structure that resembles the human brain. On the other hand, technological advancements have resulted in algorithms for optimizing regular neural networks so that the number of neural layers may be counted. Neural networks have grown from multiple layers to hundreds of layers with thousands of neurons in each layer, which could not have been achieved until recently. A deep learning network is a specific form of neural network. For skin cancer diagnosis, several strategies involving various types of ANNs and other machine learning techniques have been introduced. Li et al., for example, proposed a new data synthesis methodology that combines individual skin lesions photos with significantly processed data. The research team used a convolutional neural network (CNN) to outperform traditional detection and tracking methods. Furthermore, the system was taught using simple criteria by people.

1.1 Overview

Skin cancer specifically melanoma variant is one of the most usual and basic type of skin disease. Body parts which are uncovered and gets in contact with natural sunlight mostly fall a prey to this cancer. It's more common in outdoor labor, athletes, sunbathers and fair-skinned people. Skin cancers can develop years after receiving therapeutic x-rays or being exposed to a carcinogen.

Mentioned below are the few variants for skin cancer

- Basal cell carcinoma (about 80%)
- Squamous cell carcinoma (about 16%)
- Melanoma (about 4%)

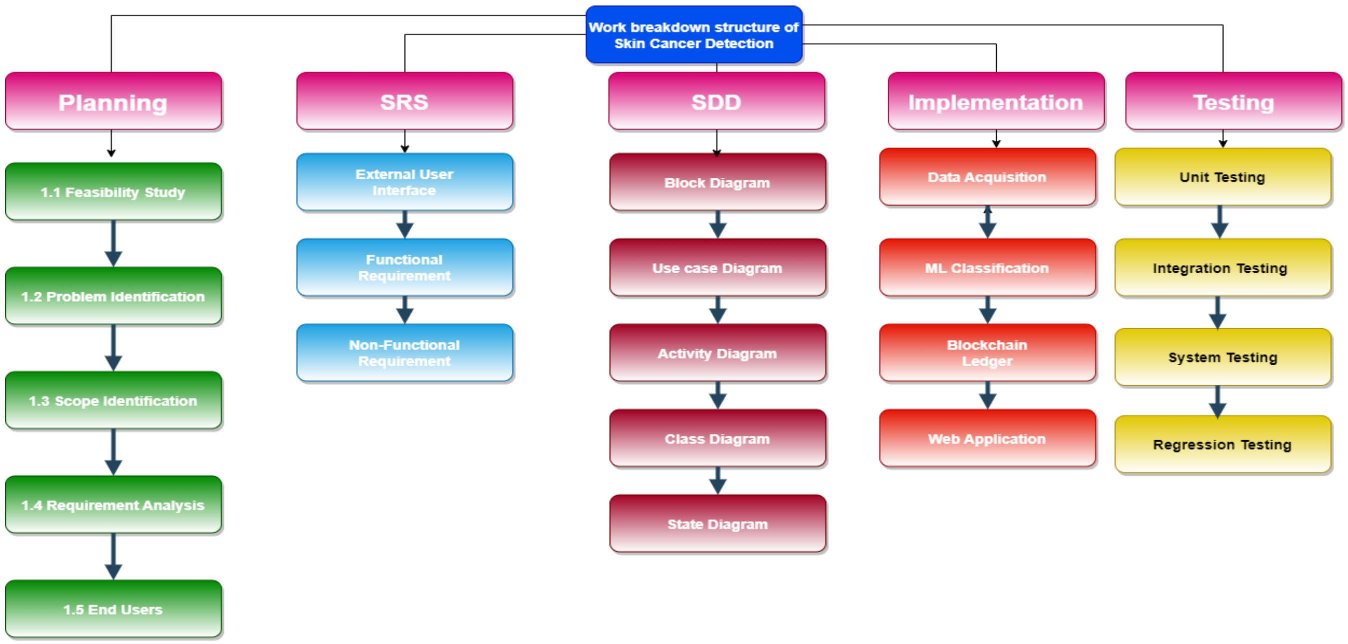

Figure 1: Work breakdown Structure

1.2 Problem Statement

Cancerous diseases of skin are the deadliest malignancy in America, and the majority of cases are preventable. Skin cancer can be disfiguring or even fatal, and it has a significant impact on one's quality of life. Because of skin cancer therapy, individuals, families, and the country all face considerable health-care costs.

Following are some highlights of the existing skin cancer.

1. Sunlight exposure is considered to be responsible for 86 percent of all melanomas, the majority of melanomas are the result of a pattern of sun exposure. Time wasted due to traffic signals has nothing to do with empty highways.
2. A recent study found substantial evidence that using sunscreen on a daily basis dramatically delays skin aging.

1.3 Proposed Solution

The primary goal of our proposed method is to prevent skin cancer. For this very purpose its highly recommended to take in usage of different available sunscreens to terminate exposure of skin to sunlight, also its recommended to utilize spectacles and clothing attires to minimize the chances.

Working Principle

The study focuses on image processing concepts combined with deep learning methods. The project is organized into various modules, each of which is intertwined with the next. The following is a list of modules:

- Datasets and annotations
- Dataset training and processing
- Output extraction
- Decision based upon Output
- Integration
- GUI presentation

1. 1.4.1 Datasets and annotations:

2. The preparation of datasets is an important aspect of the process. The collection includes photos of nevus, basal cell carcinoma, seborrheic keratosis, vascular lesion, and actinic keratosis, among other skin cancers. In our endeavor, the skin cancer dataset is crucial.

3. 1.4.2 COCO Dataset:

COCO abbreviates Common Objects in Context and is a labelled dataset. Comprising a large number of distinct forms of common life ailments. The suggested project extracts that the disease of COCO data set for this project is skin cancer. (nevus_skin_cancer, seborrheic keratosis skin cancer etc.).

4. 1.4.3 Custom Skin Cancer Dataset:

5. This project makes use of a custom-built dataset on Pakistani skin cancer. To get the coordinates of the object, the photos are gathered, filtered, and annotated.

6. 1.4.4 Dataset training and processing:

The prepared dataset is used as input to train object detection models using deep learning.

7. 1.4.5 CNN algorithm:

The acronym CNN stands for "Convolutional Neural Network." This is a method of detecting and distinguishing various objects in an image (in real-time). Object detection in CNN is approached as a classification problem, with class probabilities for the detected images provided. In our project, we use the CNN (Convolutional Neural Network) technique to train the dataset, which is then used to develop the object detection model.

8. 1.4.6 Output Extraction:

The outputs are extracted based on objects (different types of skin cancer) detected, these objects are counted and stored to keep a record.

9. 1.4.7 Decision based upon Outputs:

The count of common skin cancer, one of the retrieved outputs, is employed in decision-making.

10. 1.4.8 Density based decision:

The primary decision is based upon the density of the skin cancer in the human: prioritization because of density.

11. 1.4.9 Skin Cancer priority:

The crucial decision about skin cancer is based on an ambulance's detection: special skin cancer based on detection.

12. 1.4.10 Integration:

The many modules are then combined into a single standalone entity. For a compact solution, this stand-alone entity is required.

1.5 GUI presentation:

The visual demonstration of the project is done through the aid of GUI (graphical user interface).

1.5.1 Python-Django Framework:

Django is a Python framework for developing online apps and graphical user interfaces, which is used in this project.

1.6 Objectives

1.6.1 General Objectives:

"To develop cutting-edge software based on Deep Learning (DL) and Internet Protocol (IP) techniques that will serve as a smart administrative tool for reducing the skin cancer problem."

1.6.2 Academic Objectives:

- Development of a smart and intelligent Machine System
- To implement Deep Learning techniques and simulate the results
- To decrease disease by working in a team
- To design a project that contributes to the Cancer hospitals.

1.7 Scope

Early detection of most kinds of skin cancer is linked to a higher chance of survival. The Derma Sensor gadget is a cutting-edge, non-invasive, sector-based technology that can help clinicians detect skin cancer early.

1.8 Deliverables

1.8.1 Hawk eye

It acts as a hawk eye, observing and determining the optimal skin cancer disease flow time in real time utilizing a combination of image processing and deep learning techniques, as well as a camera and a pre-fed data set.

1.8.2 Object of disease detection:

Using the same combination of image processing and Deep learning algorithms, it can detect the object. By detecting, we imply detecting a life-threatening condition such as skin cancer.

1.8.3 Special privileges:

It grants the disease exceptional privileges to rescue "The Sacred Life" that resides within it, because it isn't just about preserving a single life, but also a family and humanity.

Chapter 2: Literature Review

Only a small percentage of patients are genetically prone to skin cancer, this project will be used as a diagnostic tool when encountering individuals with several skin cancer lesions. Clinical aspects, genetics, and therapeutic choices are all discussed in detail.

- Background
- Existing solutions and their drawbacks
- Research Papers

2.1 Background

Cancer is one of the most serious problems that the world faces today. In the United States, skin cancer is the most frequent cancer. This cancer is more relevant to some and less to few w.r.t to its reactiveness, but it can affect everyone. Either natural light or light coming from any artificial source carrying UV radiations bin it is the primary source of stretching this disease

Existing solutions and their drawbacks

Various approaches to the problem of skin cancer disease have been proposed in the past. The following are some of the solutions that are currently being developed and deployed.

- Seek shade in daylight
- Avoid sunrays
- Don't tan
- Wear protective clothes

2.2.1 Microcontroller with fixed control / Manual Controlling

The majority of traffic systems in use today have fixed controls or are handled manually. A microcontroller with a timer is used for fixed control, opening each side of the road for a predetermined time period that does not alter regardless of the density of vehicles on the road. Because there is no such check, it must allot time to a road that is even vacant. Manual control is utilized to address this issue. Because a single person oversees all traffic, he or she will not open a road if it is empty. However, this necessitates the use of manual power. In today's world, where everything is mechanized, such systems are obsolete.

2.2.2 Detection techniques and Saves lives

Malignancy afflicts one out of every five people by the age of 70. But, 99 percent cases are treatable if detected and treated early. However, we must discover skin cancer early in order to prevent it.

2.2.3 Early detection

Knowing what to check for on your own skin could aid in early detection of cancer, when it's easiest to treat, before it becomes harmful, disfiguring, or fatal. Early detection warning signs is possible if you know what to look for. Skin cancer is significantly easier to cure if caught early when it's little and hasn't spread. Effectiveness. Furthermore, when using video systems that extract objects using successive pixels, the number of motionless or unattended cars may be regarded zero.

2.2.4 Examine your skin once a month

Learn how to recognize the symptoms of skin cancer, as well as how to perform a self-examination. If you discover anything that doesn't seem quite right, make an appointment with your dermatologist straight away.

2.2.5 See your dermatologist annually

Get a full-body expert skin checkup once a year, or more frequently if you're at higher risk for skin cancer. Some doctors and other health care professionals include skin checks in routine health check-ups. Examine your skin in a well-lit environment where you can mirror yourself completely . Using a hand-held mirror, examine regions that are difficult to view. Using the "ABCDE rule," look for some of the most common markers of melanoma, one of the deadliest types of skin cancer:

Asymmetry

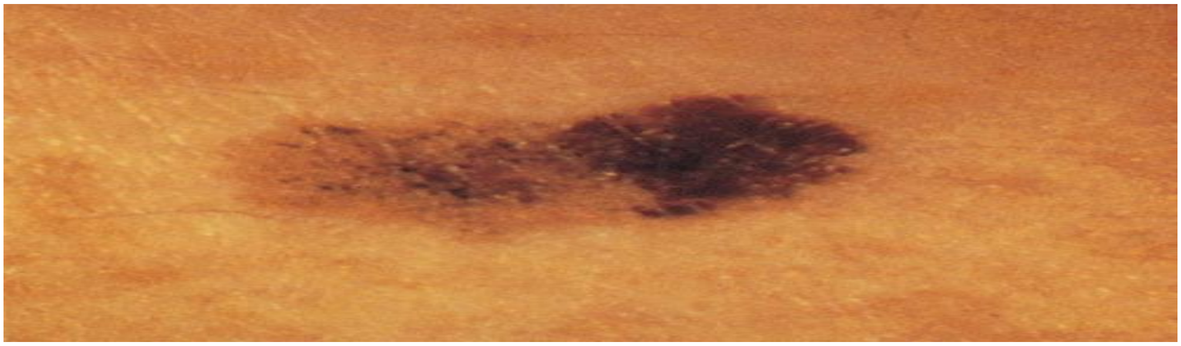

Figure 1: Asymmetry

Border

Figure 2: Border

Color

Figure 2: Color

Diameter

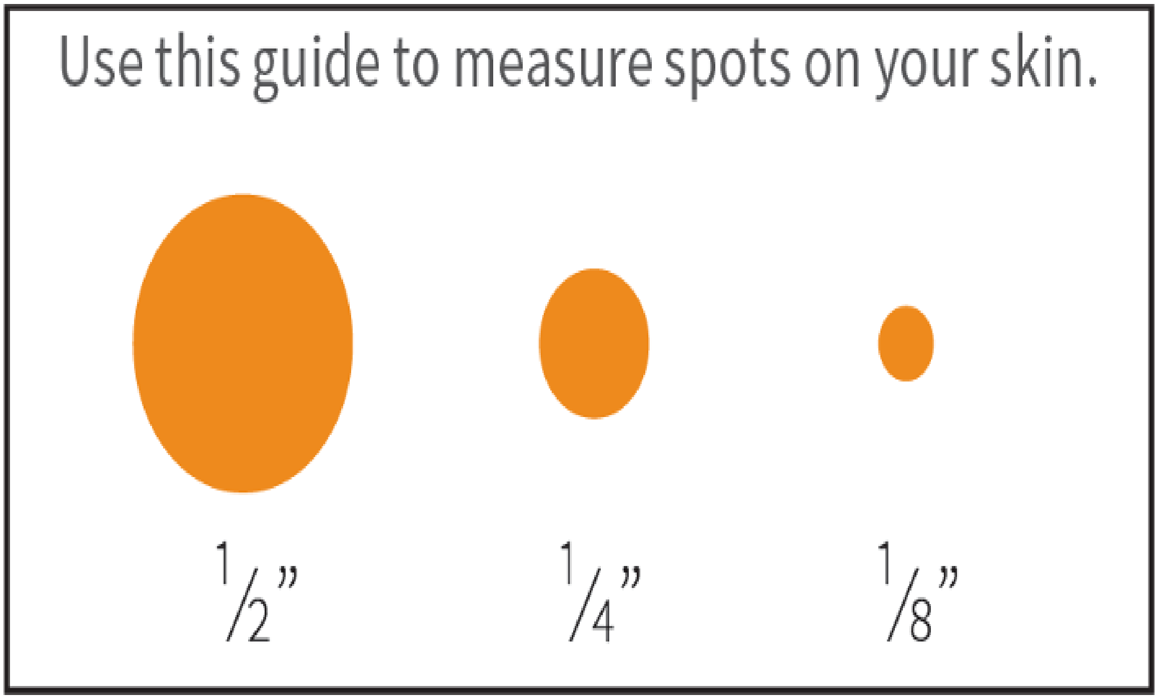

Figure 3:Diameter

Evolving

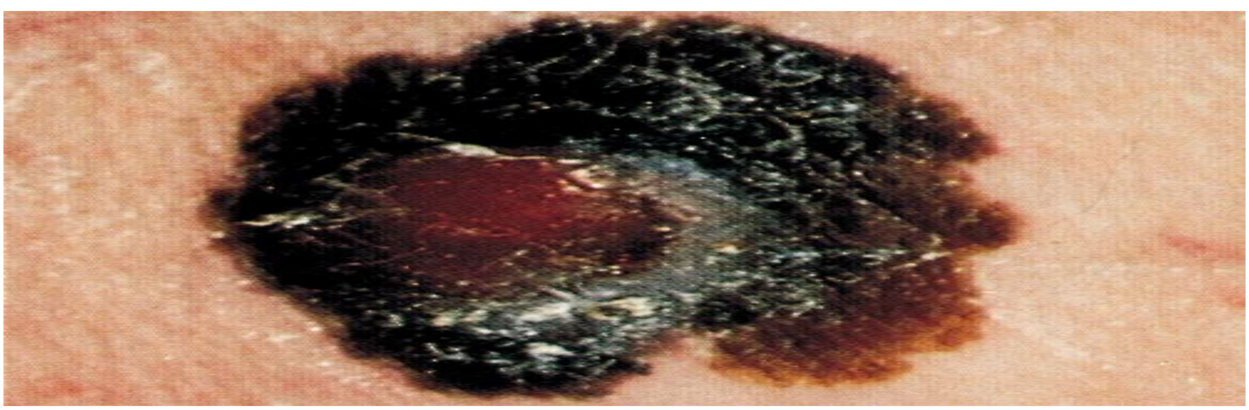

Figure 4:Evolving

Melanomas are more prevalent than basal and squamous cell skin malignancies, however they are usually curable.

The face, head, and neck, which receive the most sun, are the mere usual sites for basal cell carcinomas and squamous cell carcinomas, or malignancies. They do, however, have the ability to appear in unexpected places.

Basal cell carcinomas: what to look for:

- Scar-like flat, hard, pale or yellow patches
- Itchy reddish areas that are raised
- Small pink or red pearly lumps with blue, brown, or black patches that are translucent, glossy, and pearly
- Open sores that do not heal or heal but reappear (perhaps with seeping or crusty regions)

Squamous cell carcinomas: what to look for:

- Red spots that are rough or scaly and may cause blood out of them.
- Raised lumps or growths, with a bottom area in the middle.
- Uncovered sores that do not heal or heal but reappear (perhaps with seeping or crusty regions)
- Growths that resemble warts

However, these descriptions might not apply to all skin cancers. Tell your doctor about anything that concerns you, such as:

- Any new places
- Any location on your body that doesn't appear like others
- Any of sore which isn't recovering or getting better
- New swelling or redness beyond the mole's border
- Color that extends from the edge of an area into the surrounding skin.
- Itching in a particular area that persists or returns

Chapter 3: Interface and Detection

3.1 Skin Cancer Detection

DNN are used in the diagnosis of skin cancer. They are made up of a network of interconnected nodes. In terms of neural connections, their structure is comparable to that of the human brain. Their nodes collaborate to solve certain issues. Neural networks are functioned to do specific applications and subsequently work as professional in the scope in which they were taught. Neural networks were used in our research to differentiate pictures and distinguish between different faces of skin cancer. The International Skin Imaging Collaboration (ISIC) dataset contains a variety of skin lesions, as shown in Figure 2.

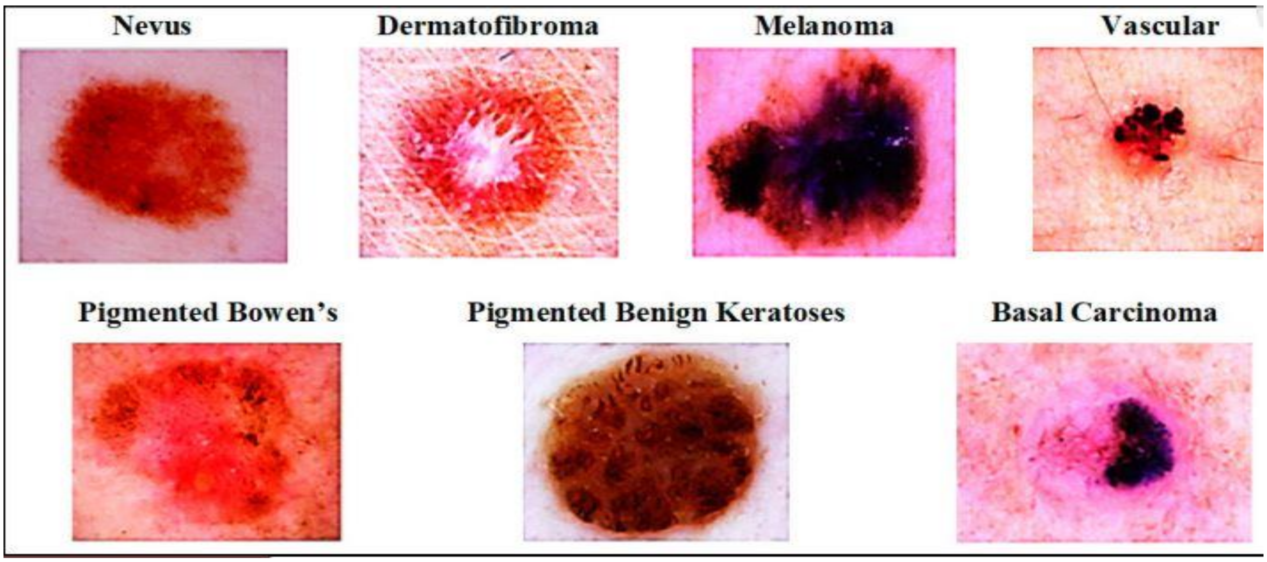

Figure 5:Skin cancer detection

3.1.1 Preparing Dataset

A dataset is a group of instances with a common characteristic. The dataset will be used to shape a deep learning system in the future. The more data provided, the more efficient the system becomes.

In this model, we used a large number of skin cancer photos from various countries, as well as a diversity of photos

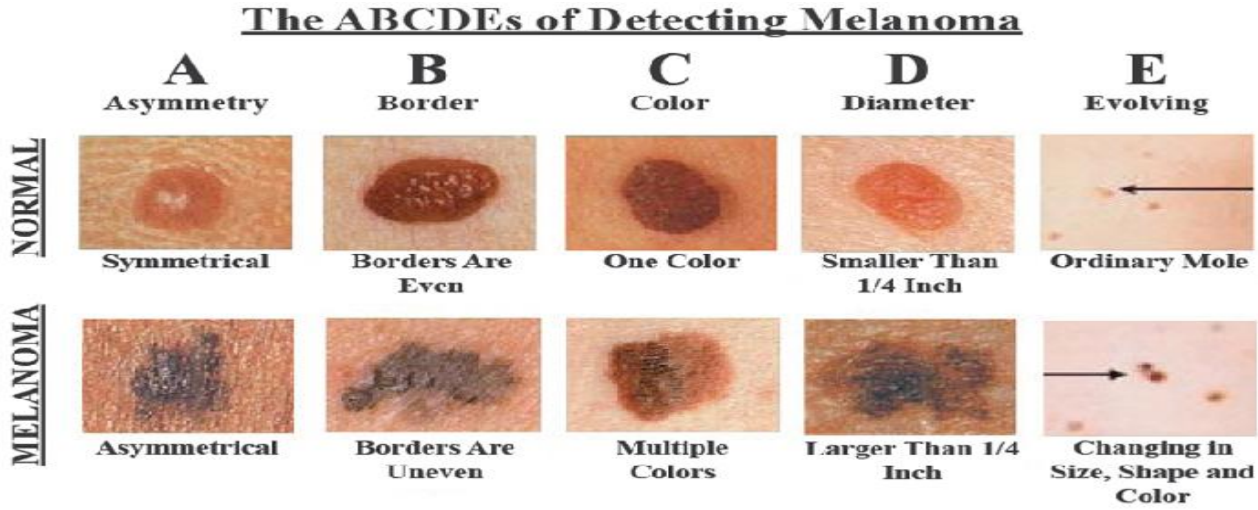

Figure 6: Proposed Dataset

3.2 GUI (graphical user interface)

Python offers a wide range of GUI development options (Graphical User Interface). Of all the GUI techniques, the Web App approach is the most extensively utilized. It's a Python interface to the built-in WP (Web App) GUI toolkit in Python. Using Python with WordPress is the quickest and easiest way to create a GUI Web App.

3.2.1 List of stake holders

- User
- Admin

3.2.2 Client and Customer Contact

Any user with Internet Connection on his Machine	• Open App • Login / Register • Choose your image

	• Select what to image • Check your image result

Table 1: User of the Application

3.3 Output shown on GUI

3.3.1 Login here

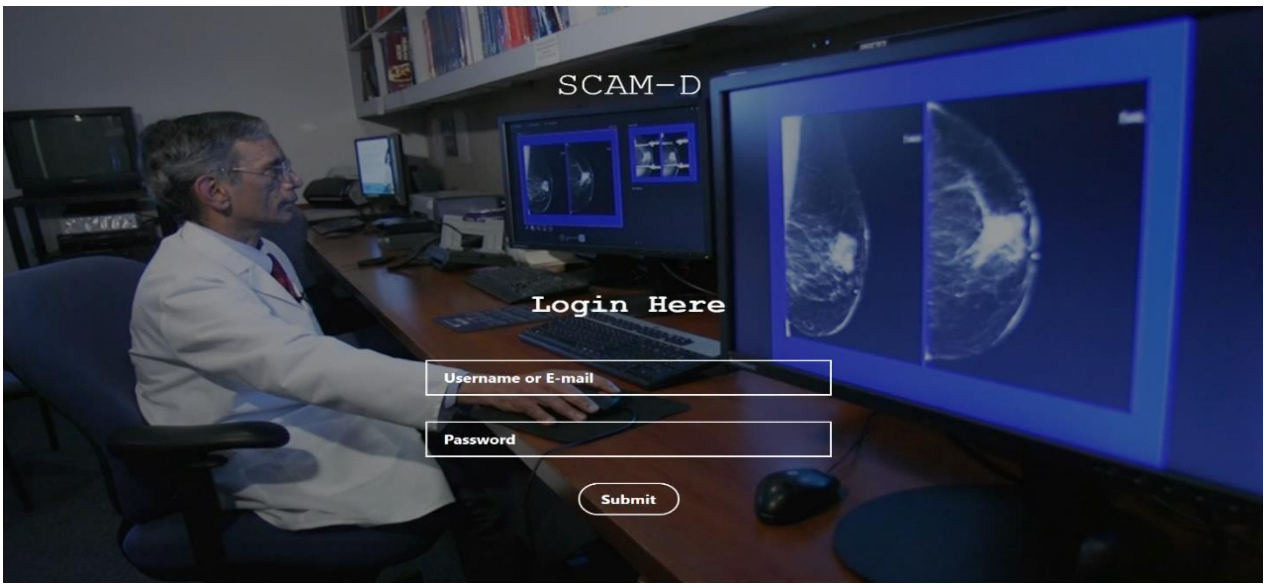

Figure 7: Login here

3.3.2 Choose a Image

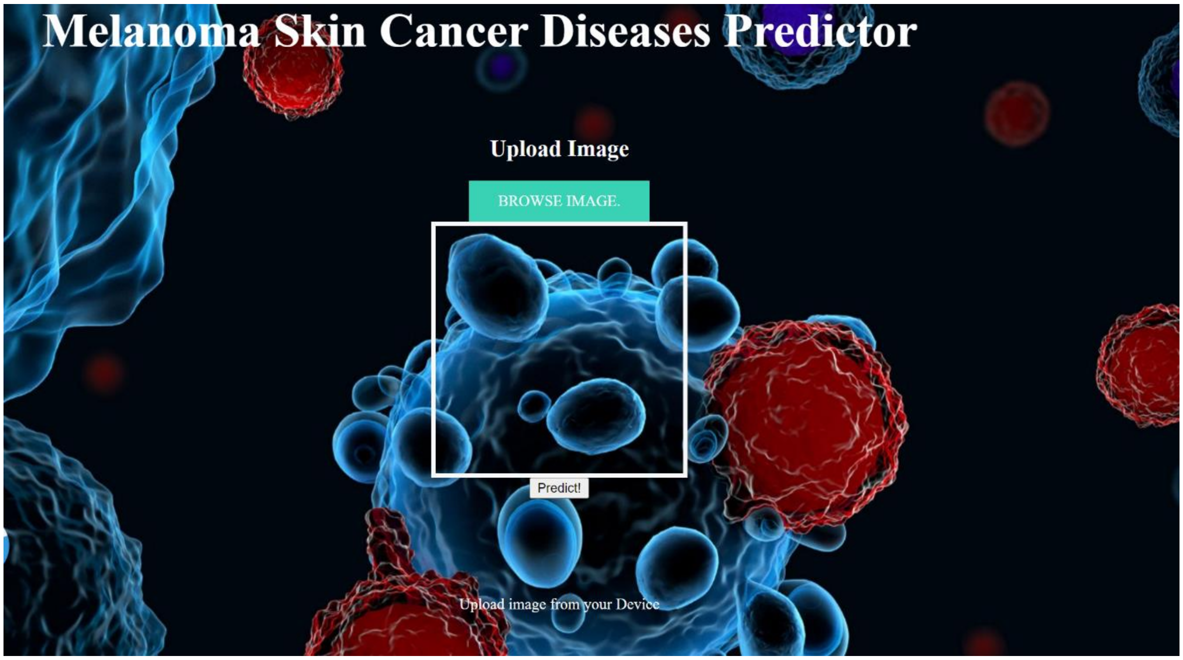

Figure 8: Choose a image

3.3.3 Result:

Figure 9:Final result

Abstract

We examine cancer decision-making in the modern context of binary results, in which people are urged to shoulder more responsibility for their own health care. We look at the roadblocks to making informed and shared decisions, such as rational parameters and expressive concerns, but believe that a better knowledge of decision-making mechanisms could aid in decision assistance. Abstract ways to decision making that explain perception, sentiment, and their interactions include classic psychophysical approaches, dual-process models that aims to improvise differences between emotive and demotion and cognition (or reason), and newer integration techniques like fuzzy-trace theory. Modern approaches stress capturing the bottom-line gist of alternatives, unlike previous emphasis on reckless use of numerical data (which includes emotion).

Making cancer-related quality-of-life decisions Cancer decisions, on the other hand, are not so simple, according to the research. This study sheds light on the different approaches how people manage to undergo heavy decisions, as well as how to assist them in making better physical and mental health decisions.

.

Keywords:

Making decisions about cancer quality of life Cancer decisions, on the other hand, are not so straightforward, according to study. This study sheds light on how people make such high-stakes decisions and how to assist them in making better physical and mental health decisions.

Decisions along the Cancer Continuum

Because each stage of cancer has its own set of obstacles, the cancer continuum—deterrence, diagnosis, judgment, treatment, survivorship, and end of life—is a valuable empirical for judging a decision of cancer decisions. People must make decisions that will have futuristic impacts repercussions for malignancies that will arise many years in the future, if they occur at all for a certain person, at the earliest stage, preventive. Nonetheless, adopting lifestyle practices such as consuming a balanced diet, quitting smoking, and following cancer screening and immunization guidelines could prevent 50% of all malignancies (e.g., immunizing for hepatitis B to avoid liver cancer)

Adopting and maintaining these behaviors often entails a succession of long-term decisions. Smokers who want to quit, for example, may have to rethink their decision numerous times throughout the day. Ordinary choice theory is used to assess the outcomes of a new activity and determine whether it is worthwhile to continue, which can be challenging when the outcomes are long-term, such as cancer prevention.

Summary and Implications

Making an informed decision all over the cancer scale should be based on a complete understanding of the advantages, drawbacks, and ambiguities linked with various therapy approaches. This goal in cancer care is difficult to accomplish, despite its ethical importance, as the instances we offered demonstrate. Cancer treatment selections might include complicated ways of guessing or diagnosing, deep different to interpret symbols which are hard to diagnose, and a wealth of options that can be overwhelming, especially when emotions like fear are involved.

3.4 Working Of GUI

The Graphical User Interface, or GUI, is not as difficult as it appears. Every day we use our computers, we come into contact with a graphical user interface (GUI)! Right now, you're probably browsing this website using a graphical user interface.

A user interface is a way for a person to communicate with a computer. On the early computers, user interfaces were typically merely a set of switches that a user could flip to control what the computer did. This method was slow, and users had to know the computer's recognized code. This approach was used by a small number of people, and as computers evolved, new ways to connect with computers arose.

3.5 Proposed Block Diagram

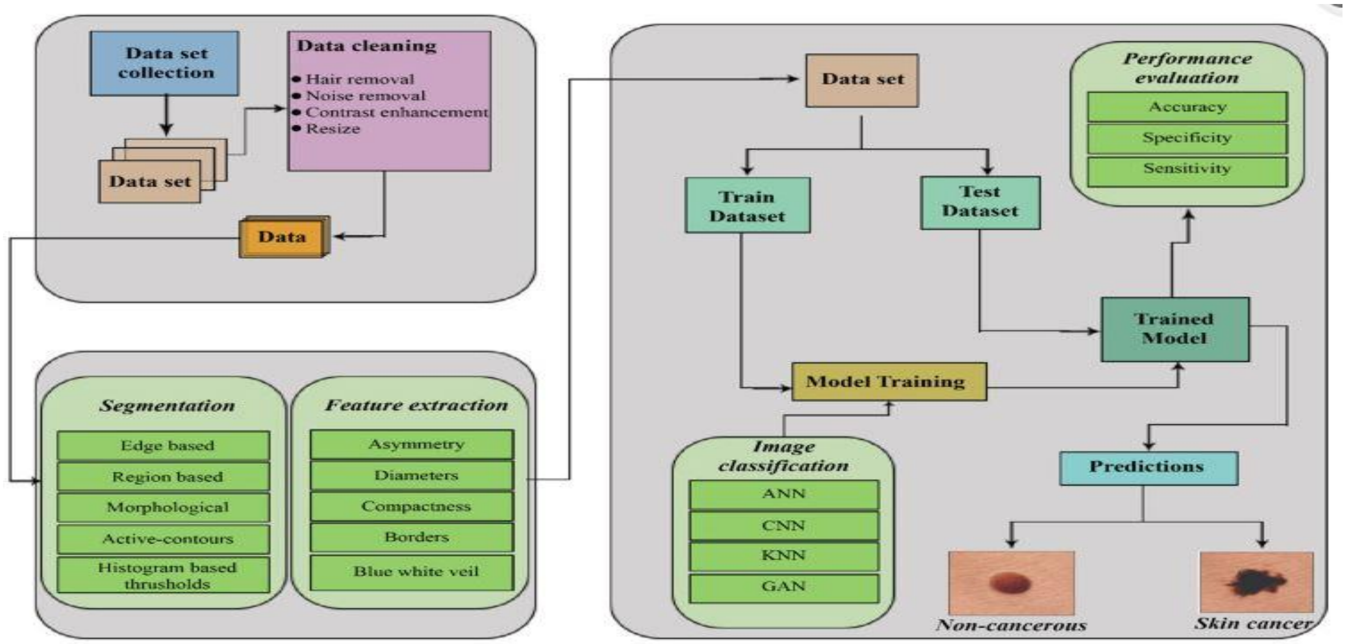

Figure 10: Proposed Block Diagram

Deep learning has drastically altered the machine learning scene during the previous couple decades. Artificial neural network approaches are dealt with in this advanced subfield of machine learning. The dynamics of human brain inspired these algorithms. Speech recognition techniques , pattern identifier, and bioinformatics are all examples of bioinformatics. are just a few of the applications that use deep learning techniques. Deep learning systems have delivered exceptional results in various areas when compared to conventional machine learning approaches.. In this paper, we thoroughly investigate and evaluate deep learning-based skin cancer detection systems. The goal of this paper is to allocate a thorough and systematic overview of the literature on classical approaches.

3.6 System Diagram

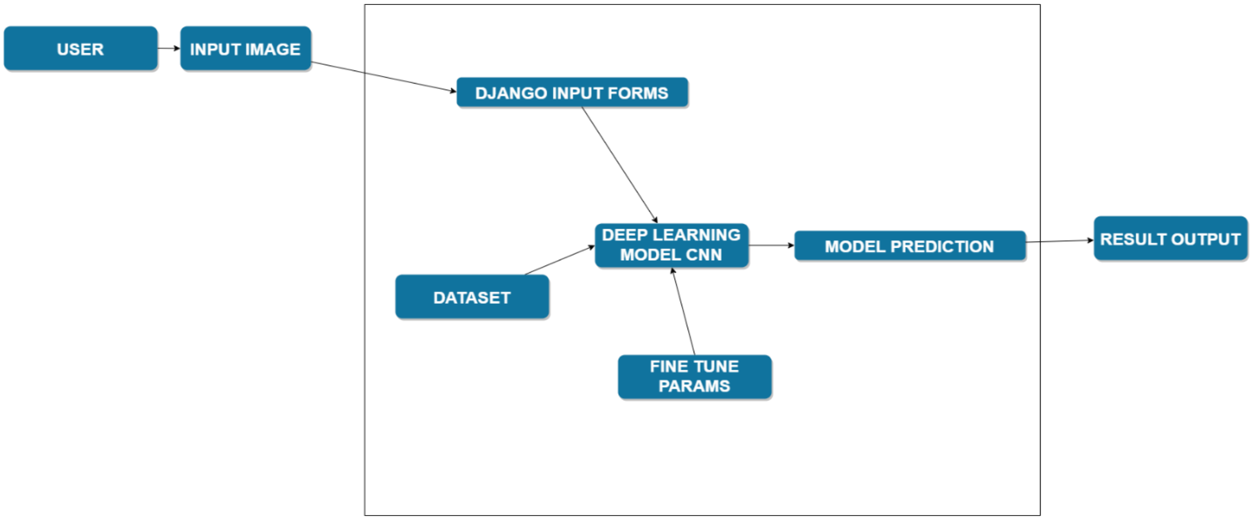

Figure 11: System Diagram

3.7 Decomposition Diagram

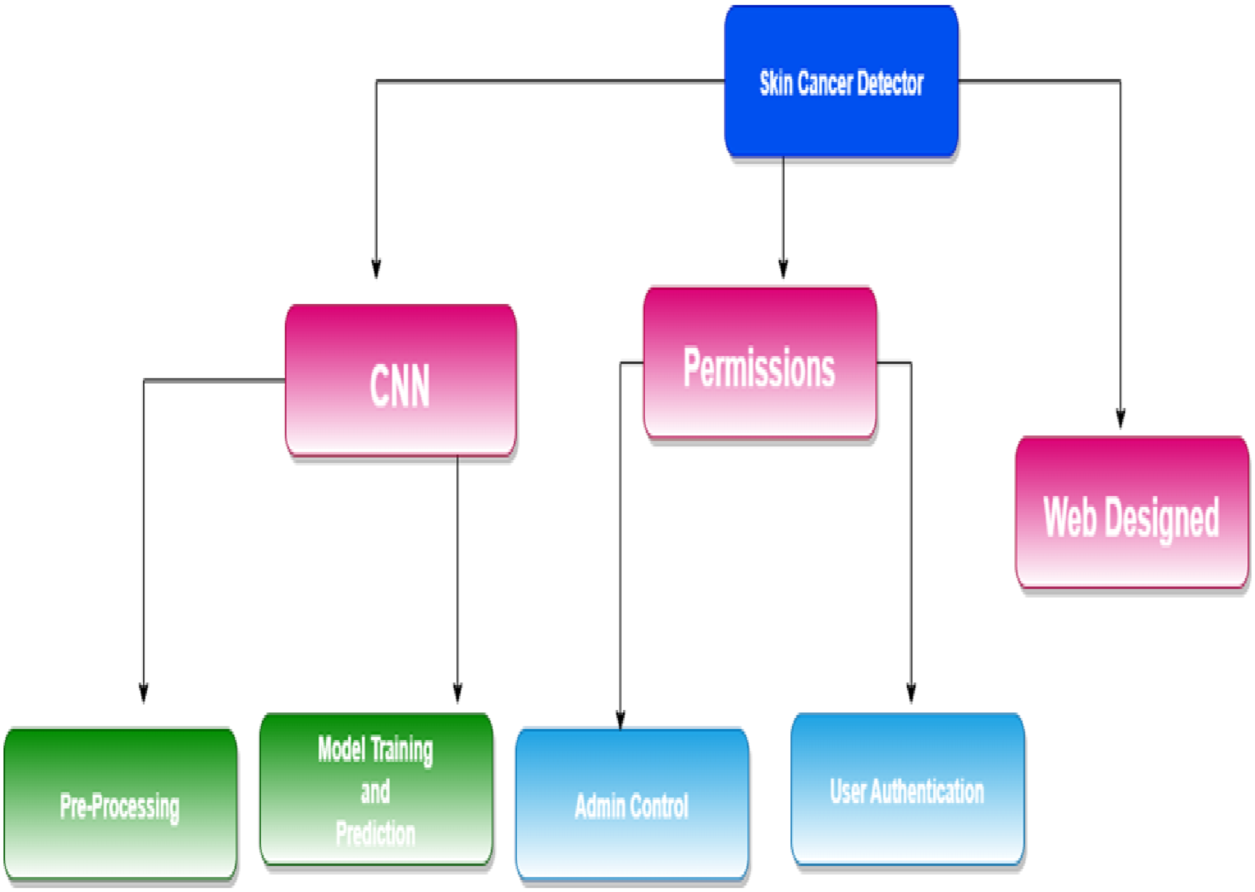

Figure 12: Decomposition Diagram

3.8 Activity Diagram

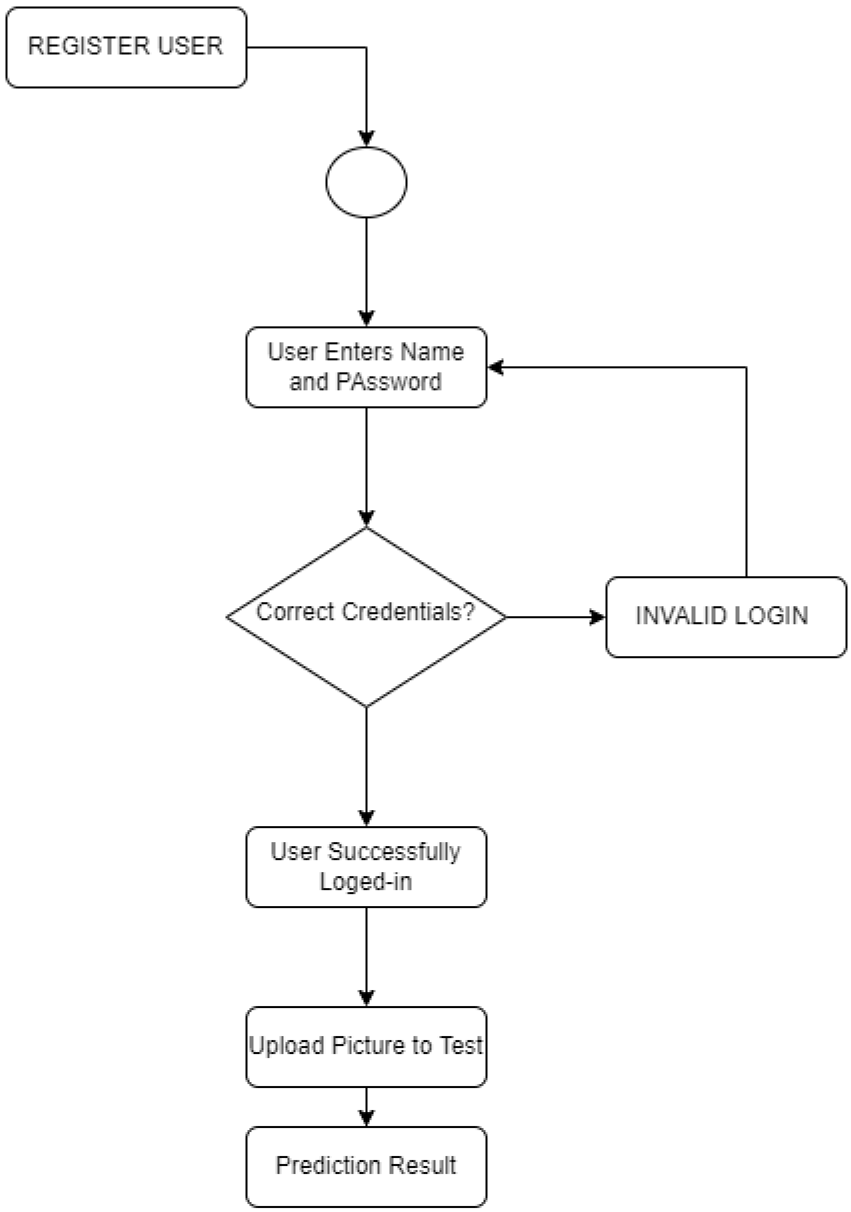

Figure 13: Activity Diagram

3.9 Class Diagram

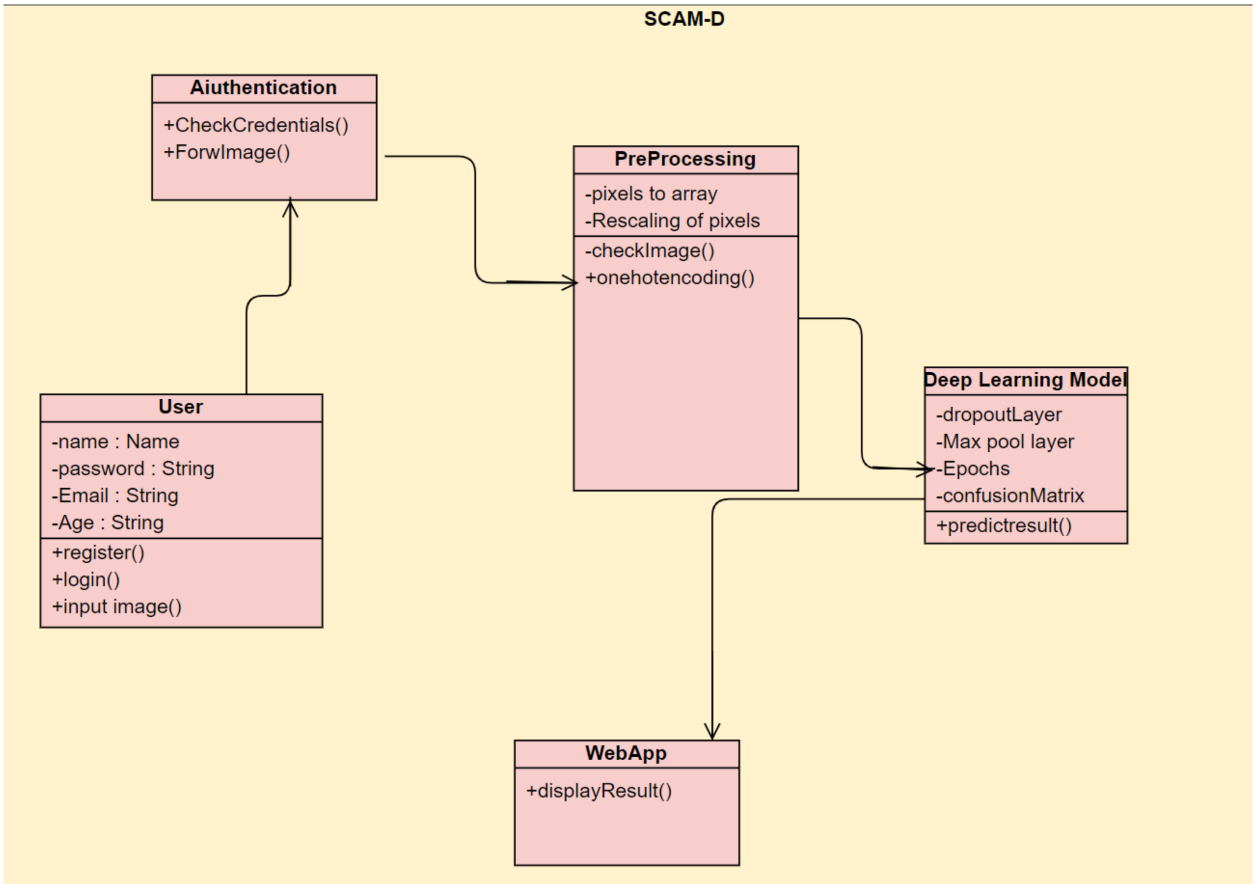

Figure 14: Class Diagram

3.10 Use case Diagram

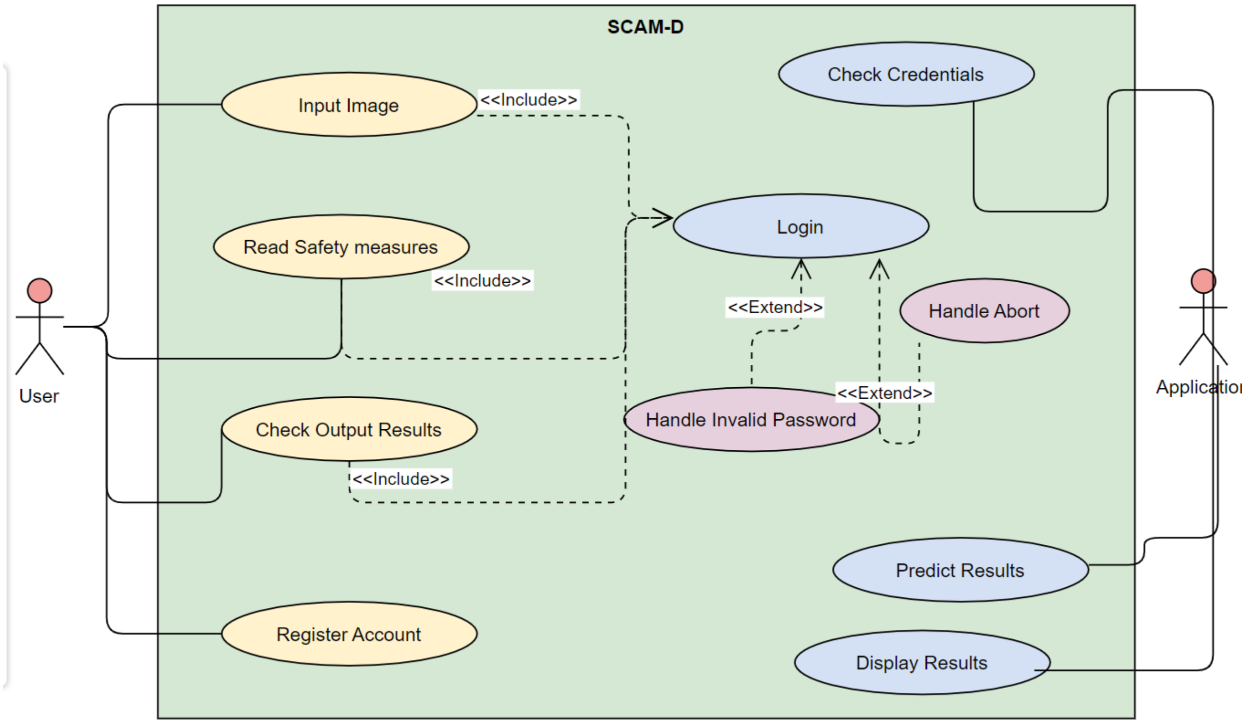

Figure 15: Use Case Diagram

3.11 Sequence Diagram

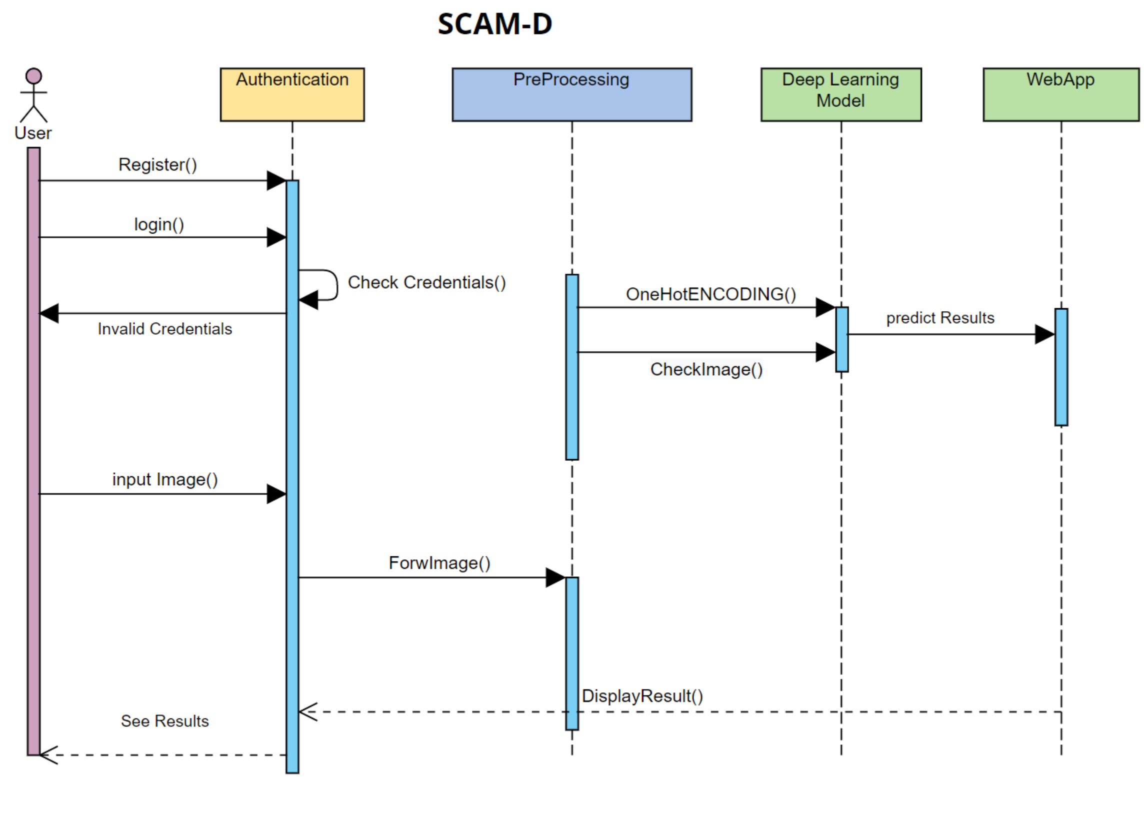

Figure 16: Sequence Diagram

3.12 Component Diagram

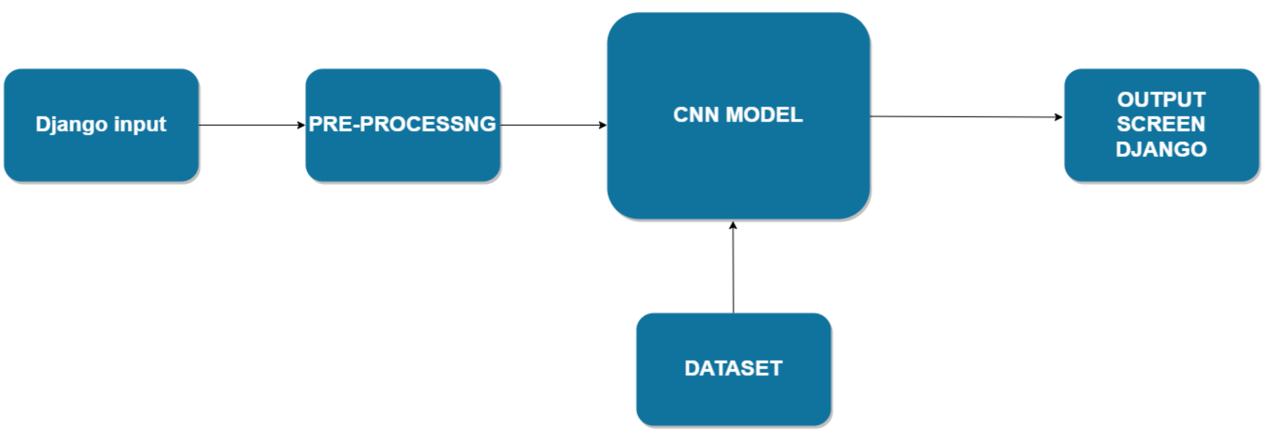

Figure 17: Component Diagram

Chapter 4: Code Analysis and Evaluation

Code:

importing Essential Libraries

```
import os

%matplotlib inline
import matplotlib.pyplot as plt
import numpy as np
import pandas as pd
import os
from glob import glob
import seaborn as sns
from PIL import Image
np.random.seed(11) # It's my lucky number
from sklearn.preprocessing import StandardScaler
from sklearn.model_selection import train_test_split, KFold, cross_val_score, GridSearchCV
from sklearn.metrics import accuracy_score
import itertools

import keras
from keras.utils.np_utils import to_categorical # used for converting labels to one-hot-encoding
from keras.models import Sequential, Model
from keras.layers import Dense, Dropout, Flatten, Conv2D, MaxPool2D
from keras import backend as K
```

Model Building

```
# See learning curve and validation curve

def build(input_shape= (224,224,3), lr = 1e-3, num_classes= 2,
          init= 'normal', activ= 'relu', optim= 'adam'):
    model = Sequential()
    model.add(Conv2D(64, kernel_size=(3, 3),padding = 'Same',input_shape=input_shape,
                     activation= activ, kernel_initializer='glorot_uniform'))
    model.add(MaxPool2D(pool_size = (2, 2)))
    model.add(Dropout(0.25))

    model.add(Conv2D(64, kernel_size=(3, 3),padding = 'Same',
                     activation =activ, kernel_initializer = 'glorot_uniform'))
    model.add(MaxPool2D(pool_size = (2, 2)))
    model.add(Dropout(0.25))

    model.add(Flatten())
    model.add(Dense(128, activation='relu', kernel_initializer=init))
    model.add(Dense(num_classes, activation='softmax'))
    model.summary()
```

Cross-Validating Model

```
# define 3-fold cross validation test harness
kfold = KFold(n_splits=3, shuffle=True, random_state=11)

cvscores = []
for train, test in kfold.split(X_train, y_train):
  # create model
    model = build(lr=lr,
                  init= init,
                  activ= activ,
                  optim=optim,
                  input_shape= input_shape)

    # Fit the model
    model.fit(X_train[train], y_train[train], epochs=epochs, batch_size=batch_size, verbose=0)
    # evaluate the model
    scores = model.evaluate(X_train[test], y_train[test], verbose=0)
    print("%s: %.2f%%" % (model.metrics_names[1], scores[1]*100))
    cvscores.append(scores[1] * 100)
    K.clear_session()
    del model
```

Testing the model

First the model has to be fitted with all the data, such that no data is left out.

```
# Fitting model to all data
model = build(lr=lr,
              init= init,
              activ= activ,
              optim=optim,
              input_shape= input_shape)

model.fit(X_train, y_train,
          epochs=epochs, batch_size= batch_size, verbose=0,
          callbacks=[learning_rate_reduction]
         )

# Testing model on test data to evaluate
y_pred = model.predict_classes(X_test)

print(accuracy_score(np.argmax(y_test, axis=1),y_pred))
```

ResNet50

The CNN above is not a very sophisticated model, thus the resnet50, is also tried

```
input_shape = (224,224,3)
lr = 1e-5
epochs = 50
batch_size = 64

model = ResNet50(include_top=True,
                 weights= None,
                 input_tensor=None,
                 input_shape=input_shape,
                 pooling='avg',
                 classes=2)

model.compile(optimizer = Adam(lr) ,
              loss = "binary_crossentropy",
              metrics=["accuracy"])

history = model.fit(X_train, y_train, validation_split=0.2,
                    epochs= epochs, batch_size= batch_size, verbose=2,
                    callbacks=[learning_rate_reduction]
```

```
[ ] # Train ResNet50 on all the data
    model.fit(X_train, y_train,
              epochs=epochs, batch_size= epochs, verbose=0,
              callbacks=[learning_rate_reduction]
             )
```

```
# Testing model on test data to evaluate
y_pred = model.predict(X_test)
print(accuracy_score(np.argmax(y_test, axis=1), np.argmax(y_pred, axis=1)))

# save model
# serialize model to JSON
resnet50_json = model.to_json()

with open("resnet50.json", "w") as json_file:
    json_file.write(resnet50_json)

# serialize weights to HDF5
model.save_weights("resnet50.h5")
print("Saved model to disk")
```

Predication code :

```python
import sys
import os
import glob
import re
import numpy as np
import tensorflow as tf
from django.http import HttpResponse
from django.shortcuts import render
from tensorflow.keras.models import load_model
from werkzeug.utils import secure_filename
from tensorflow.keras.applications.resnet50 import preprocess_input
from tensorflow.keras.preprocessing import image
from tensorflow.compat.v1 import ConfigProto
from tensorflow.compat.v1 import InteractiveSession

def model_predict2(img_path, model):
    print(img_path)
    img = image.load_img(img_path, target_size=(224, 224))

    # Preprocessing the image
    x = image.img_to_array(img)
    # x = np.true_divide(x, 255)
    ## Scaling
    x=x/255
    x = np.expand_dims(x, axis=0)
    return "Something wrong with image. Model Cant process it."
```

```python
def predict_output_old(request):
    print("i am here")
    return HttpResponse("Path clear")

from django.http import HttpResponse
from django.shortcuts import render, redirect
from .forms import *

# Create your views here.
def predict_output(request):
    form = RiceForm()
    if request.method == 'POST':
        print(request.FILES['file'].name)
        form = RiceForm(request.POST, request.FILES)
        if form.is_valid():
            user_pr = form.save(commit=False)
            user_pr.file = request.FILES['file']
            print(user_pr.file.url)
            # f = request.post.files['file']

            basepath = os.path.dirname(__file__)
            print(basepath)
            user_pr.save()
            print("photo saved at ",(user_pr.file.url))


            MODEL_PATH = os.path.join(basepath,'static\\resnet50_new.h5')
            print(MODEL_PATH)
            model = load_model(MODEL_PATH)
            filename = request.FILES['file'].name
            file_path = os.getcwd()
            file_path_full = os.path.join(file_path,'media',filename)
            if "skin" in file_path_full:
                # Make prediction
```

```
            file_path = os.getcwd()
            file_path_full = os.path.join(file_path,'media',filename)
            if "skin" in file_path_full:
                # Make prediction
                preds = model_predict(file_path_full, model)
                result=preds
                return HttpResponse(result)
            else:
                result = model_predict2(file_path_full, model)
                return HttpResponse(result)

        else:
            return HttpResponse('Invalid')

def success(request):
    return HttpResponse('successfully uploaded')
```

```
from django.urls import path
from . import views


from django.conf import settings
from django.conf.urls.static import static

urlpatterns = [

    path('', views.index),
    path('home', views.Mainpage,name="home"),
    path('mainPage/', views.OurProject,name="mainPage"),
    path('mainPage/predict_it', views.predict_output,name="predict_it"),
    path('predict', views.predict_output,name="predict"),
    # path('', views.index),/predict
]

if settings.DEBUG:
        urlpatterns += static(settings.MEDIA_URL,
                              document_root=settings.MEDIA_ROOT)
```

Diagnosing skin cancer

Visual inspection is often the first step in the process of diagnosing skin cancer. Monthly self-examinations and yearly doctor visits are recommended for checking for skin cancer by the Skin Cancer Foundation and the American Cancer Society. If your doctor finds something out of the ordinary, he or she will perform a thorough examination of the area, taking note of the size, shape, colour, and texture of the object, as well as any bleeding or scaling. If your doctor suspects that any of your lymph nodes are enlarged, he or she may perform a lymph node exam. Your primary care physician may suggest you see a dermatologist for a more in-depth evaluation and diagnosis.

Diagnosis

In order to make a skin cancer diagnosis, a doctor may:

- **Examine your skin.**

  The doctor might take a look at your skin to check for skin cancer. In order to determine whether or not the changes you've noticed are the result of skin cancer, your doctor may perform a skin exam. Additional testing may be necessary to definitively establish the diagnosis.

- **Remove a sample of skin for testing (skin biopsy).**

  Collect a sample of the skin you're concerned about (skin biopsy). If your doctor notices anything unusual on your skin, he or she may suggest taking a sample. If you have skin cancer, a biopsy will tell you what kind it is.

Determining the extent of the skin cancer

Your doctor may advise you to have any suspicious skin biopsied in order to rule out more serious conditions. If you have skin cancer, a biopsy will tell you what kind it is.

Because basal cell carcinoma and other forms of superficial skin cancer rarely metastasize, a biopsy that removes the entire tumour is usually sufficient for staging purposes. Additional testing to determine the full extent of your cancer may be recommended if you have a large squamous cell carcinoma, Merkel cell carcinoma, or melanoma.

It is possible to perform imaging tests to check lymph nodes for cancer, and there is also a treatment option that involves surgically removing a lymph node from the area and analysing it for cancer signs (sentinel lymph node biopsy).

Biopsy

Multiple different types of biopsies can be performed. However, an excisional biopsy, in which the clinician removes the entire tumour, is sufficient in many instances of skin cancer treatment.

The excisional biopsy, in which the entire growth is removed, is a common method of treating skin cancer.

Shave biopsies, in which the top layers of the lesion are removed with a razor blade, and punch biopsies, in which a small, circular section of the tum, including deeper layers of skin, is removed with a specialised tool, are the two most common types of skin biopsies.

Lymph nodes that raise suspicion may undergo a biopsy to determine the presence of cancer cells.

Imaging tests

Basal cell carcinoma, the most common type of skin cancer, and the vast majority of other skin cancers are contained within the original site of the cancer and do not metastasize to other parts of the body. Melanoma and Merkel cell carcinoma are among the most malignant cancers and have an exceptionally high rate of metastasis. Medical imaging can be used to check for metastasis, or the spread of cancer, to other parts of the body, such as the lungs, liver, or bones. Here are a few illustrations:

Scans by Computed Tomography

X-ray\sMRI

These procedures cause no discomfort whatsoever. If they find any potential problem areas or evidence of metastases, a more extensive biopsy may be necessary.

Diagnosis; skin biopsy

The dermatologist will remove the area totally or in part if it appears to be skin cancer. This is an easy task to complete during your session. Your dermatologist will perform a skin biopsy to remove the spot.

Your dermatologist will use a microscope to evaluate what he or she removes.A biopsy of the removed skin will allow the doctor to check for cancer cells. Your biopsy report will specify the type of skin cancer cells found, if any were detected. If no cancerous cells were found during the biopsy, the results will be explained in detail in a report.

How to find a dermatologist

If you find a strange spot on your skin, a trip to the dermatologist can put your mind at ease. Dermatologists have more experience than any other type of doctor in identifying skin cancer because of their extensive training and focus on skin health.

Chapter 5: Conclusion

Skin cancer has recently been dubbed the most dangerous and prevalent type of cancer in humans. Skin cancer comes in a variety of forms. Melanoma is a frequent type of skin cancer, and early detection can help treat it and, hopefully, prevent death from it. The invention of a method that allows for the early detection of skin cancer is extremely beneficial and valuable. For the best detection of cancer from dermoscopy images, this study used an improved channel technique. After preprocessing the input dermoscopy picture, the suggested method segmented the region of interest based on noise reduction and discrepancy improvement. We also applied point birth to the split images in order to highlight useful features. Finally, we divided the image into two classes, healthy and cancerous, using the optimized Deep Believe Network (DBN). The heat exchange optimization technique was designed to improve network efficacy in terms of trust and delicacy. DBN optimization adopted this new metaheuristic approach. As a result, the suggested system's key contribution is to apply a recently established interpretation of a recently released heat exchange optimization for the assessment of terrible cancer. The key benefit of utilizing this style is that the results demonstrate that it increases the system's effectiveness in terms of both delicacy and delicacy, i.e., it increases the ability to trust during colorful runs. Fractal analysis, CNN, Delaunay triangulation, Side by Side system, inheritable algorithm, emulsion system, and SVM were used to compare the suggested system's performance against seven other styles. Simulation findings reveal that the suggested system produces attractive outcomes for the comparative methods based on a variety of performance indicators. The proposed system's main flaw is that it takes a long time to complete due to various software methods. We will concentrate on designing styles that simplify the system from theoretical techniques to real-time systems for practical usage in unborn exploration.

Basal Cell Carcinoma

The epidermis' basal cells are the site of development for basal cell cancer. Keratinocytes, the skin's specialized cells, are all derived from basal cells, a type of stem cell. They can be found in the base stratum. Basal cell carcinoma is the most prevalent form of skin cancer. Every year, over four million cases are reported in the United States. A basal cell carcinoma may appear as a pearly or waxy mass, such as the one depicted. Basal cell carcinomas seldom spread (or metastasis), thus a biopsy, which involves removing the tumor from the skin and examining it in a medical lab, is typically adequate to cure them.

Squamous Cell Carcinoma

Squamous cell cancer develops in the epidermis' squamous cells. Squamous cells are flattened, keratin-filled cells found in the epidermis' upper layers. The 2nd most frequent type of skin cancer is squamous cell carcinoma. Every year, almost two million cases are reported in the United States. Squamous cell carcinoma can take the form of a hard, red mass or a flat, scaly, or crusty lesion, as shown in figure. Because squamous cell carcinomas are usually contained and do not spread, they may usually be removed surgically.

Melanoma

Melanoma begins in the epidermis' melanocytes. Melanocytes are melanin-producing cells present in the epidermis' stratum Basale. Melanoma, least common type of skin cancer, accounting for only about 1% of all cases. Melanoma, on the other hand, is the most dangerous form of skin cancer. Melanoma is a malignant tumor on the skin that is responsible for the deaths due to skin cancer. It will metastasis and spread to different parts of the body if not treated. Most patients live for at least five years if melanoma is identified early and while it is still localized in the skin. Melanoma patients who are diagnosed after the cancer has spread to other organs have a 17% probability of living for five years.

Chapter 6: Future Work

Sunscreen's significance in preventing premature ageing of the skin

Research shows that daily sunscreen use significantly reduces skin ageing in middle-aged men and women. Results show that daily use of an SPF 15+ broad-spectrum (UVA/UVB) sunscreen reduces skin ageing by 24%. (And reapplied sunscreen after sweating, bathing, or spending more than a few hours outdoors).

The sun's UV radiation are responsible for more than 90% of apparent skin changes linked with ageing.

Statement by Skin Cancer Foundation:

"This study underlines the importance of applying daily sunscreen as part of a full sun protection strategy that includes seeking shade and wearing protective gear such as wide-brimmed hats and UV-blocking eyewear," said the Skin Cancer Foundation.

How to combat skin cancer

- A New Skin Cancer Treatment Is Showing Signs of Success: Here's How It Works According to the researchers, this type of radiation treatment may be a better option for elderly people and others who may have problems following surgery.

- Some experts questioned the findings and asked for more research comparing brachytherapy to more traditional methods like surgery.

How the treatment works

High-dose rate brachytherapy is a type of radiation therapy in which radiation is directed to specific areas where cancer has been detected.

This means that the radiation is more precisely targeted than in traditional radiation therapy, perhaps leading in fewer side effects and a shorter treatment time.

Basal cell carcinoma and squamous cell carcinoma are the most and second most common forms of skin cancer, respectively, and their response to brachytherapy was investigated.

References and Work Cited

1. Stack Over Flow, 2022: http://www.stackoverflow.com/
2. Geeks for Geeks, 2022: https://www.geeksforgeeks.org/
3. Research Gate, 2022: https://www.researchgate.net/
4. A2 Hosting, 2022: https://www.a2hosting.com/
5. Kaggale, 2022:: http://www.kaggle.com/
6. W3Schools, 2021: https://www.w3schools.com/
7. Webopedia, 2022: https://www.webopedia.com/
8. E. Crocetti, S. Mallone, T. Robsahm, … A. G.-E. J. of, and undefined 2015, ‘‘Survival of patients with skin-melanoma in Europian Countries increases further: results of the EUROCARE-5 study,’’ *Elsevier*, Accessed: Aug. 02, 2021. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S0959804915007455.
9. D. Schadendorf, D. Fisher, … C. G.-N. reviews D., and undefined 2015, ‘‘Melanoma,’’ *nature.com*, 2015, doi: 10.1038/nrdp.2015.3.

10. H. Chang, ''Skin cancer reorganization and classification with deep neural network,'' Mar. 2017, Accessed: Aug. 02, 2021. [Online]. Available: https://arxiv.org/abs/1703.00534v1.
11. M. Vestergaard, P. Macaskill, … P. H.-B. J. of, and undefined 2008, ''Dermoscopy compared with naked-eye examination for the diagnosis of primary form of melanoma: a meta-analysis of studies performed in a clinical setting'' *Wiley Online Libr.*, vol. 159, no. 3, pp. 669–676, Sep. 2006, doi: 10.1111/j.1365-2133.2008.08713.x.
12. A. Esteva, B. Kuprel, R. Novoa, J. Ko, S. S.- nature, and undefined 2017, ''Dermatologist level classification of skin-cancer with deep neural-networks,'' *nature.com*, Accessed: Aug. 02, 2021. [Online]. Available: https://www.nature.com/articles/nature21056?spm=5176.100239.blogcont100708.20.u9mVh9.
13. T. J. Brinker *et al.*, ''Skin cancer classification using convolutional neural networks: Systematic review,'' *J. Med. Internet Res.*, vol. 20, no. 10, 2018, doi: 10.2196/11936.
14. T. Brinker, A. Hekler, A. Enk, … J. K.-E. J. of, and undefined 2019, ''Deep learning outperformed 136 of 157 dermatologists in a head-to-head dermoscopic melanoma image classification task,'' *Elsevier*, Accessed: Aug. 02, 2021. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S0959804919302217.
15. T. Brinker, A. Hekler, A. Enk, … J. K.-E. J. of, and undefined 2019, ''A convolutional neural-network trained with dermo images performed on par with 145-dermatologists in a clinical melanoma image classifications task,'' *Elsevier*, Accessed: Aug. 02, 2021. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S0959804919301443.

SCAM-D

ORIGINALITY REPORT

7%	6%	1%	3%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	www.drugs.com Internet Source	1%
2	Submitted to Higher Education Commission Pakistan Student Paper	1%
3	Submitted to Universiteit Hasselt Student Paper	1%
4	"The Nurse Practitioner in Urology", Springer Science and Business Media LLC, 2020 Publication	<1%
5	Submitted to Universiti Tunku Abdul Rahman Student Paper	<1%
6	www.univadis.co.uk Internet Source	<1%
7	www.ijert.org Internet Source	<1%
8	scholars.unh.edu Internet Source	<1%