Cairo University
Faculty of Computers and Artificial Intelligence
Department of Computer Sciences

DMC

Detect mouth Cancer

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Graduation Project

Academic Year 2022-2023

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References

1.1 Motivation

- **our motivation is to help people to discover oral cancer by only physical symptoms in early case and contact a list of doctors from home and find out there places using google maps**

- Oral cancer, also known as mouth cancer, is cancer of the lining of the lips, mouth, or upper throat. In the mouth, it most commonly starts as a painless white patch, that thickens, develops red patches, an ulcer, and continues to grow. When on the lips, it commonly looks like a persistent crusting ulcer that does not heal, and slowly grows
-

The symptoms :

- mouth ulcers that are painful and do not heal within several weeks
- unexplained, persistent lumps in the mouth or the neck that do not go away
- unexplained loose teeth or sockets that do not heal after extractions
- unexplained, persistent numbness or an odd feeling on the lip or tongue
- sometimes, white or red patches on the lining of the mouth or tongue These can beearly signs of cancer, so they should also be checked
- changes in speech, such as a lisp.

Mouth cancer is categorized by the type of cell the cancer (carcinoma) starts to grow in.

Squamous cell carcinoma is the most common type of mouth cancer, accounting for 9 out of 10 cases. Squamous cells are found in many areas of the body, including the inside of the mouth and in the skin.Less common types of mouth cancer include:

- adenocarcinoma, which is cancers that develop inside the salivary glands
- sarcoma, which grows from abnormalities in bone, cartilage, muscle or other tissue
- oral malignant melanoma, where cancer starts in the cells that produce skin pigment or colour(melanocytes). These appear as very dark, mottled swellings that often bleed
- Lymphoma, which grows from cells usually found in lymph glands, but they can also grow in themouth.

1.2 Problem definition

The main problem facing us in Oral cancer treatment is our ignorance that this sings for oral cancer By that we miss an opportunity for the patient to find solutions before the disease spreads and his situation deteriorates.
And, if the tumor appears we need to contact doctors and mangment the patient time curation

causes of mouth cancer

Tobacco and alcohol use. Tobacco use of any kind, including cigarette smoking, puts you at risk for developing oral cancers. Heavy alcohol use also increases the risk. Using both tobacco and alcohol increases the risk even further.

HPV. Infection with the sexually transmitted human papillomavirus (specifically the HPV 16 type) has been linked to oral cancers.

Age. Risk increases with age. Oral cancers most often occur in people over the age of 40.

Sun Exposure. Cancer of the lip can be caused by sun exposure.

1.3 Project Objective (suggested solution)

The main idea of our project MCD (Detect Mouth Cancer) is to Make a mobile app which can detect the early signs of Oral cancer, So this helps them discover the disease at an early stage, and then discover nearst specialists using google maps to ensure the presence of the disease and treat it early, all that without leaving their places and The application allows them to use their phone's camera to take an image of the mouth or upload image from the storage on the device to check for early signs of cancer, and then the application allows them to communicate with a list with nearst specialists to treat the disease at an early stage.

you can do all of that without going to hospital or clinic usig deep learninng

(CNN) and Flutter (Dart) mobile app

our motivation is to help people to discover oral cancer by only physical symptoms in early case and contact a doctors from home

1.4 Gantt chart of project time plan

first 4 months:

1. Search about project idea

2. collection datasets

3. Preprocessing

4. Study flutter , firebase

5. Make intial version of mbile application

6. use bloc for hight performance

7. use media query

6. Write the documentation

7. Prepare the presentation

last 4 months:

1. Data augmantaion

2. CNN model

3. Website to detect oral cancer using streamlit

4. local api and ngrok

5. update mobile app with new Feature)google maps)

6- add Image picker to mobile app to take images by camera or upload

7- add firebase authentication to the app

8- add list for nearst oral cancer specialists by location to the app

9- connect the app to model using API by http methods

10 - Write the documentation

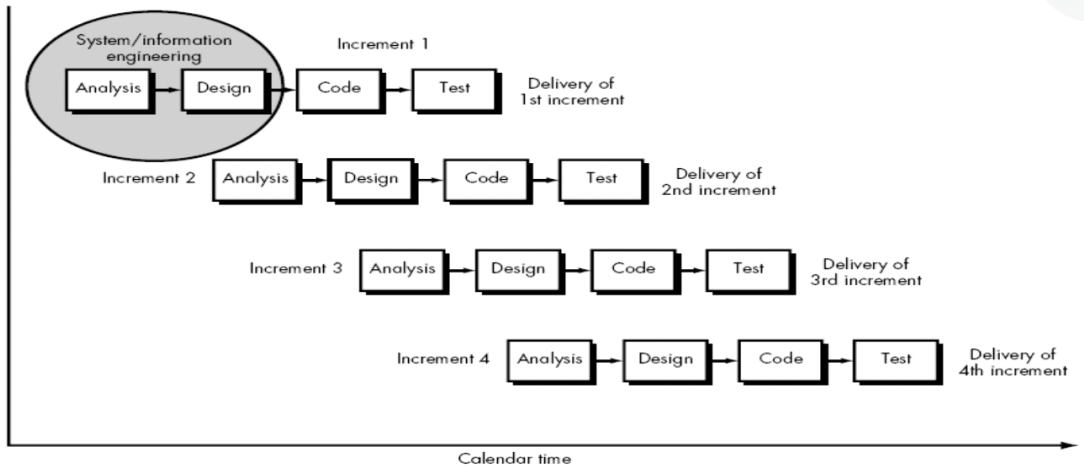
11- Prepare the presentation

1.5 Project development methodology

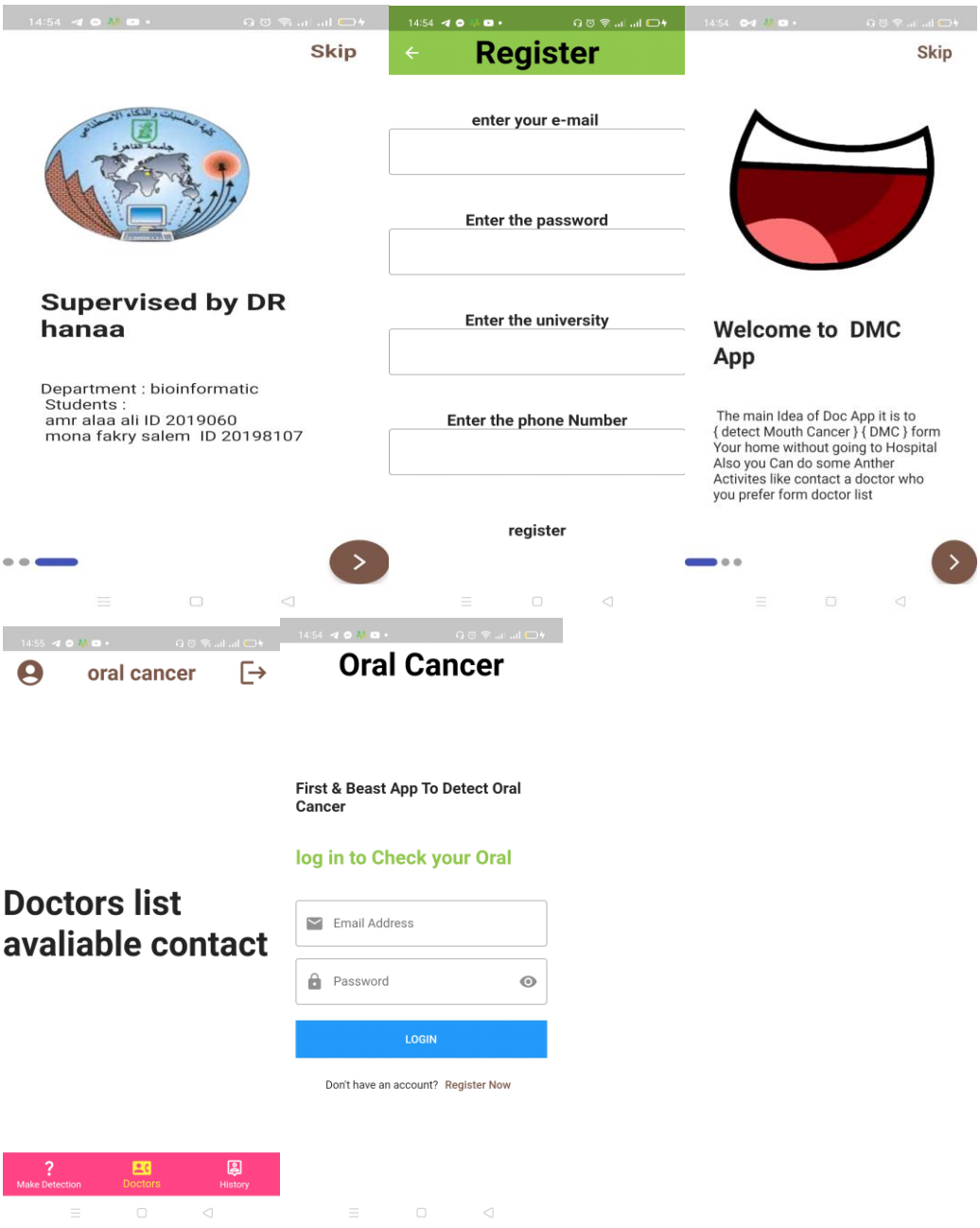
Incremental method:

•Software process model we choosed to implement the app is incremental method

➢ Incremantal Method



first version



last version

1.6 The used tools in the project (SW and HW)

1- Android Studio: Integrated Development Environment (IDE) for Android app development

2-Flutter: an open source framework by Google for building natively compiled, multi-platform applications from a single codebase

3- Dart programming language: Dart is a client-optimized language for fast apps on any platform

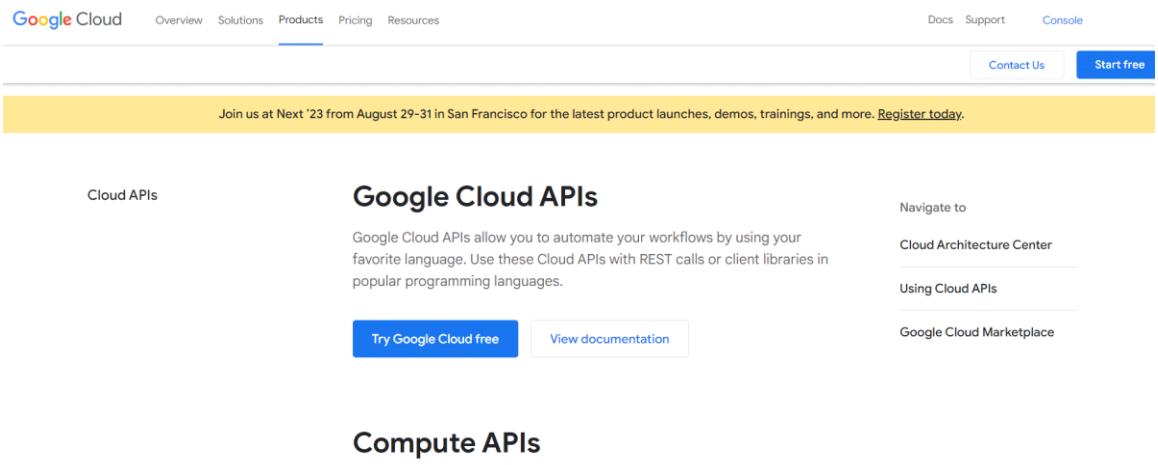
4- Firebase_auth: An API which is Simple, multi-platform

sign-in and sing up

5- Firebase: Realtime Database is a cloud-hosted NoSQL database that lets you store and sync data between your users in realtime.

6- CNN : A Convolutional Neural Network (ConvNet/CNN) is a Deep Learning algorithm and class of artificial neural network (ANN) that can take in an input image and have tens or hundreds of layers that each learn to detect different features of an image

7- Google Maps Platform



8- Streamlit

9- Flak for local API

10- Image picker

Chapter 2 :
Related work

• there are many related works to detect many types of cancer like:
• 1- Oral cancer-classify by RISHABH SINGH using CNN Convolutional Layer with input shape (256,256,3) with accuracy of the model is = 58 %
and it was with only 320 data image
• 2- Oral Cancer (Lips & Tongue) by PRAKHAR PIPERSANIA USING CNN CONVOLUTIONAL LAYER WITH INPUT SHAPE (256,256,3) WITH ACCURACY OF THE MODEL IS = 70%
and it was with only 320 data image
• but The main differences between them and our project that we
• 1- our model using 19953 images after auugmantaion
• 2- our model has accuracy 98%
• 8- we reshaped the model into strong mobile app and site
• 4- our app can navigate in google maps to find out best doctors
• 5- our app is able to find list for nearst doctors by location
• 6- our App using Deep learnning to detect the disease CNN
• 7- Our App its to easy to use just upload And take Image for your mouth using camera

Chapter 3 :system requriements

1.5.1. Functional requirement

• The app response input data from user and send result to user as 0 or 1 which expresses cancer or non cancer

• add time table for drugs

• contact a list of doctors

• view advisment

1.5.2. Non-functional requirement

- **usability**

The site is easy to use and there is nothing ambiguous about it so that the user can register and enter the website and use it easily, and all labels are obvious and user can understand them easily.

- **Performance**

Response time is as quick as possible.

- **Availability**

The Application is available for anyone to use.

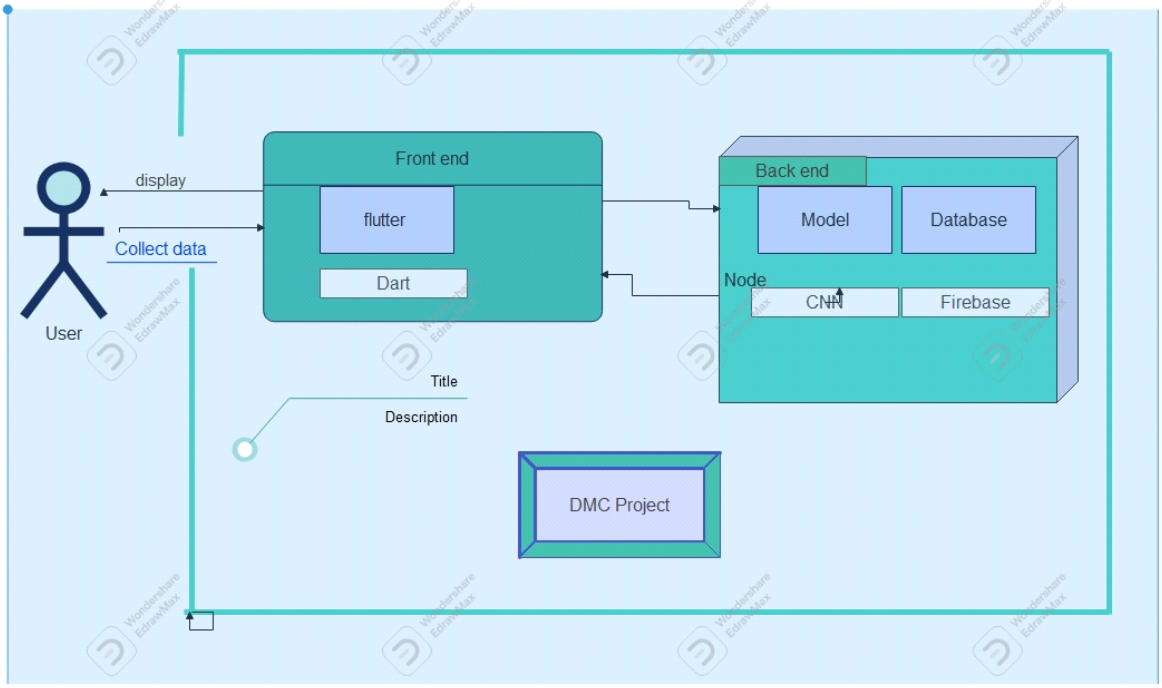
- **Scalability**

The capability of the app handles a growing number of patients.

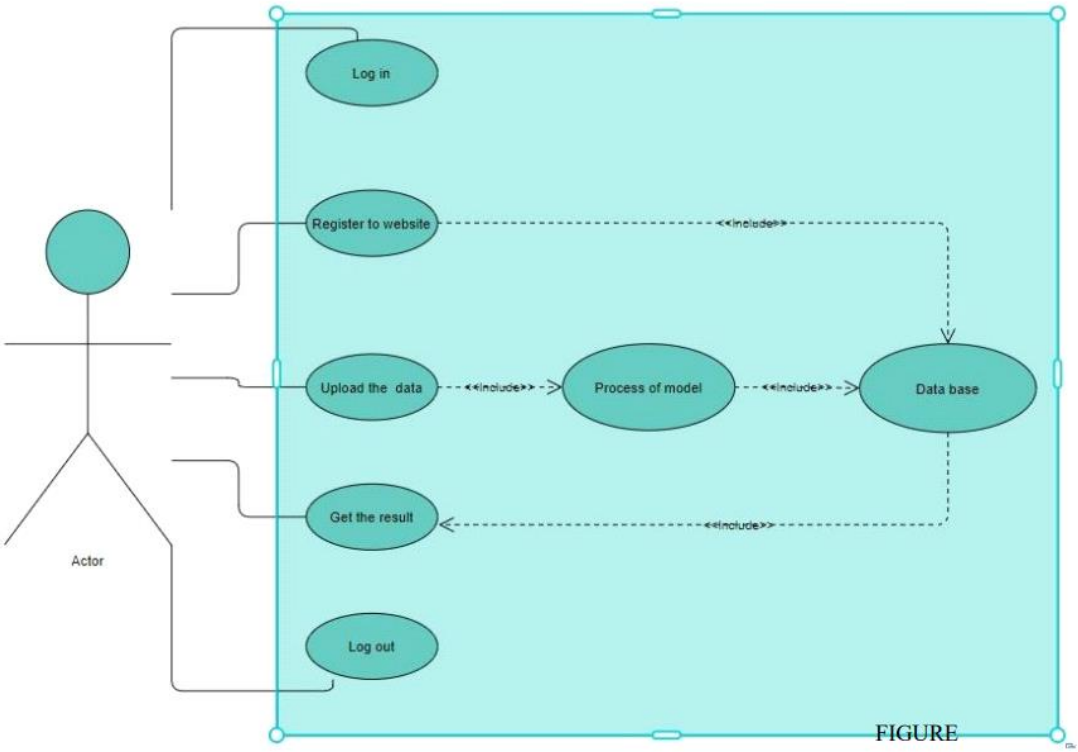
▪ Stackholders

Doctors , patients and simple poeple

- **System architecture**



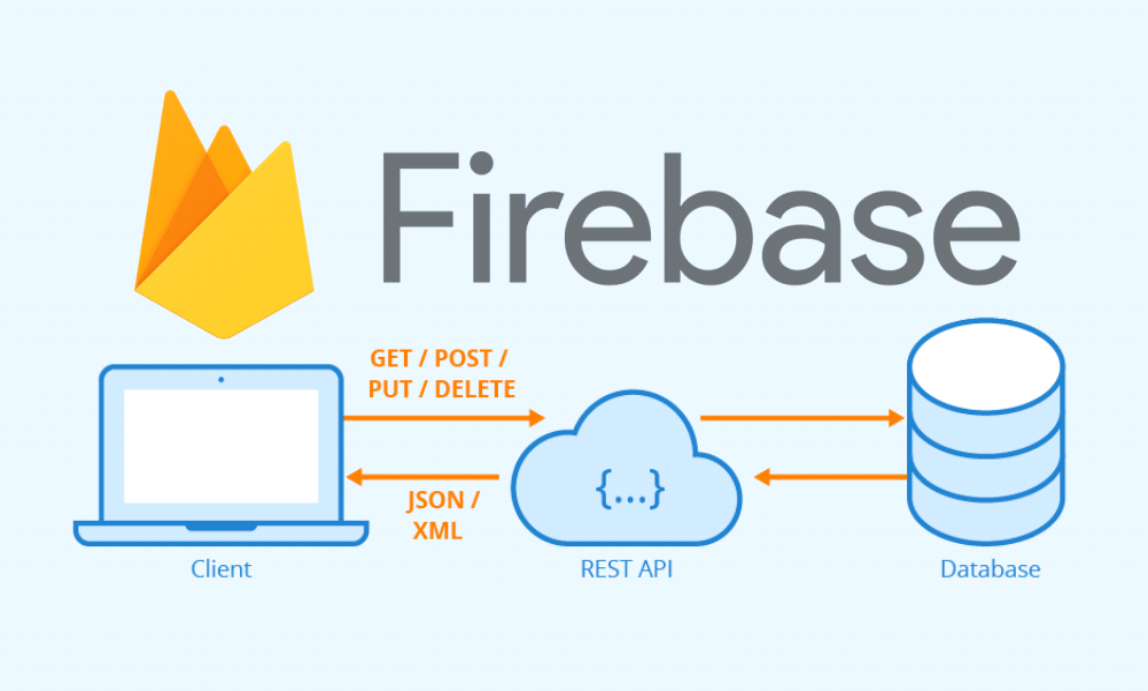
- **Use-case Diagram**



FIGURE

Database

Database built to save user information and to make user enable to log in and sign in.
This database created by Firebase database, it contains to main tables:



Chapter 4: System Design

4.1. System Component Diagram

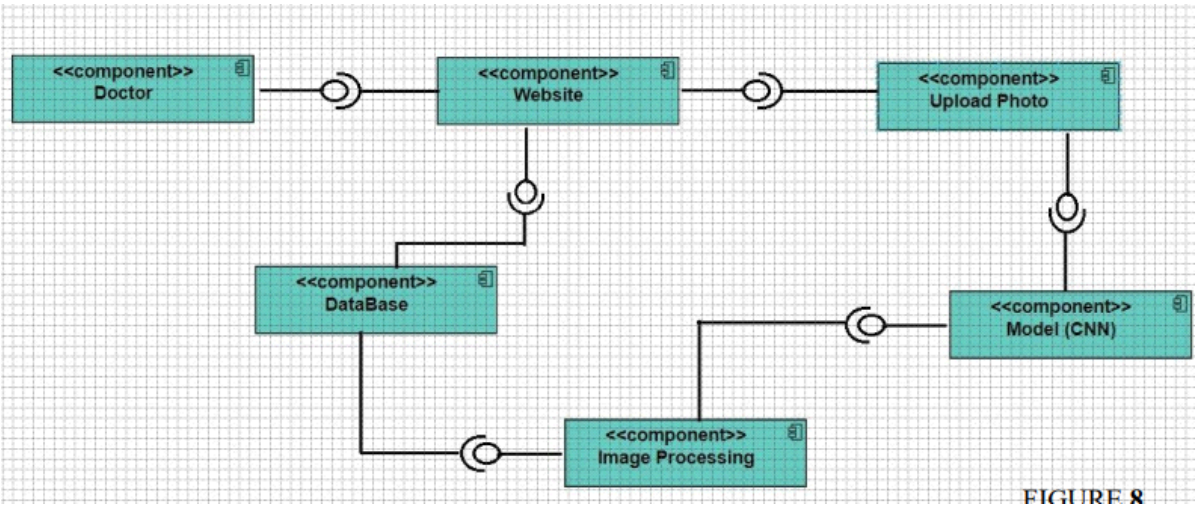
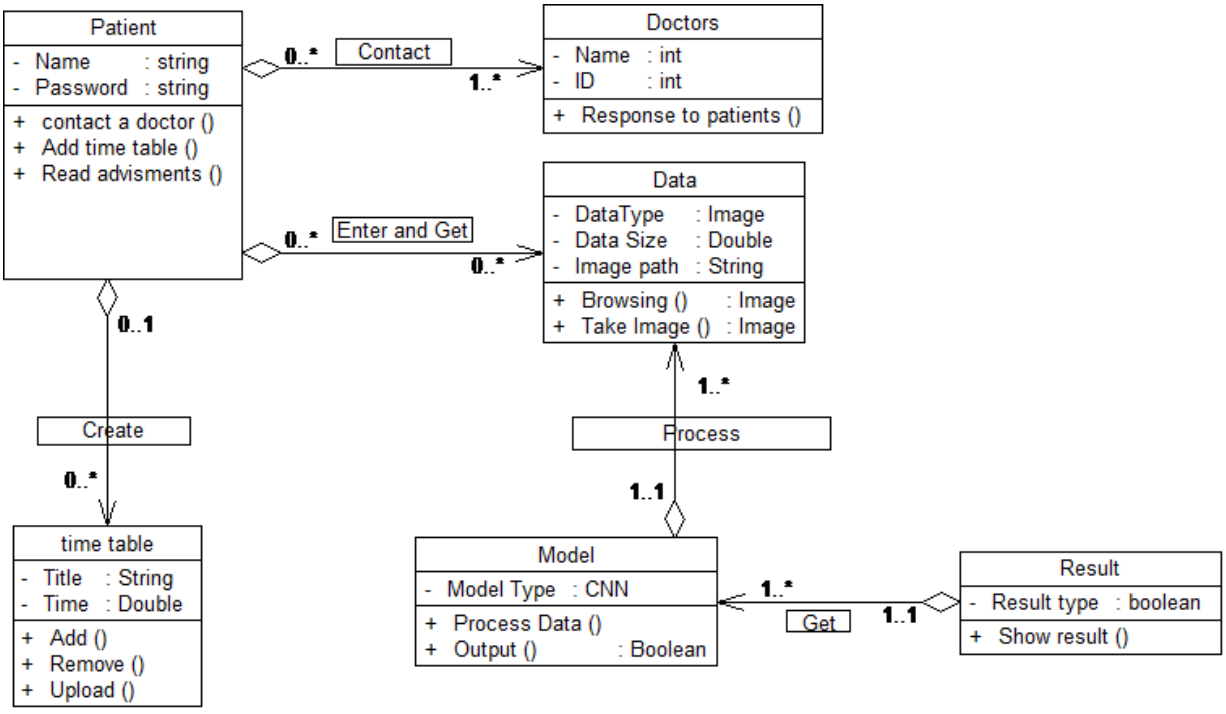
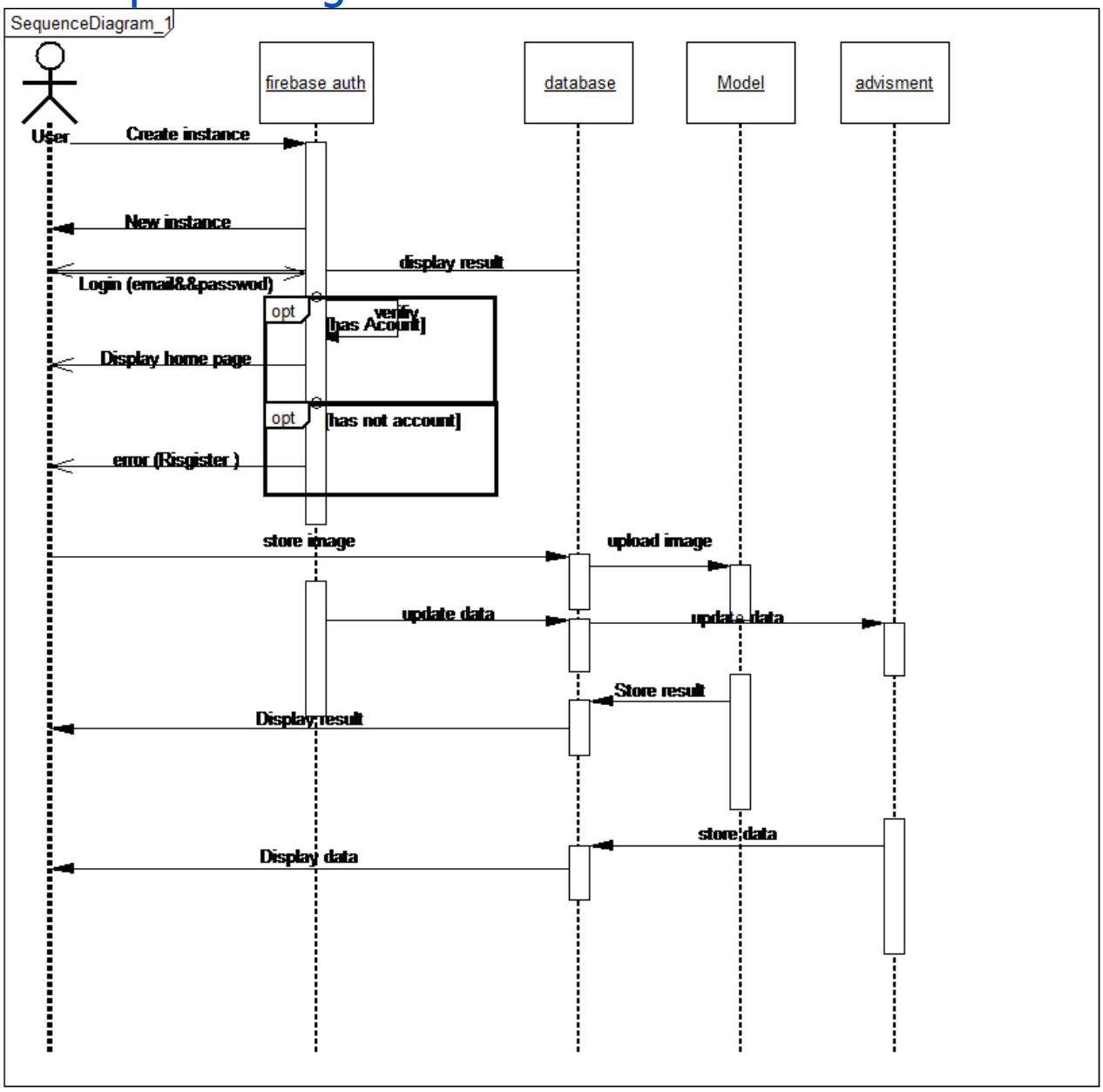


FIGURE 8

4.2. System Class Diagrams:



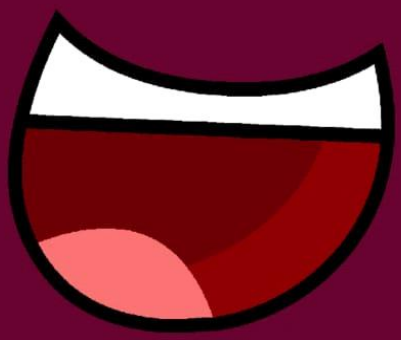
4.3. Sequence Diagrams



4.5. System GUI Design :

6:08

Skip



Welcome to DMC App

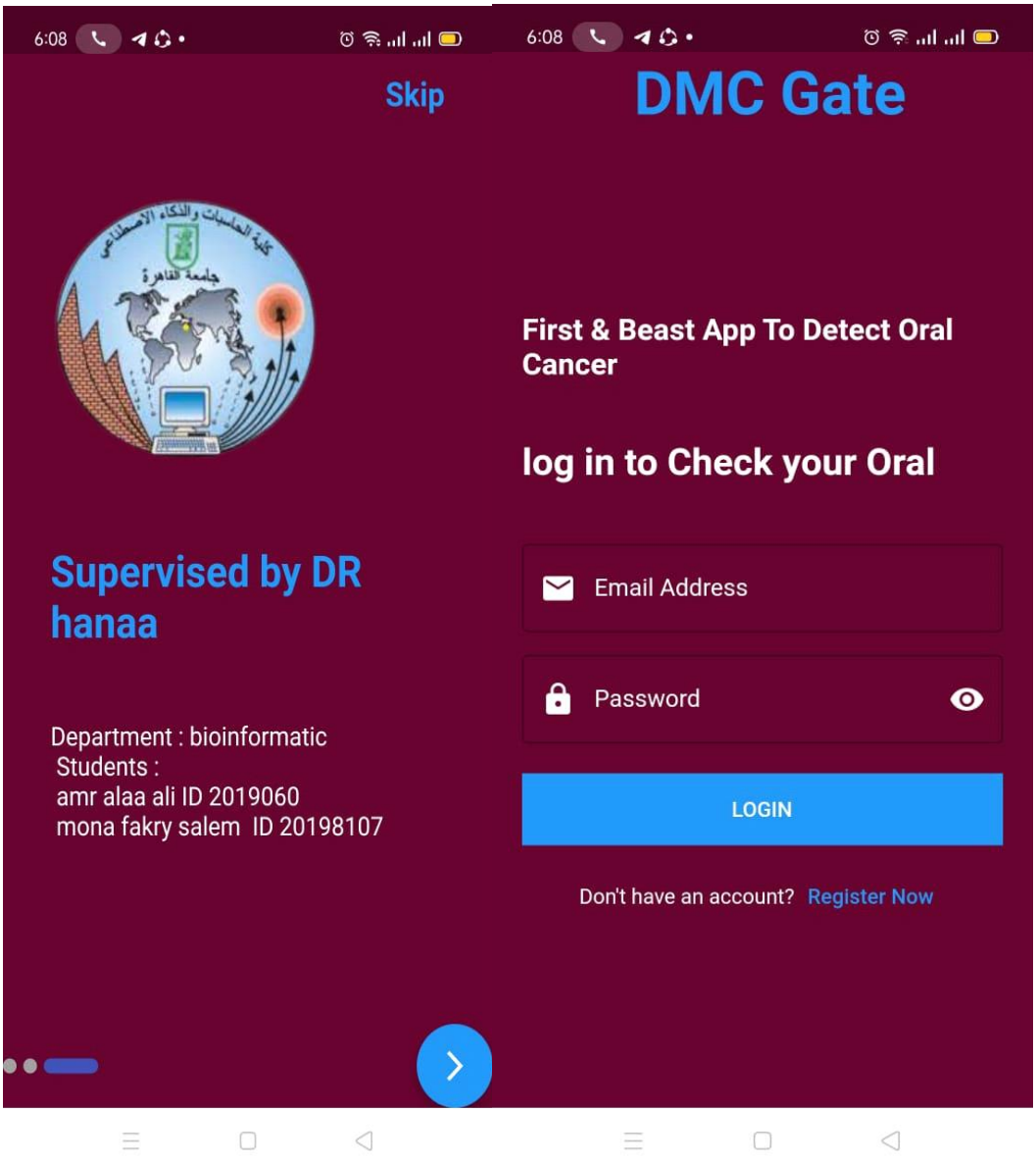
The main Idea of Doc App it is to { detect Mouth Cancer } { DMC } form Your home without going to Hospital Also you Can do some Anther ...

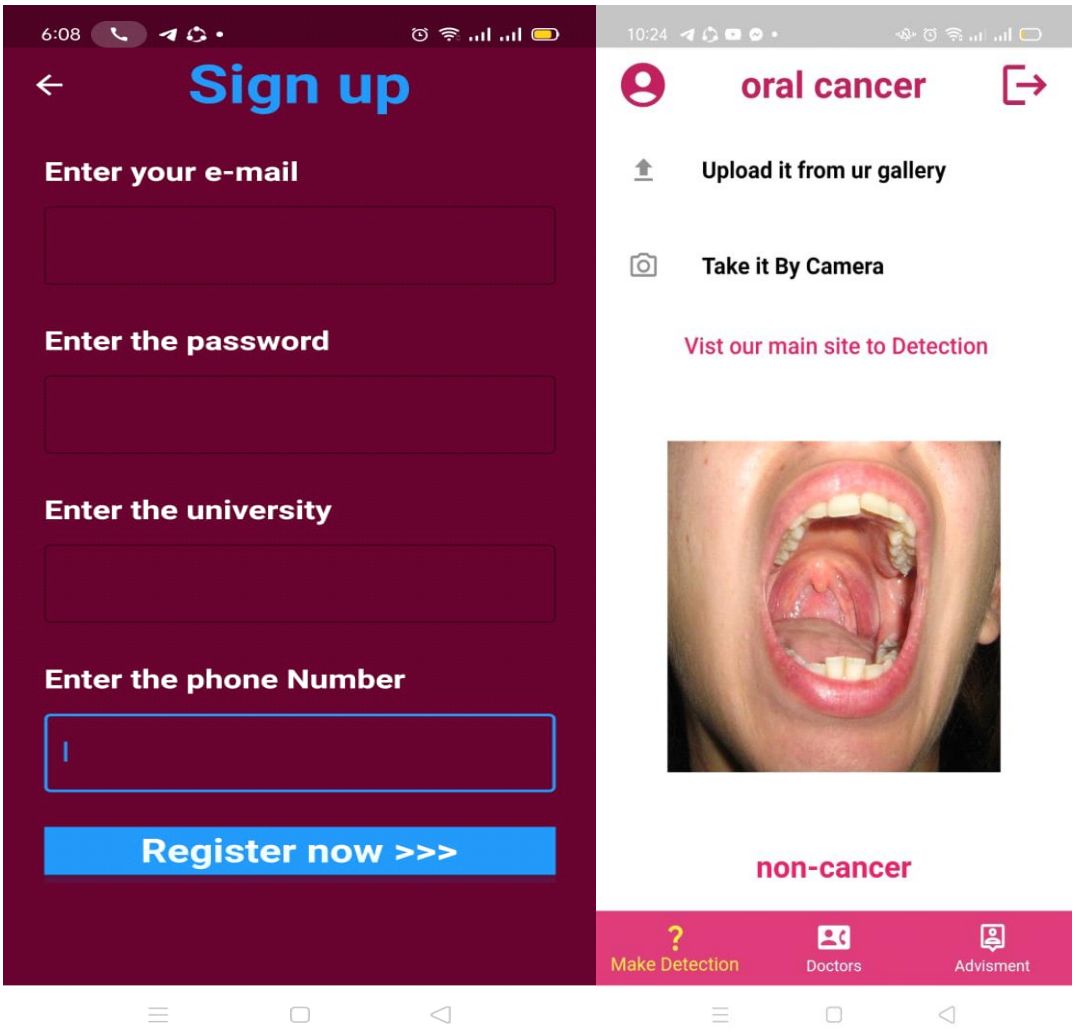
6:08

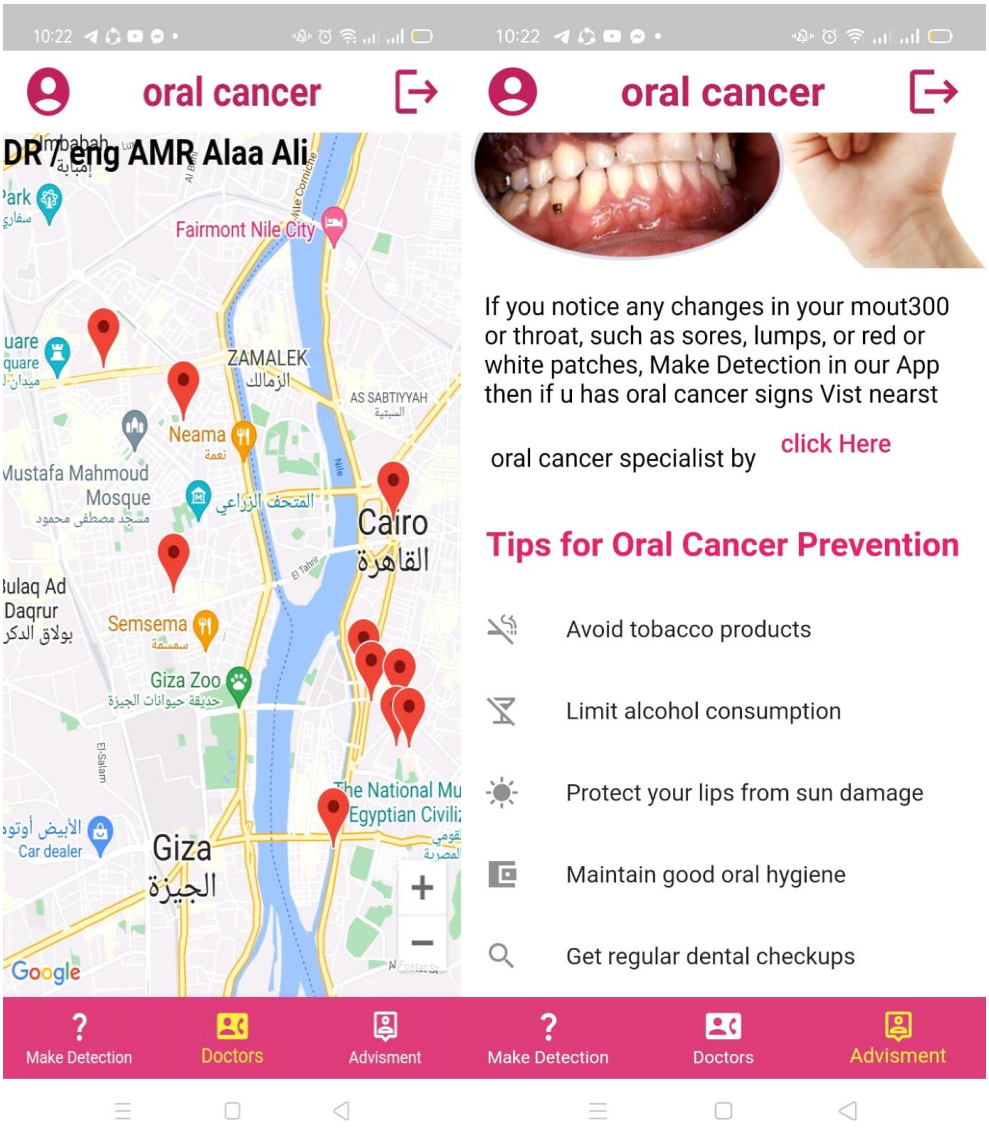
Skip

Mouth Cancer Detection

Mouth cancer, also known as oral cancer, is where a tumour develops in a part of the mouth. It may be on the surface of the tongue, the inside of ...

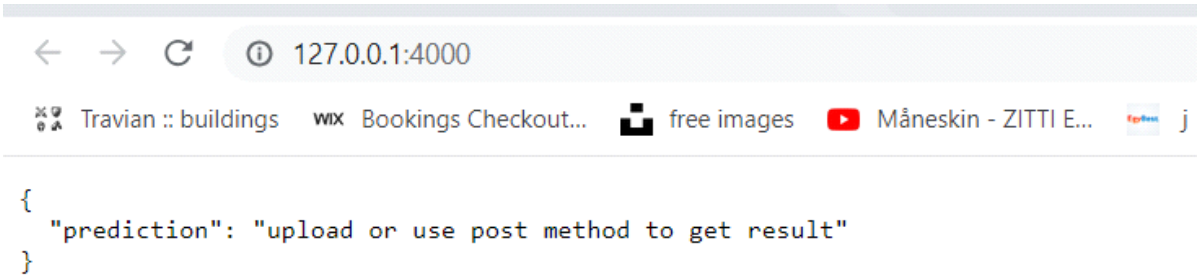

6:08
Skip
Supervised by DR hanaa
Department : bioinformatic
Students :
amr alaa ali ID 2019060
mona fakry salem ID 20198107
6:08
DMC Gate
First & Beast App To Detect Oral Cancer
log in to Check your Oral
Email Address
Password
LOGIN
Don't have an account? Register Now

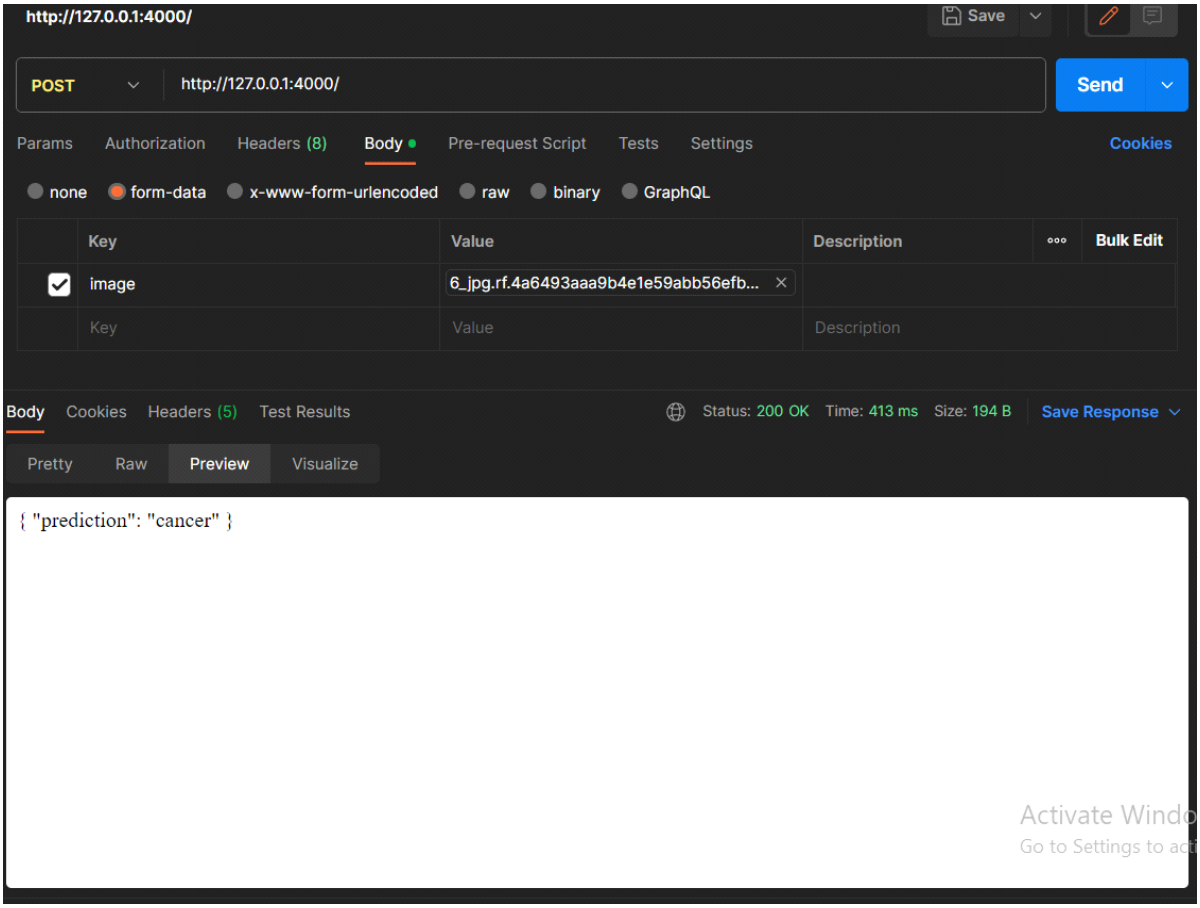

6:08
Sign up
Enter your e-mail
Enter the password
Enter the university
Enter the phone Number
Register now >>>
10:24
oral cancer
Upload it from ur gallery
Take it By Camera
Vist our main site to Detection
non-cancer
Make Detection
Doctors
Advisment



APIs & websites for the model

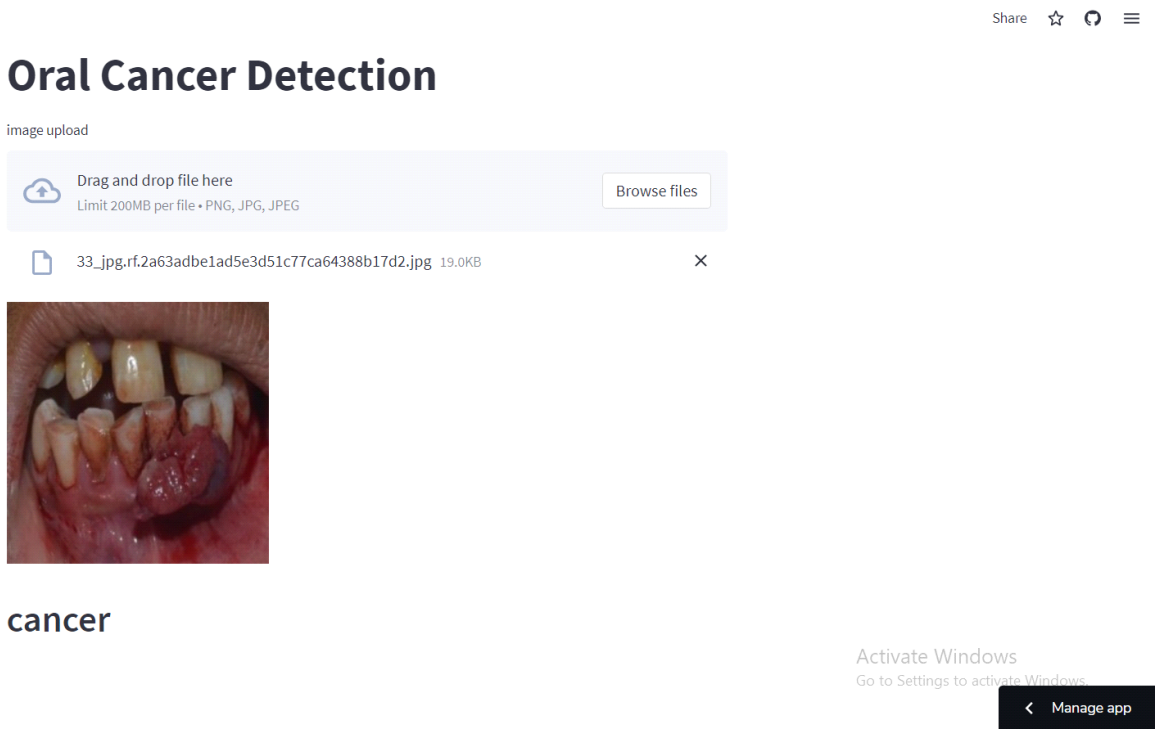
1- local API





2- Streamlit

https://amr8tom-oral-api-dd-h1mb0b.streamlit.app/



Chapter 5: Implementation and Testing

5.1. Overview

Dataset Overview

31 patients' CT images in different stages before and after chemotherapy are
used in our project.
To ensure that we get the best accuracy, we took a sample of the clearest CT
images which appears the tumor, we did it manually to:

- Dataset has 19953 images after augmantation,

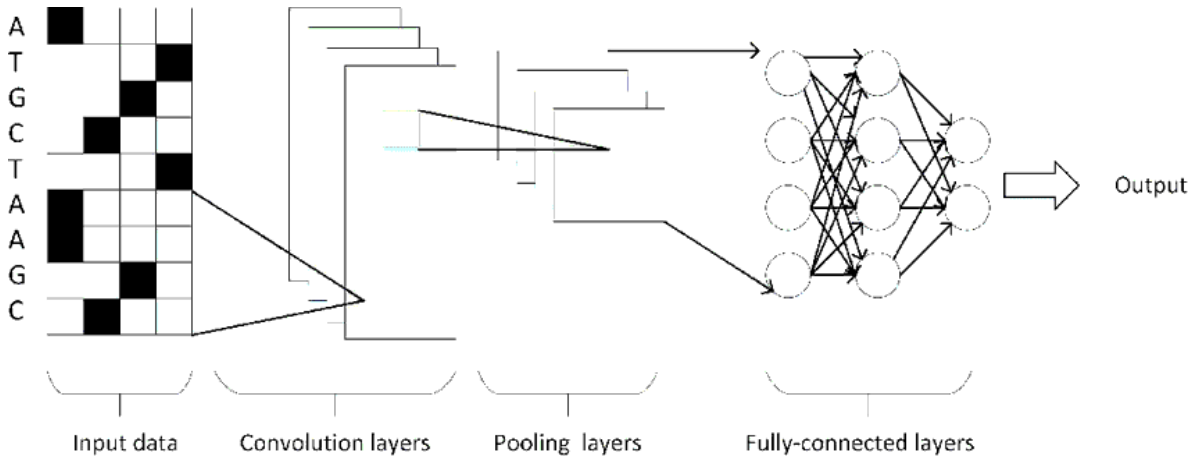
In all models' trials we will use both datasets and compare between accuracies.

5.2. Models Implementation and Testing

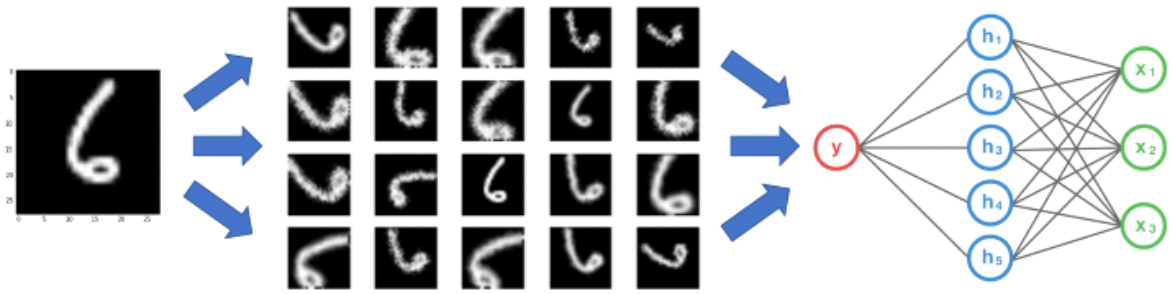
We classified The images into two Classes, (C) Cancer and (N)(Non-Cancer)

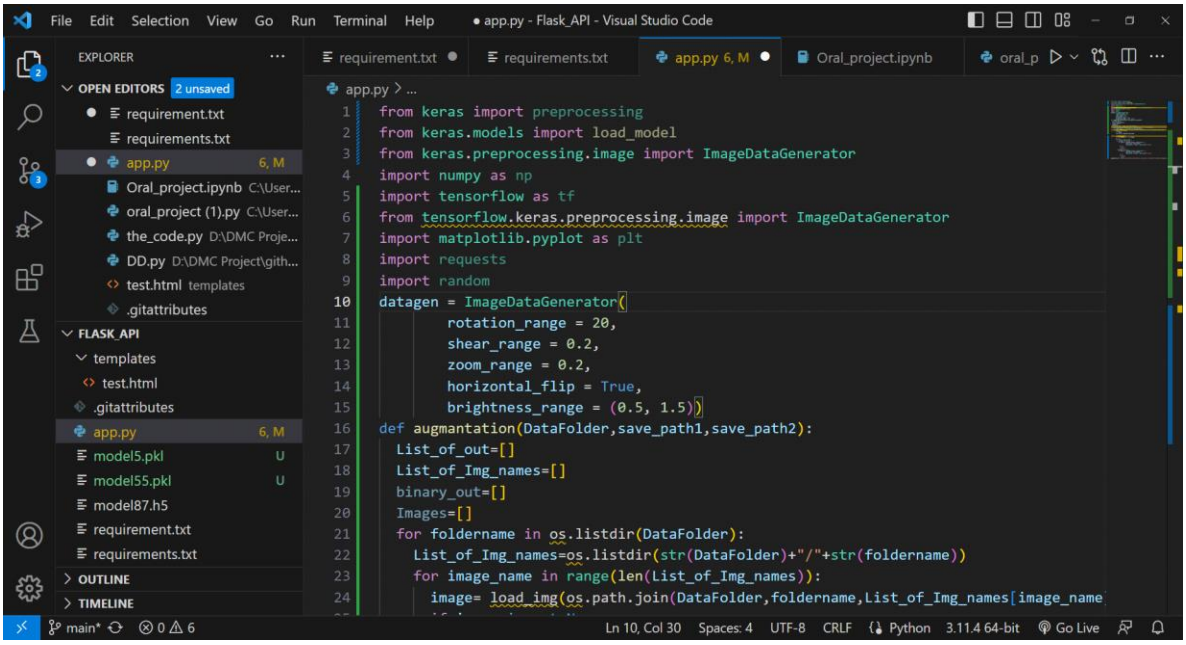
We Used next methods.

5.2.1. Traditional CNN Model :



5.2.2 Data augmantation :



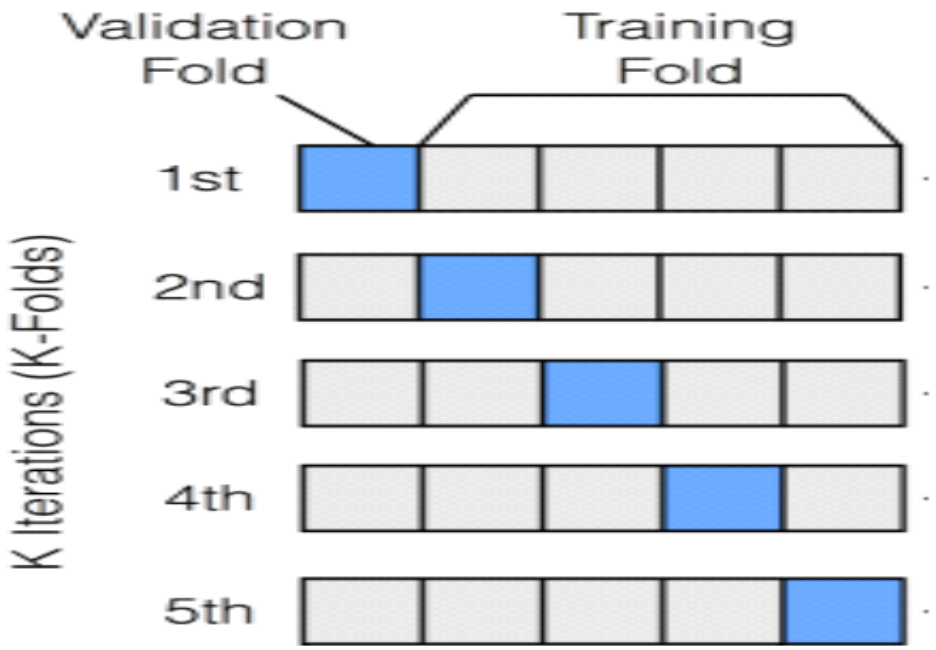


5.2.3. CNN Model with Cross-Validation:

Cross-validation is a technique for evaluating a machine learning model and
testing its performance. It helps to compare and select an appropriate model
for the specific predictive modeling problem.
it tends to have a lower bias than other methods used to count the model's
efficiency scores. It makes cross-validation a powerful tool for selecting the
best model for the specific task.
Algorithm of playing cross
validation:
1- Divide the dataset into 3 parts: using splitfolders.ratio

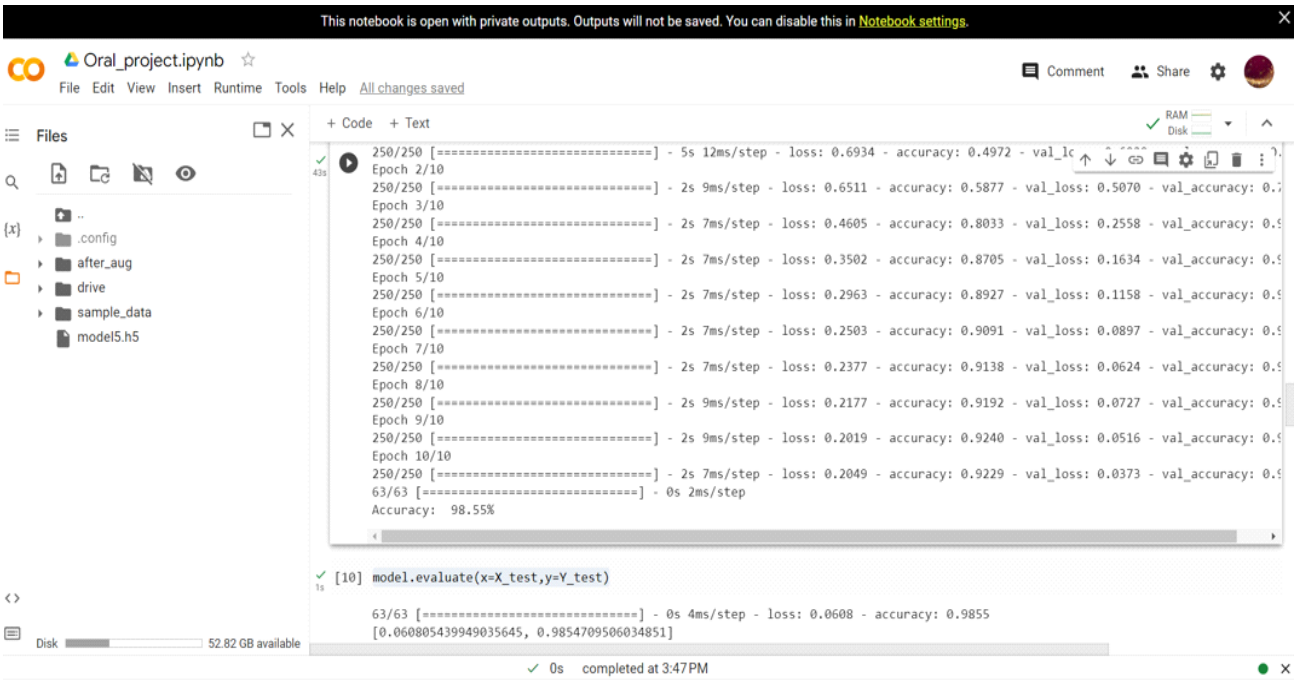
```
# reading and splitting data
#path="/content/drive/MyDrive/OralCancer_Last_data"
path="/content/drive/MyDrive/augmented_data"

splitfolders.ratio(path,"after_aug",(0.7,0.1,0.2))
```



2- Train the model on the training set.
3- Validate the model on the test set .
4- Repeat 1-3 steps a couple of times.
method that you are using.

The model :



refrences:

Sure, here are some references related to oral cancer and models using CNN:

1. https://www.kaggle.com/datasets/shivam17299/oral-cancer-lips-and-tongue-images

2. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7523083/

3 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6551010/

4. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7495088/

5. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6691196/

6.
https://www.sciencedirect.com/science/article/abs/pii/S1386505619301913

7. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6170521/