אוניברסיטת חיפה
UNIVERSITY OF HAIFA
جامعة حيفا

User Guide for proHealth360 final project

PROHEALTH360
WHERE HEALTH MEETS INNOVATION

Team
Aseel Khawaled - 211752969
Maria Orabi - 212394134
Ameera Rayan- 211864053
Supervised by:
Dr.George Martvel

Table of content

Introduction :

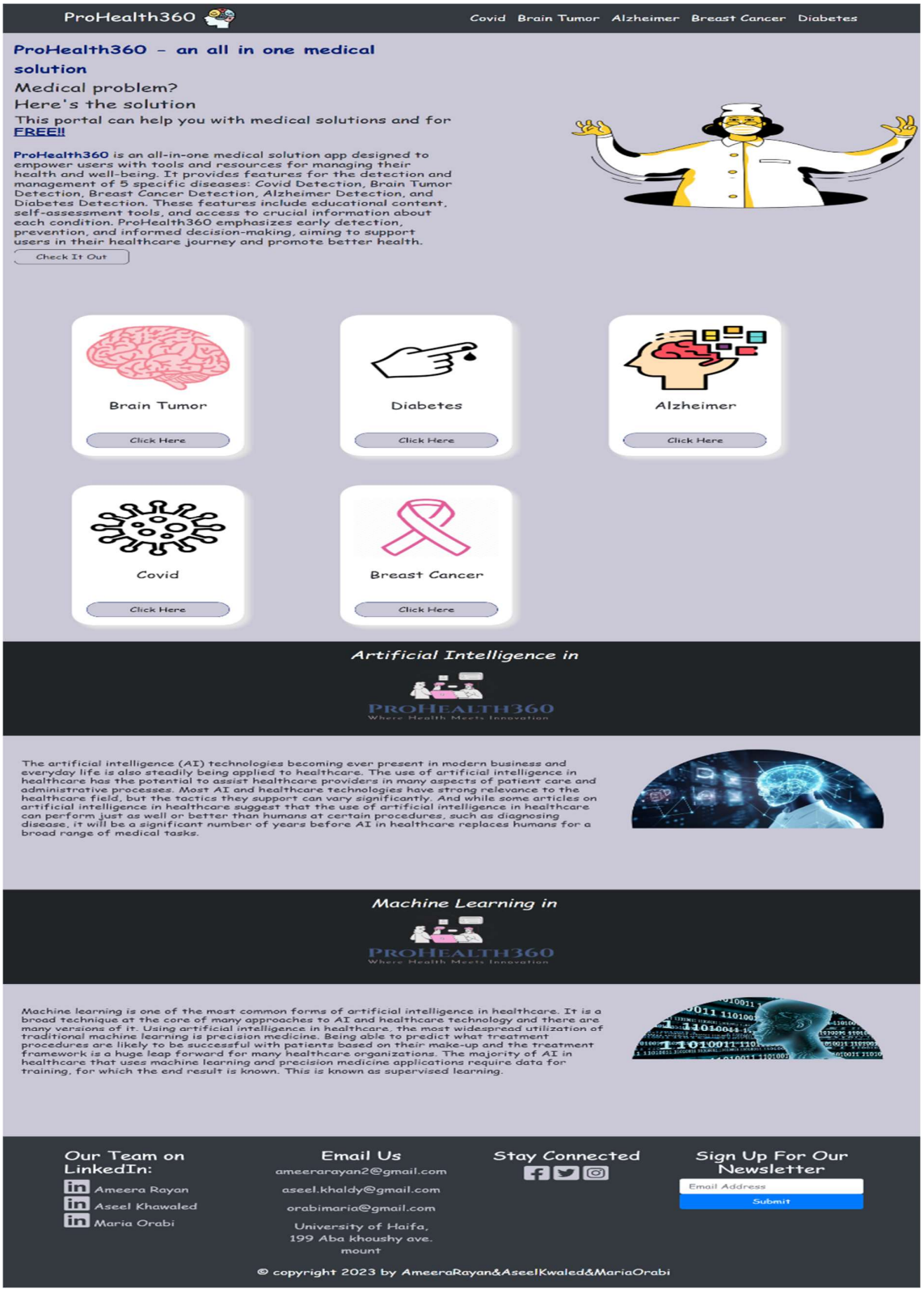
proHealth360 is a web app that is based on the Flask app framework, it’s free and everyone can use it anytime.
No need to download anything, it's Wi-Fi less and it’s available to everyone.
All you need is just a computer.

 ProHealth360 offers accurate disease detection such as COVID-19, Breast Cancer, Alzheimer’s, and more. By providing real-time predictive analysis, our platform accelerates the diagnostic process and ensures equitable access to essential healthcare services for individuals in remote or underserved communities.
So here a user guideline to make sure that our users will have the best experience of visiting out web app.

every page is explained well and full of detailed guides as possible.

so let's zoom in on the instructions. 

- **Home page: The home page represents the initial landing page displayed when accessing the website for the first me.**



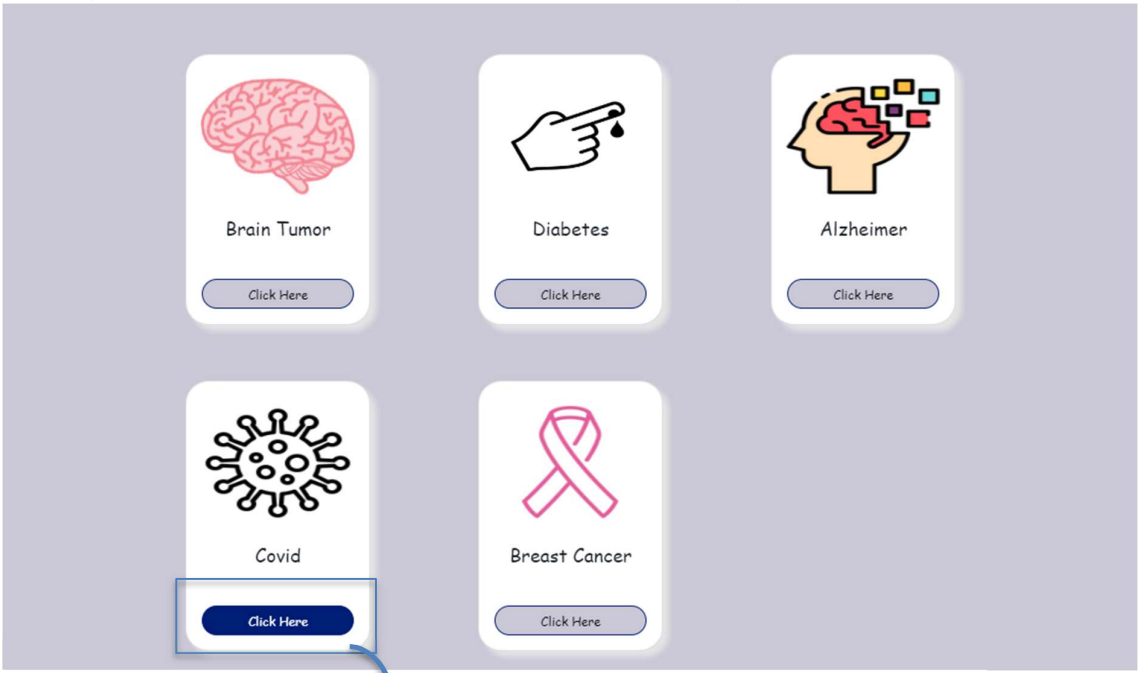
- **Section 1&2: Explore Disease Detection**

  To navigate to a specific page, choose the corresponding option from the navigator bar.

  Users have five options:

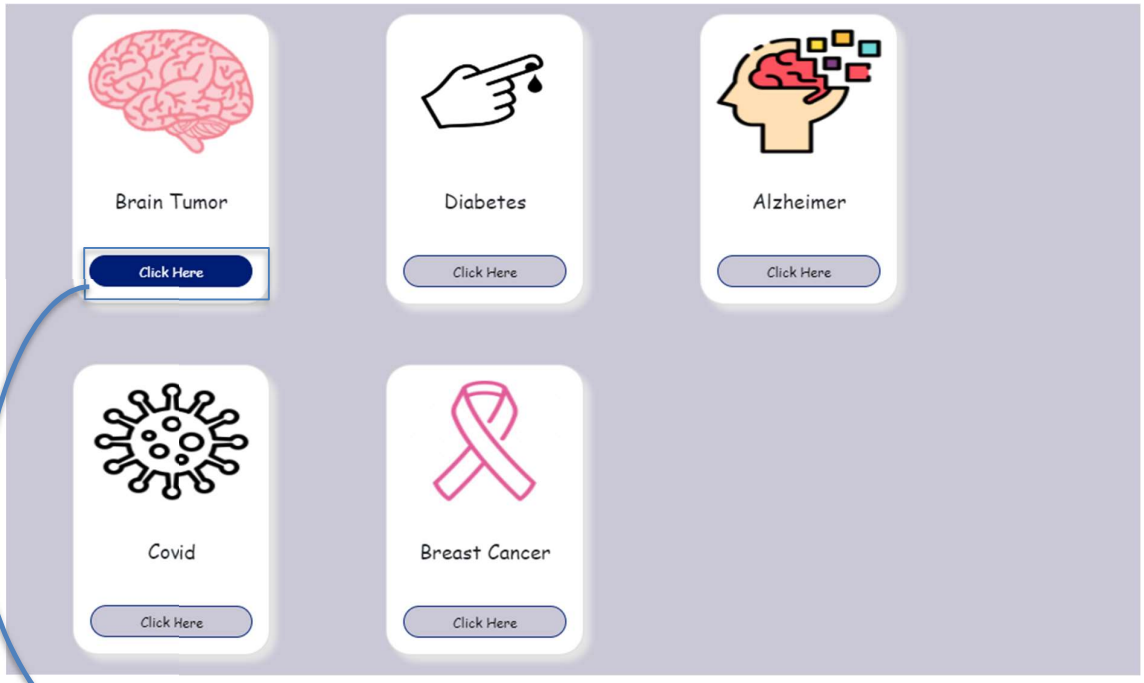
  5. Covid Detection: Detect potential Covid-19 infections by uploading relevant medical data or symptoms.

  Clicking on covid option will take him to the COVID homepage web:

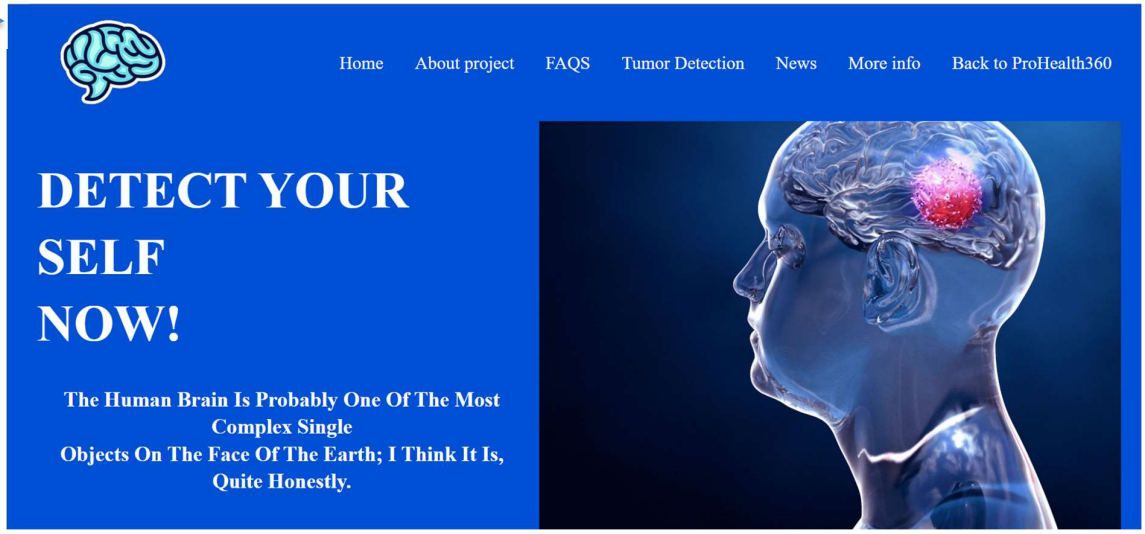


Leading To COVID web home page:

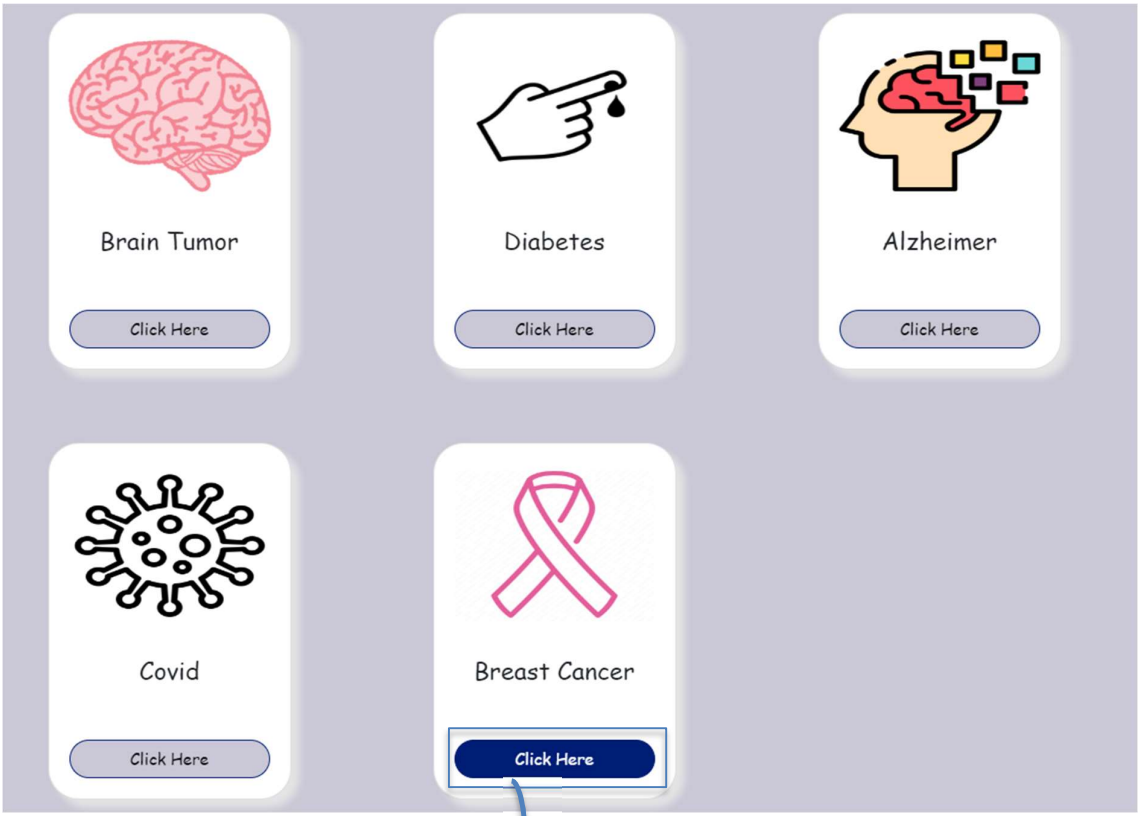
2. Brain Tumour Detection: Use advanced imaging technology to screen for brain tumours and receive early diagnosis.



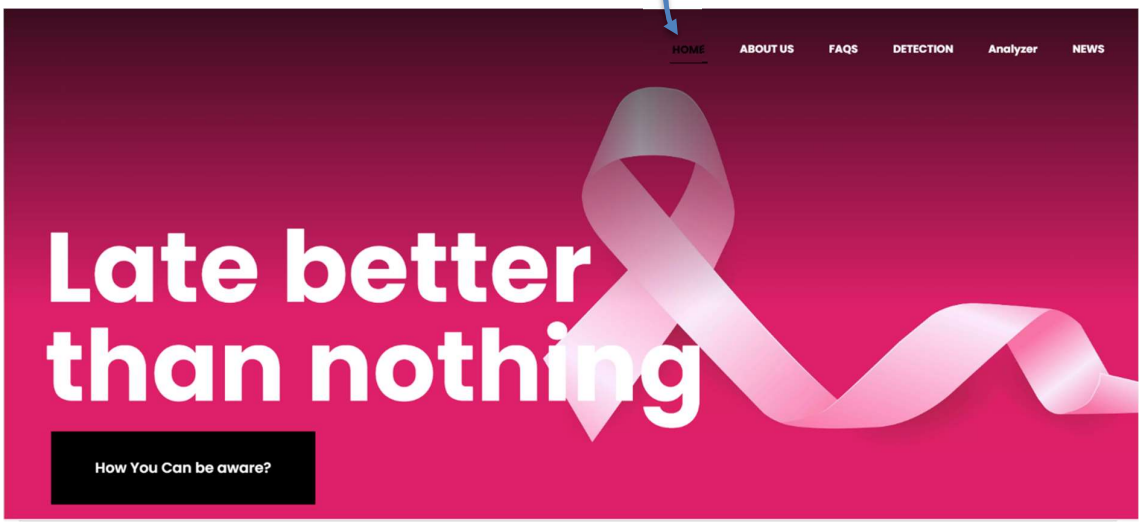
Leading To Brain Tumour homepage:



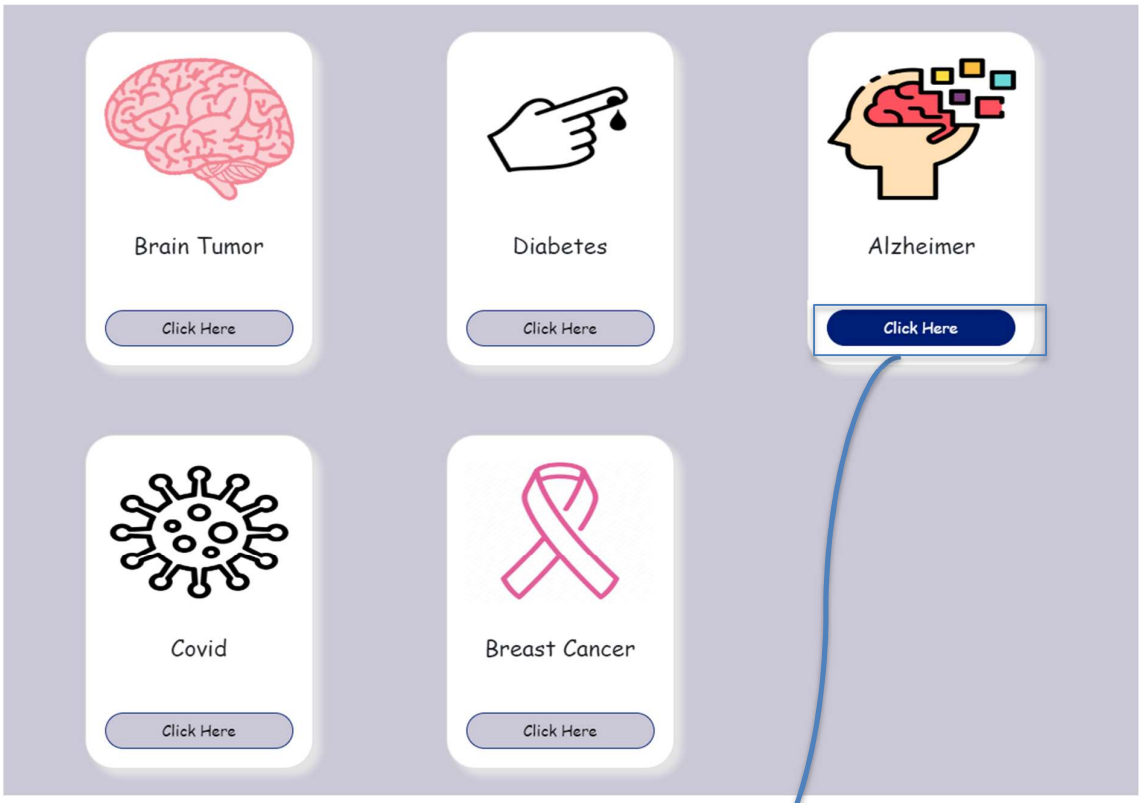
3. Breast Cancer Detection: Access tools for breast cancer screening and learn about preventive measures.



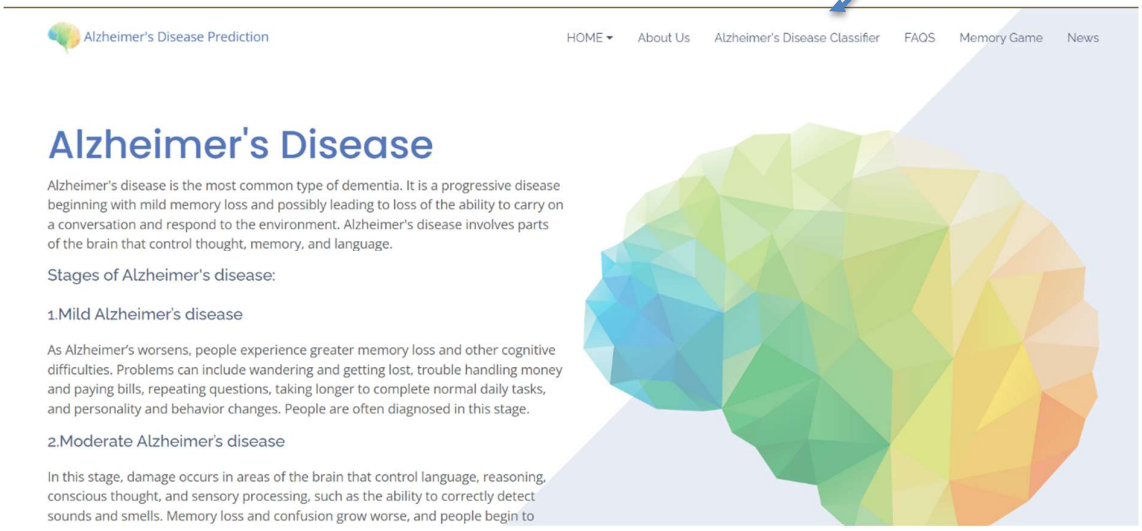
Leading To Breast Cancer homepage:



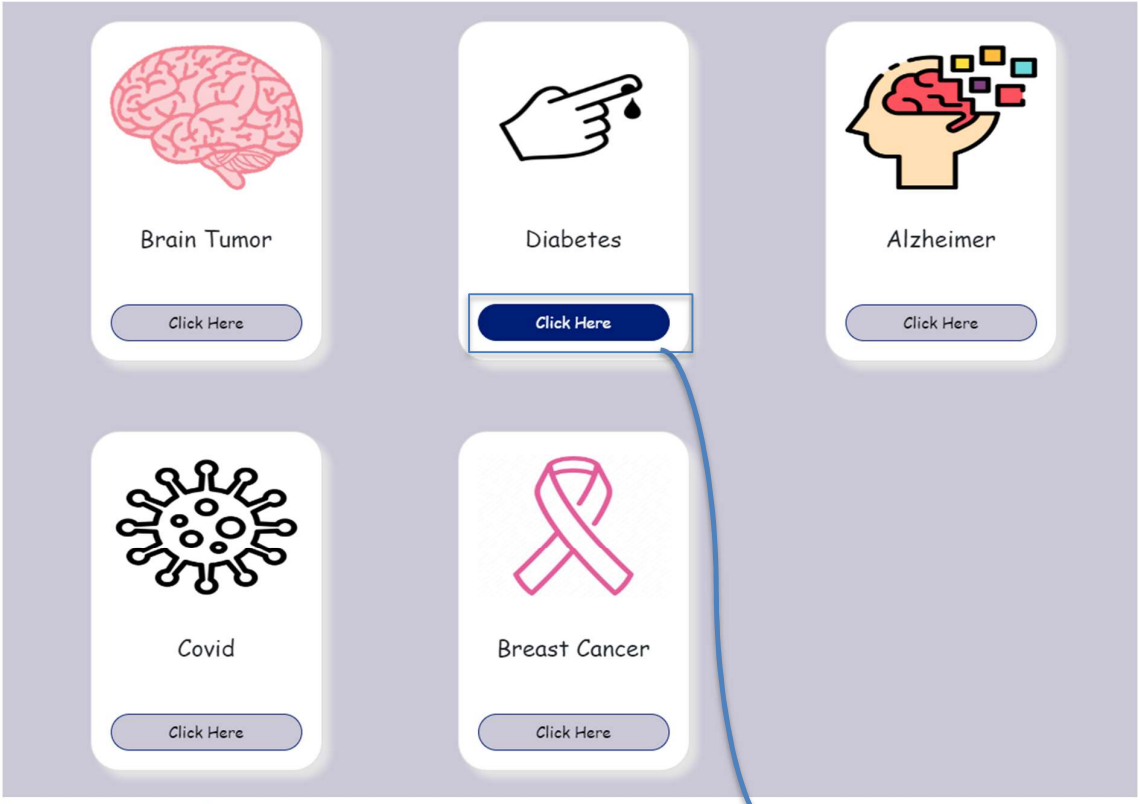
4. Alzheimer Detection: Utilize cognitive assessment tools to detect early signs of Alzheimer's disease.



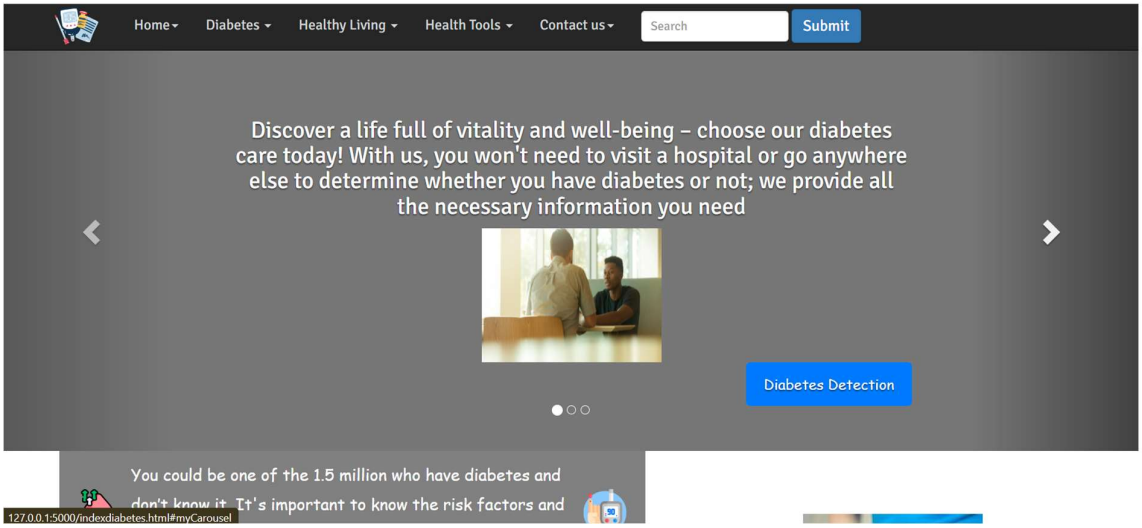
Leading To Alzheimer's homepage:



5. Diabetes Detection: Monitor blood sugar levels and assess the risk of developing diabetes with our screening tools.



Leading To Diabetes homepage:

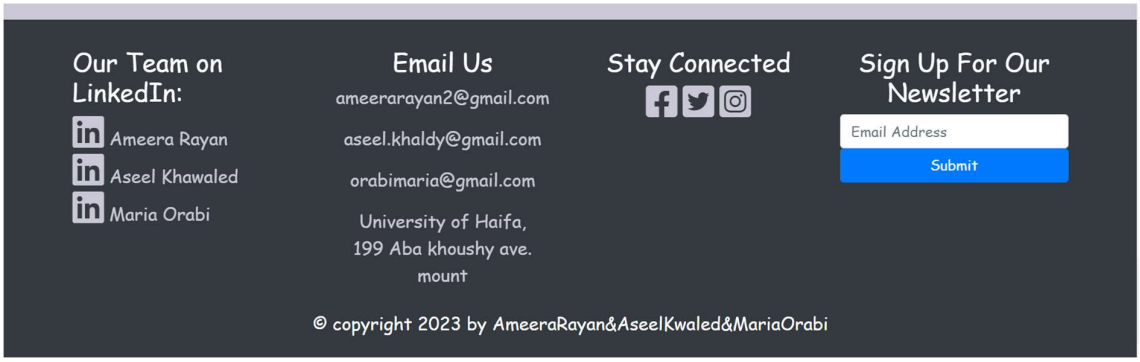


Explore each section by clicking on the respective header to access detailed information and diagnostic tools for each disease. Whether you're looking for educational resources, self-assessment tools, or crucial information about specific conditions, ProHealth360 offers a comprehensive suite of features to support your healthcare journey – all available for free!

- **Section 3:**
  In this section, we delve into the innovative use of artificial intelligence (AI) within our platform, ProHealth360. Our AI-powered algorithms analyse medical data with precision, enabling accurate disease detection and early intervention.

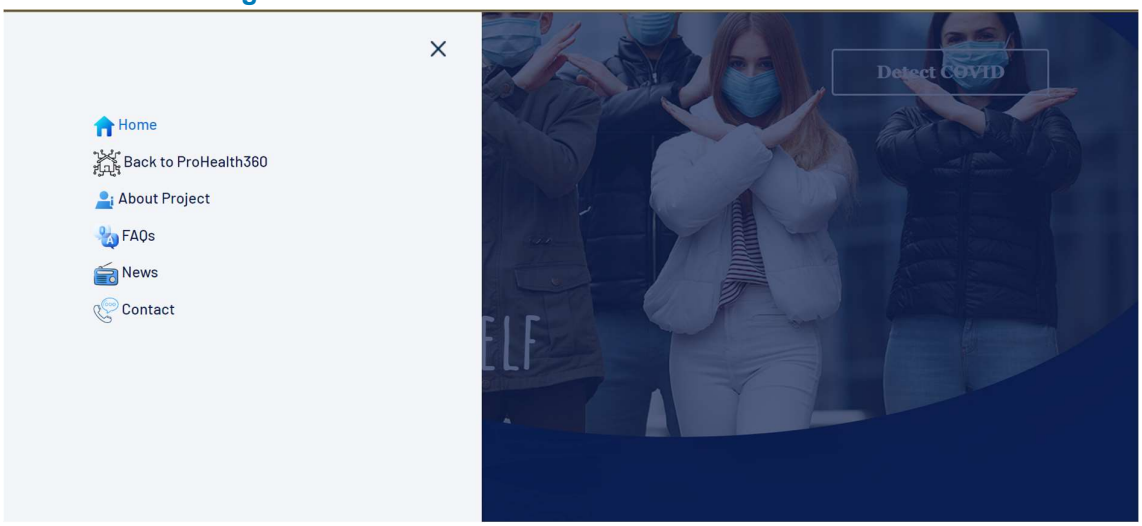
- **Section 4:**
  In this Section highlights our utilization of machine learning (ML) and deep learning techniques within ProHealth360. Through ML algorithms and deep learning models, our platform achieves unparalleled accuracy in disease detection and prediction.

- **In the final section (footer):**
  You can click on any of the social media icons to visit our respective pages on those platforms.



Also you'll find a footer containing information about our team and you can contact us, and sign up for our newsletter.

- **COVID web app home page :**
  First section :navigation



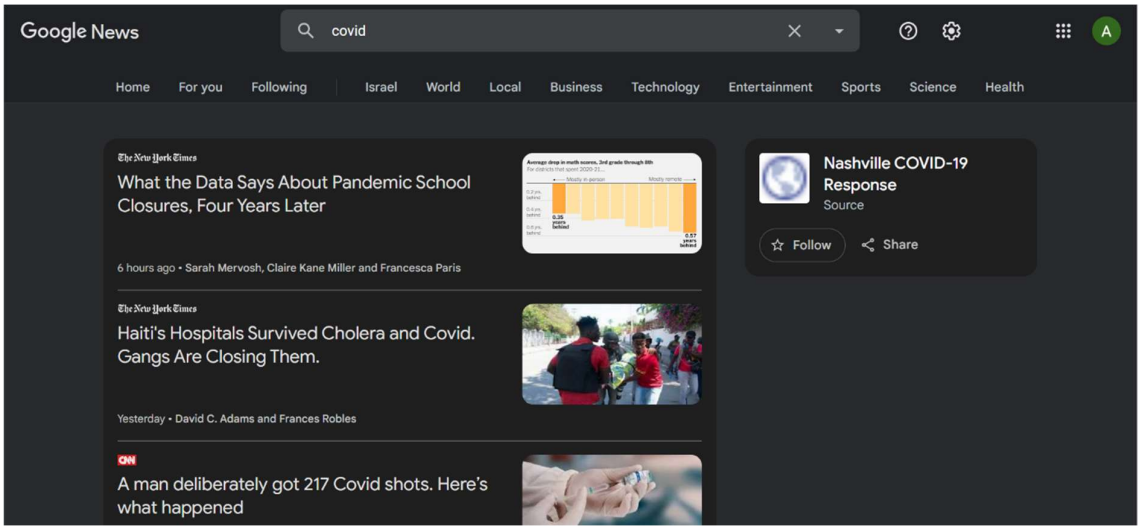
In this section users have 6 options :

1. Clicking on the "Back to proHealth360" will lead the user back to the base web homepage.

2. Clicking on “home” will lead the user to the Covid web homepage (existing page).
3. Clicking on “About project” will lead the user to a this page:

4. Clicking on “FAQs” will lead the user to this page :

5. Clicking on “News” will lead the user to this page:



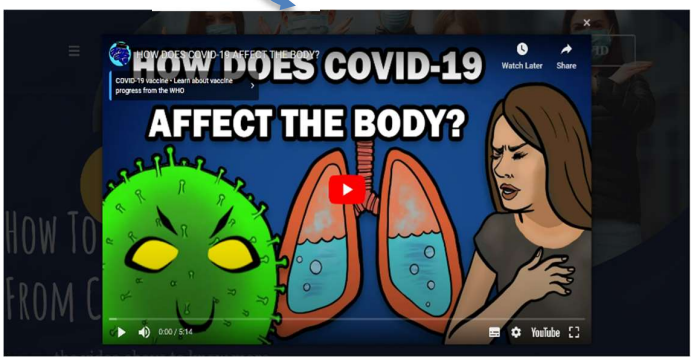
This page is out of our platform, it includes Google news about covid disease. We want to make sure if the used needs to know any news about the disease so he can by clicking on the “news” navigator and to make him updated.

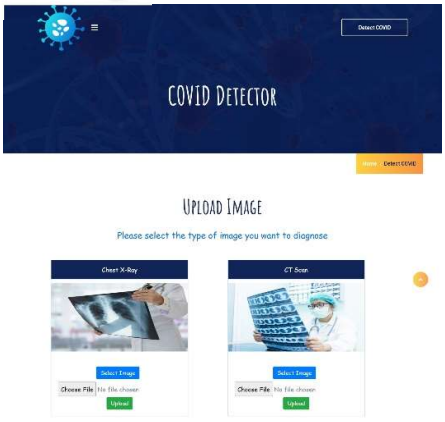
6. Clicking on “Contact” will lead the user to this page :

- **Second section: Information on covid**

  Also by clicking on this button, a short informative video about COVID-19 and about the vaccine will appear.

  And if user clicks on “detect covid” will lead him to the detector page.



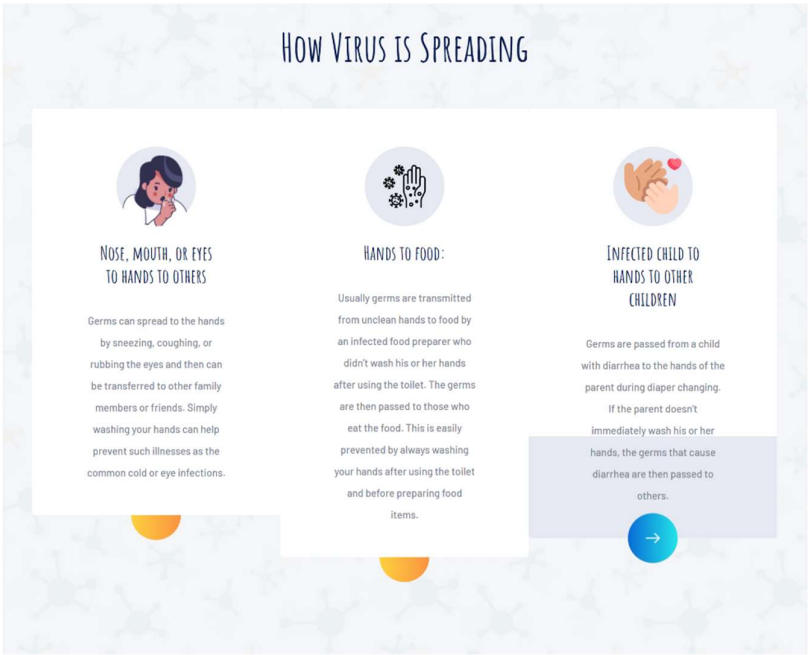


- **Second section: Information about COVID-19**

Also here , user can click on “Detect” button to lead him to detection page.

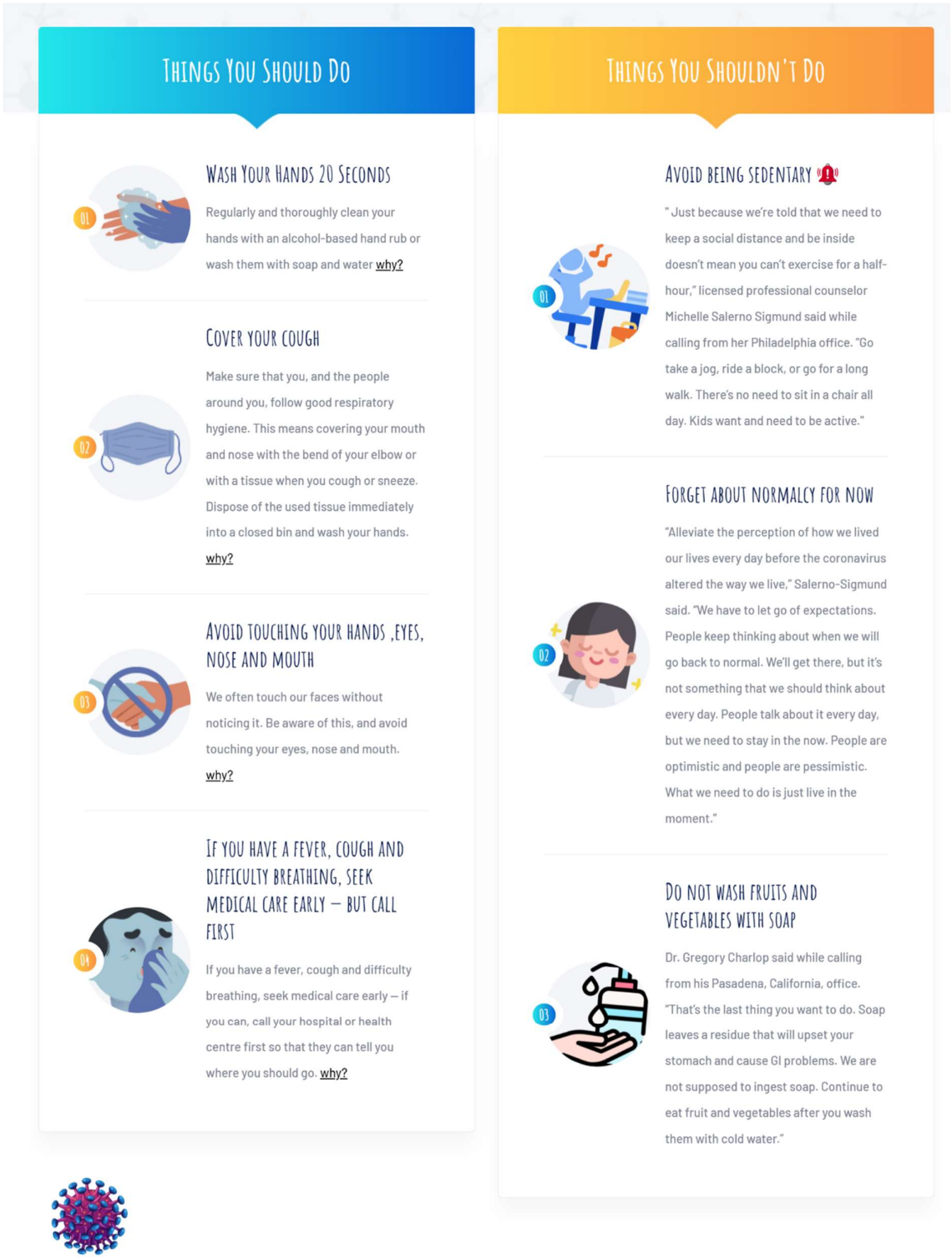
A general information about COVID-19 disease to ensure awareness to patients.

- **Third section: How virus is spreading ?**



This section explains how covid can be spread more than way to prevent the patient if he has covid not to spread it with others.

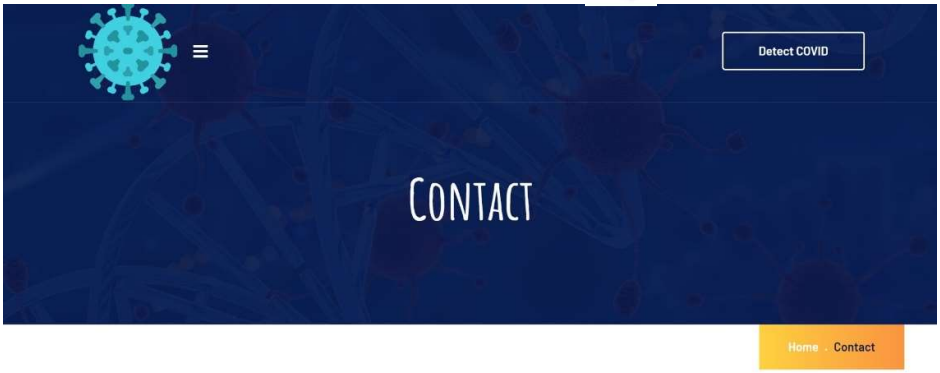
- **Fourth section: Things u should/should not do as a patient.**



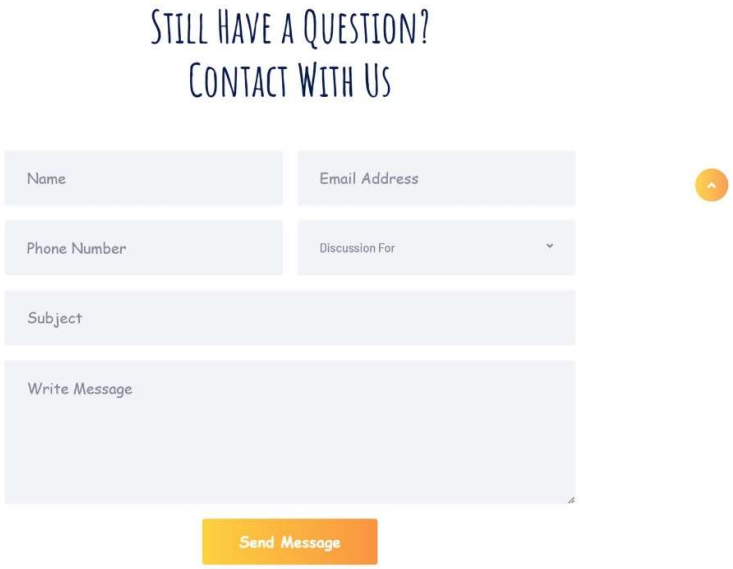
If u have been detected with a high probability of getting COVID-19 so u can find in our platform an instruction on things u should do, and things you shouldn't do.

- **Last Section : Contact**

This button will lead the user to the Contact page:



Feel free to contact us and send an email for any questions 😊 . Please provide the subject and to elaborate what the issue.



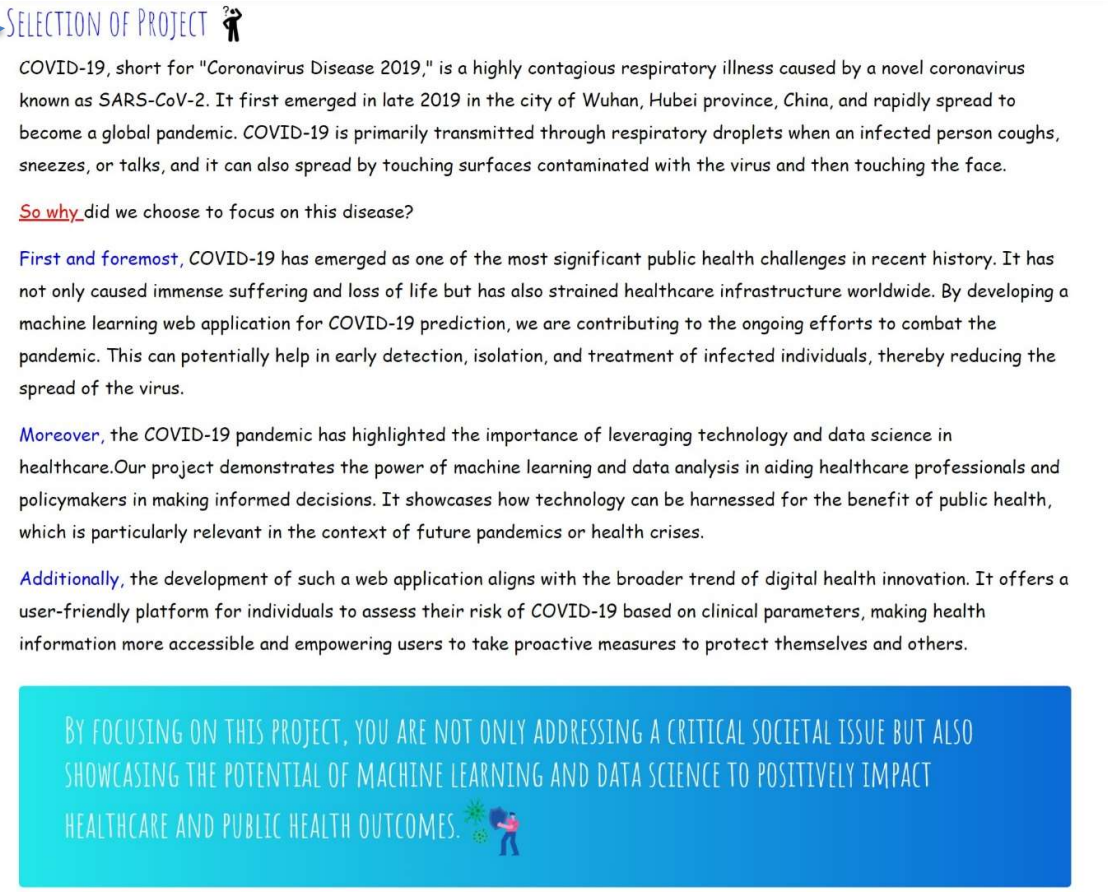
- **About us page in covid web:**

More Know About Corona

PROTECT YOURSELF FROM CRONOAVIRUS

- **First section: Selection of project**

In this section we explain why we have chosen to detect COVID-19 especially for many reasons, so we have written all that.



- **Section 2: project models**

HEALTHCARE AND PUBLIC HEALTH OUTCOMES.

HERE THE USER CAN UPLOAD CHEST X-RAYS OR CT SCANS AND GET THE OUTPUT OF POSSIBILITY OF COVID INFECTION : COVID-19-DETECTION-BASED-ON-CHEST-X-RAYS-AND-CT-SCANS

COVID-19 Detection based on Chest X-rays and CT Scans using four Deep Learning algorithms : VGG16, ResNet50, InceptionV3, Xception. The models were trained for 500 epochs on around 1000 Chest X-rays and around 750 CT Scan images. After training, the accuracies acheived for the model are as follows:

Acuuarcy of each 4 models that we have developed in our project to detect covid.

	InceptionV3	VGG16	ResNet50	Xception
Chest X-rays	96%	94%	83%	92%
CT Scans	93%	93%	80%	95%

Our data is based on CT-scans and chest X-rays that we have gather.

DATA GATHERING

The dataset for the project was gathered from two sources:

- Chest X-ray images (1000 images) were obtained from: Chest X-ray Repository
- CT Scan images (750 images) were obtained from: CT Scan Repository

80% of the images were used for training the models and the remaining 20% for testing

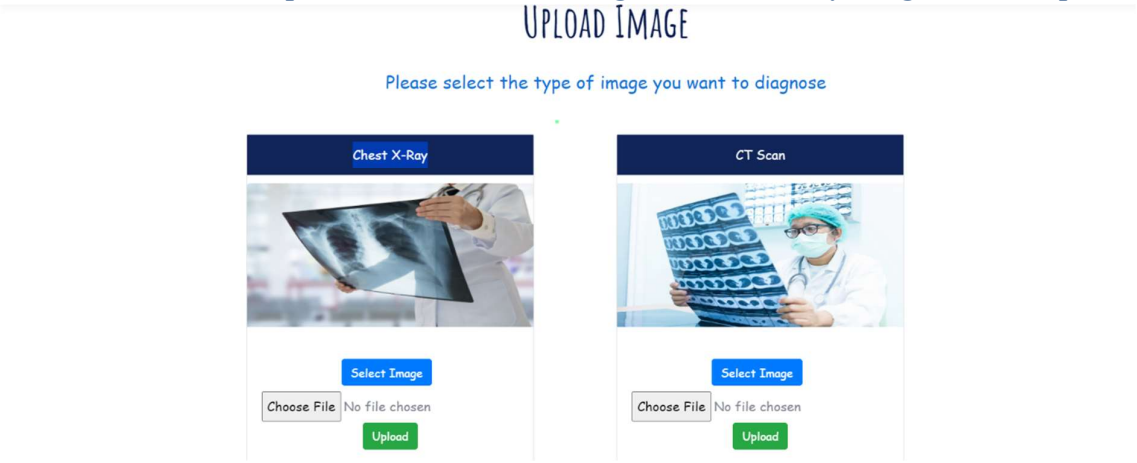
Before we build our model – we did a lot of data pre-processing , here we example one model in a simple way.

BUILDING THE MODEL

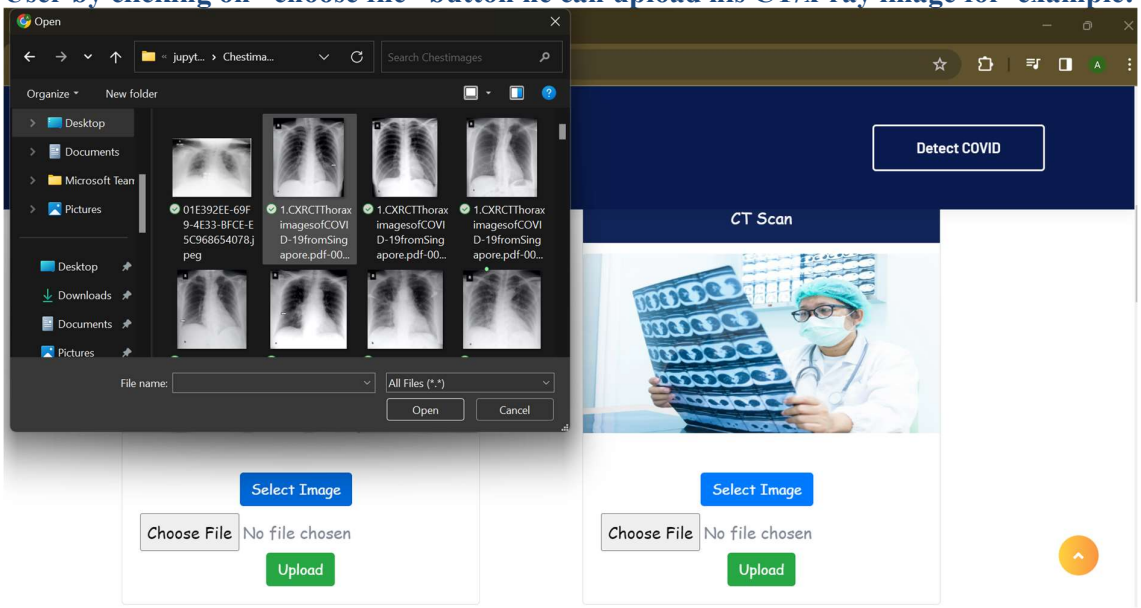
we first added 3 custom layers to the pretrained models so that they can be trained on our dataset . The code for adding custom layers, for example, to the ResNet50 model is shown below. We added a Flatten layer to flatten all our features and a Dropout layer to overcome overfitting. Finally, We added the Dense output layer using softmax function as the activation function.

In this section, we elaborate on how we detect COVID and give a high probability of getting covid to the user.

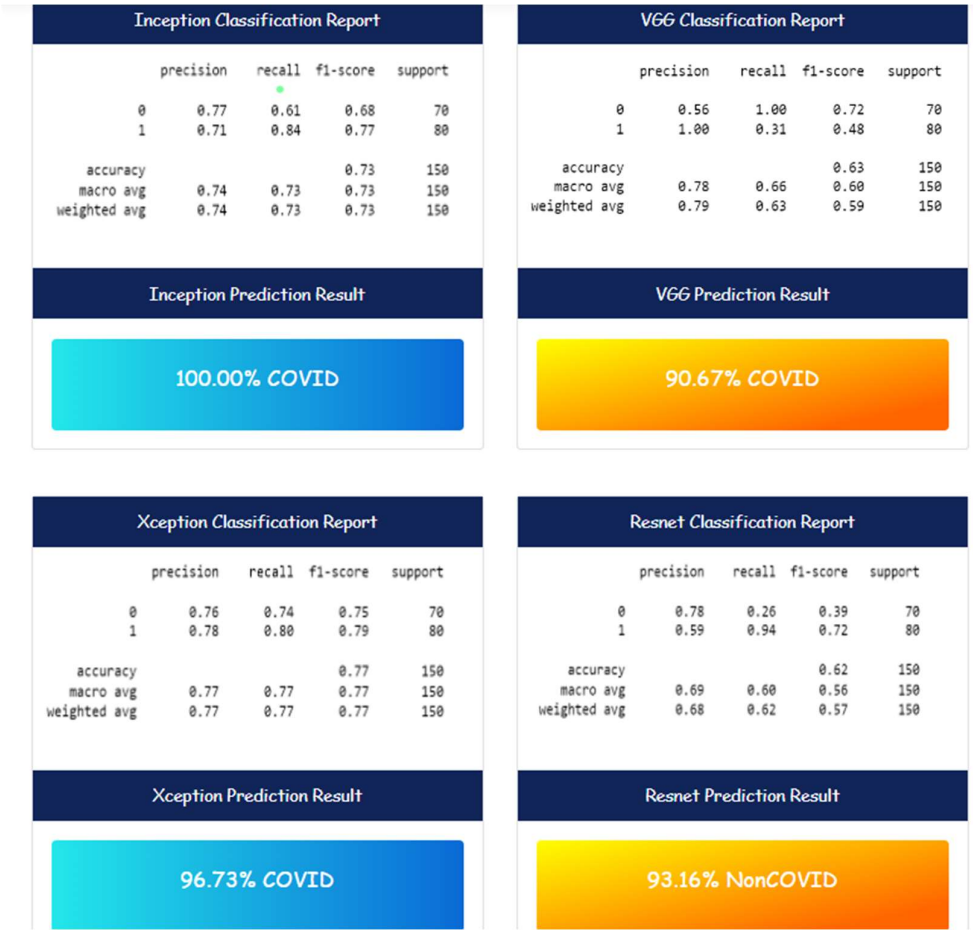
- **Covid detector page :**
  Here users can upload either CT-scan images or chest X-ray image, for example:



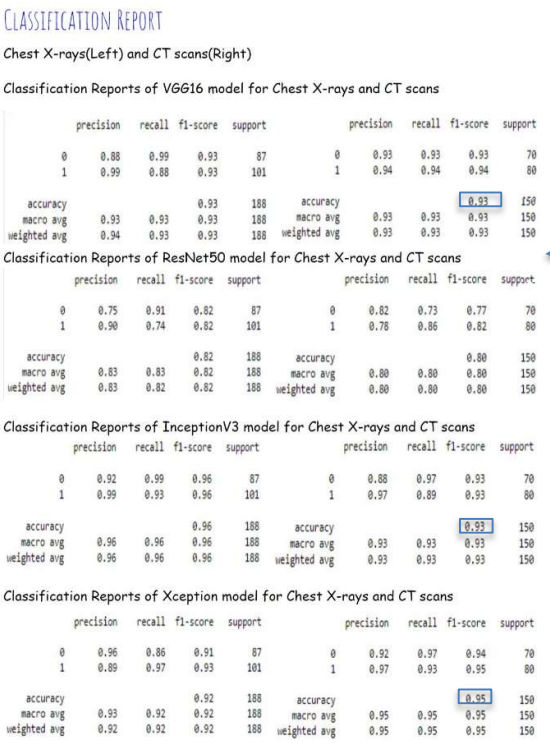
User by clicking on “choose file” button he can upload his CT/x-ray image for example:



Then by clicking on “upload” button, the user will get an immediate result which is probability of getting covid Relatively to each model.(we have 4 models)



- **Section 3: accuracy metrics**



Classification Report

Chest X-rays(Left) and CT scans(Right)

Classification Reports of VGG16 model for Chest X-rays and CT scans

	precision	recall	f1-score	support		precision	recall	f1-score	support
0	0.88	0.99	0.93	87	0	0.93	0.93	0.93	70
1	0.99	0.88	0.93	101	1	0.94	0.94	0.94	80
accuracy			0.93	188	accuracy			0.93	150
macro avg	0.93	0.93	0.93	188	macro avg	0.93	0.93	0.93	150
weighted avg	0.94	0.93	0.93	188	weighted avg	0.93	0.93	0.93	150

Classification Reports of ResNet50 model for Chest X-rays and CT scans

	precision	recall	f1-score	support		precision	recall	f1-score	support
0	0.75	0.91	0.82	87	0	0.82	0.73	0.77	70
1	0.90	0.74	0.82	101	1	0.78	0.86	0.82	80
accuracy			0.82	188	accuracy			0.80	150
macro avg	0.83	0.83	0.82	188	macro avg	0.80	0.80	0.80	150
weighted avg	0.83	0.82	0.82	188	weighted avg	0.80	0.80	0.80	150

Classification Reports of InceptionV3 model for Chest X-rays and CT scans

	precision	recall	f1-score	support		precision	recall	f1-score	support
0	0.92	0.99	0.96	87	0	0.88	0.97	0.93	70
1	0.99	0.93	0.96	101	1	0.97	0.89	0.93	80
accuracy			0.96	188	accuracy			0.93	150
macro avg	0.96	0.96	0.96	188	macro avg	0.93	0.93	0.93	150
weighted avg	0.96	0.96	0.96	188	weighted avg	0.93	0.93	0.93	150

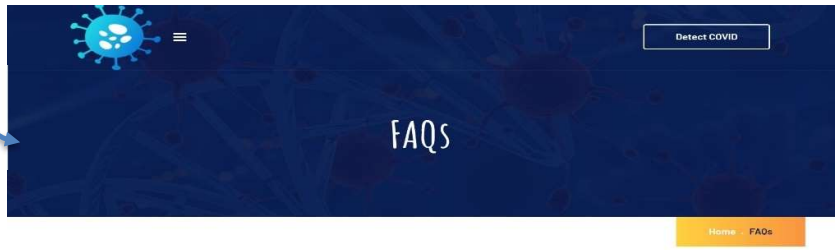
Classification Reports of Xception model for Chest X-rays and CT scans

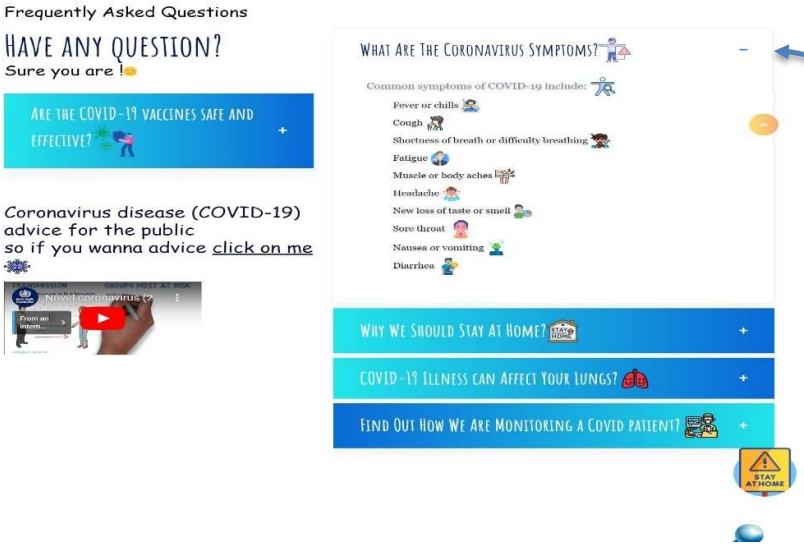
	precision	recall	f1-score	support		precision	recall	f1-score	support
0	0.96	0.86	0.91	87	0	0.92	0.97	0.94	70
1	0.89	0.97	0.93	101	1	0.97	0.93	0.95	80
accuracy			0.92	188	accuracy			0.95	150
macro avg	0.93	0.92	0.92	188	macro avg	0.95	0.95	0.95	150
weighted avg	0.92	0.92	0.92	188	weighted avg	0.95	0.95	0.95	150

Here we present our model accuracy, to show the user that we have achieved a high accuracy.
The success of our model illustrates the effectiveness of our approach, which utilizes advanced algorithms. This high level of accuracy not only confirms the reliability of our model but also highlights its potential to provide valuable insights into patient health.

- **FAQs page in covid web:**

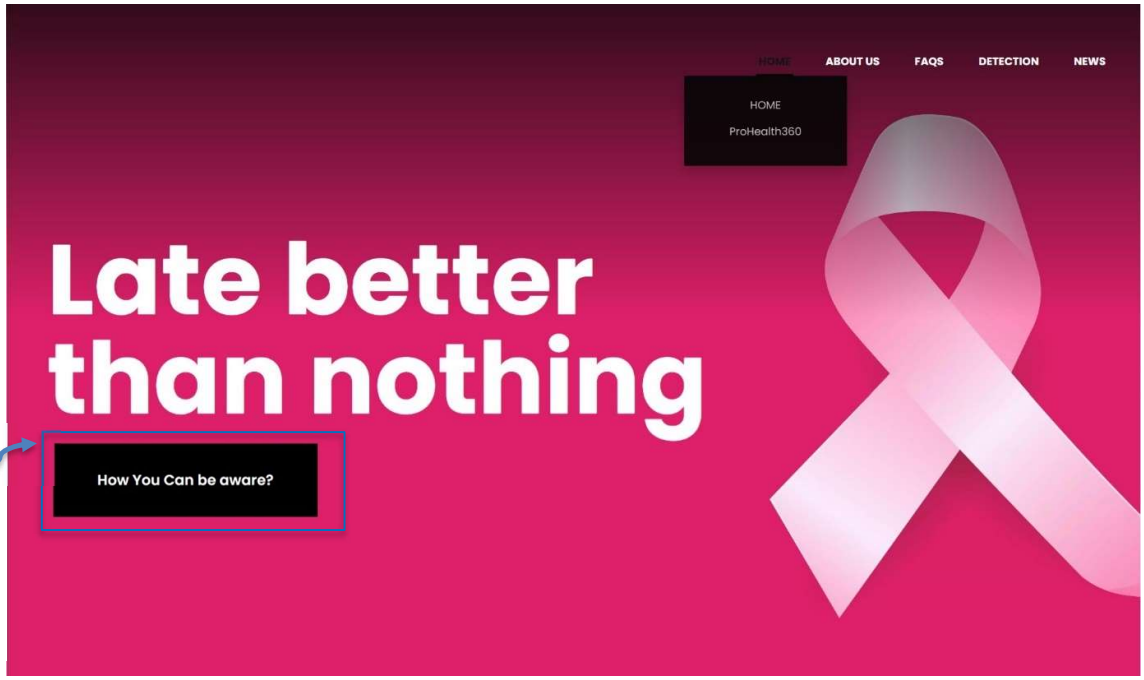
In this section user can look up to frequently asked questions by other users.





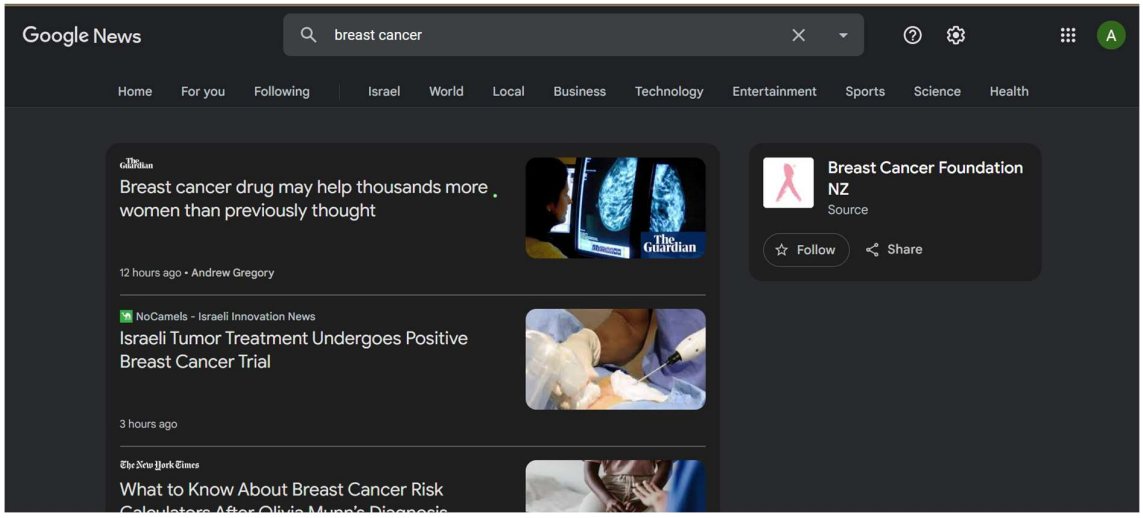
By clicking on "+" user can see the answer of a specific question.

- **Breast cancer homepage:**
- **First section : Navigator**

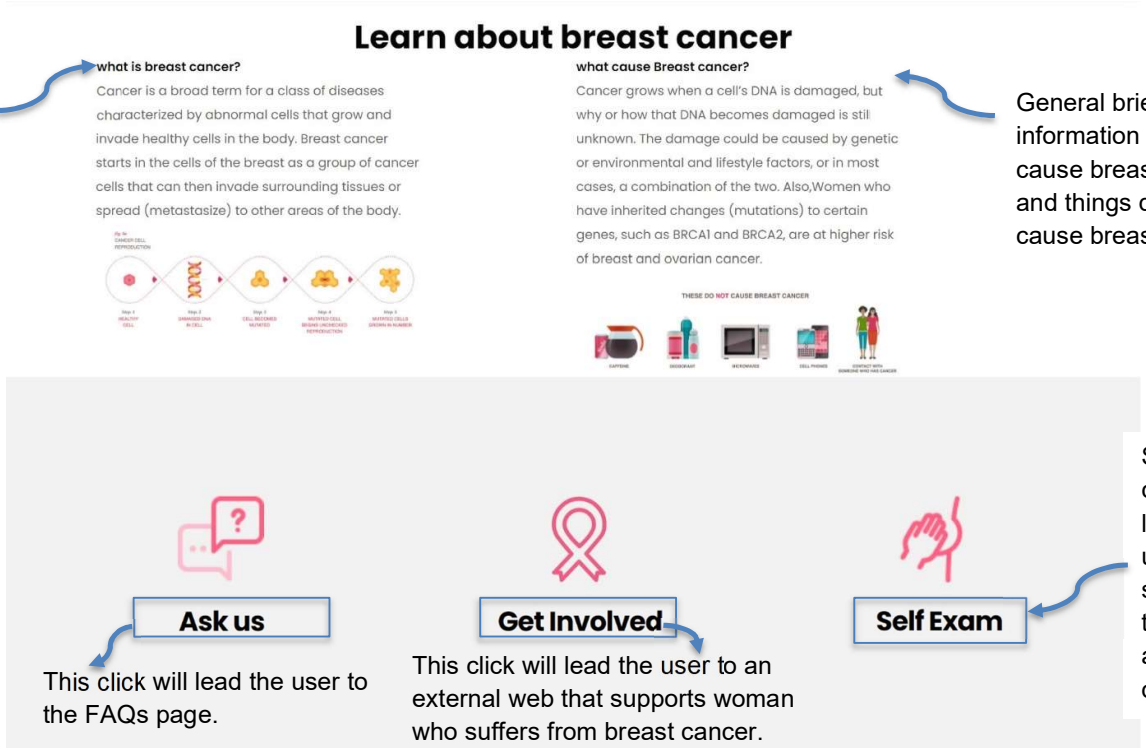


This button will lead the user to the "FAQs" page.

If user decided to click on "breast cancer" option will lead him to this home page and he has 5 navigation options:
1. "ProHealth" that will lead him to the landing homepage.
2. "About us" will lead the user to about us page.
3." FAQS" will lead the user to the frequently asked question page.
4. "Detect" will lead the user to classifier page .
5. "News" page. If the user click on "news" will lead him to Google news in breast cancer:



- **Second section: General information**



General brief information about what is breast cancer and how it affects patient's body.

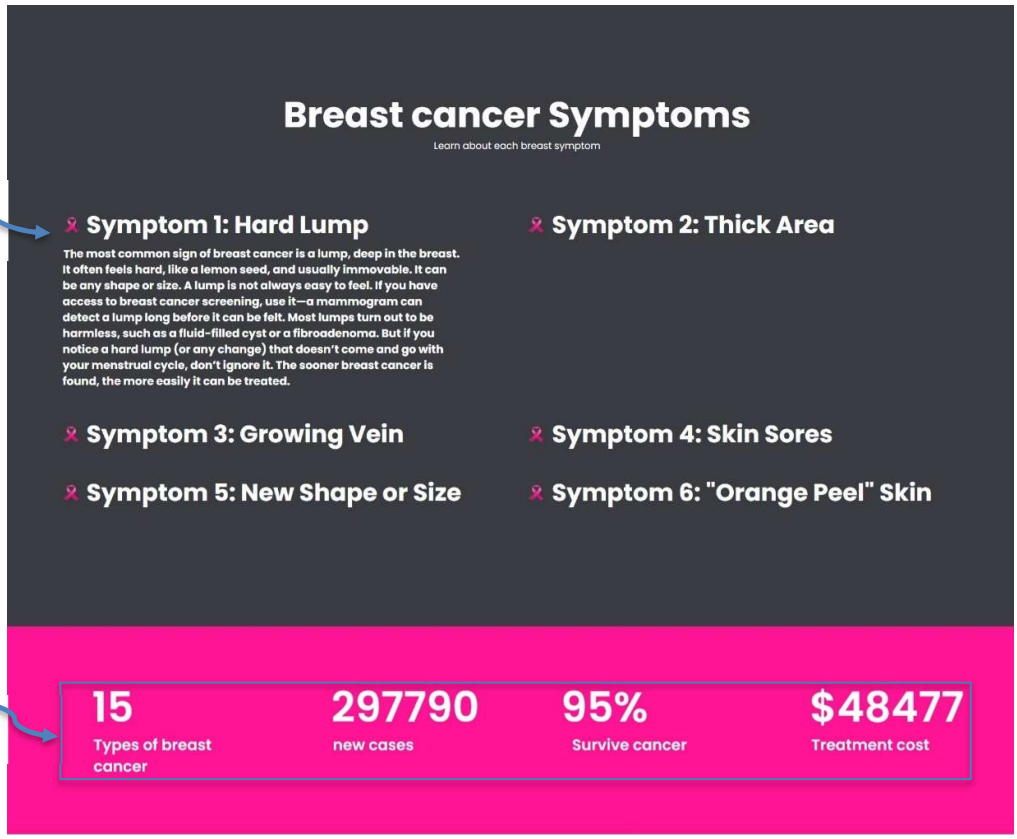
General brief information about what cause breast cancer and things do not cause breast cancer.

Self exam click will lead the user to a short video that explain about diagnoses.

This click will lead the user to the FAQs page.

This click will lead the user to an external web that supports woman who suffers from breast cancer.

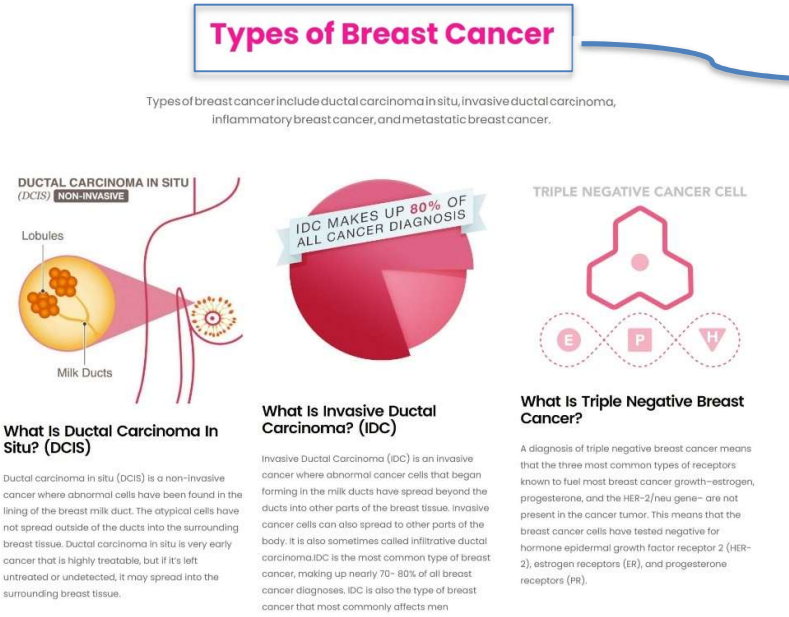
- **Third section: symptoms**



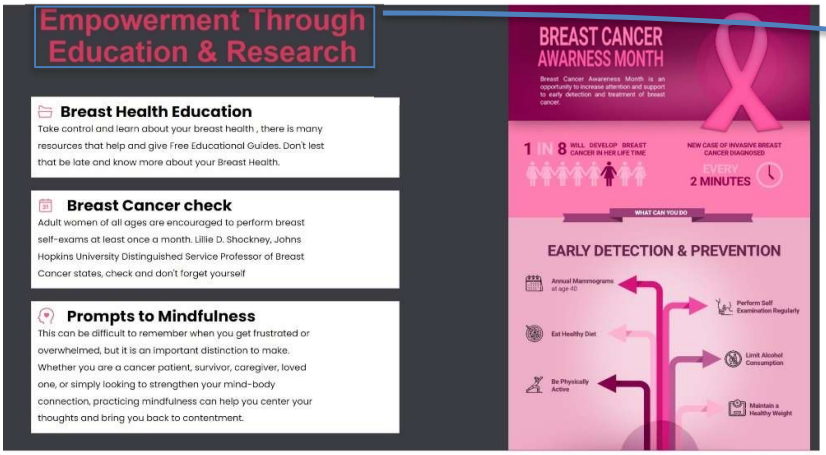
This section represent few breast cancer symptoms by clicking on symptom will show the user an short explanation.

Statistics about breast cancer patients.

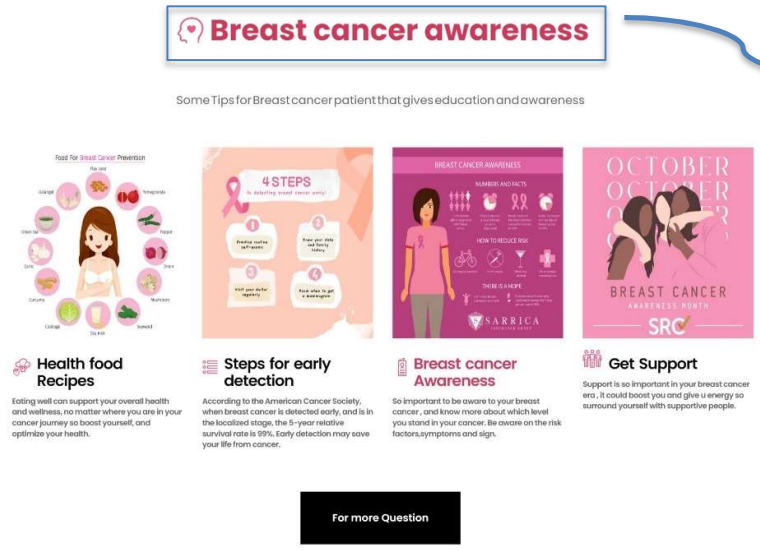
- **Fourth section: raise awareness**



This section include more specific information for patient who has detected with breast cancer. Its describes each type of breast cancer and how it differs form another types.

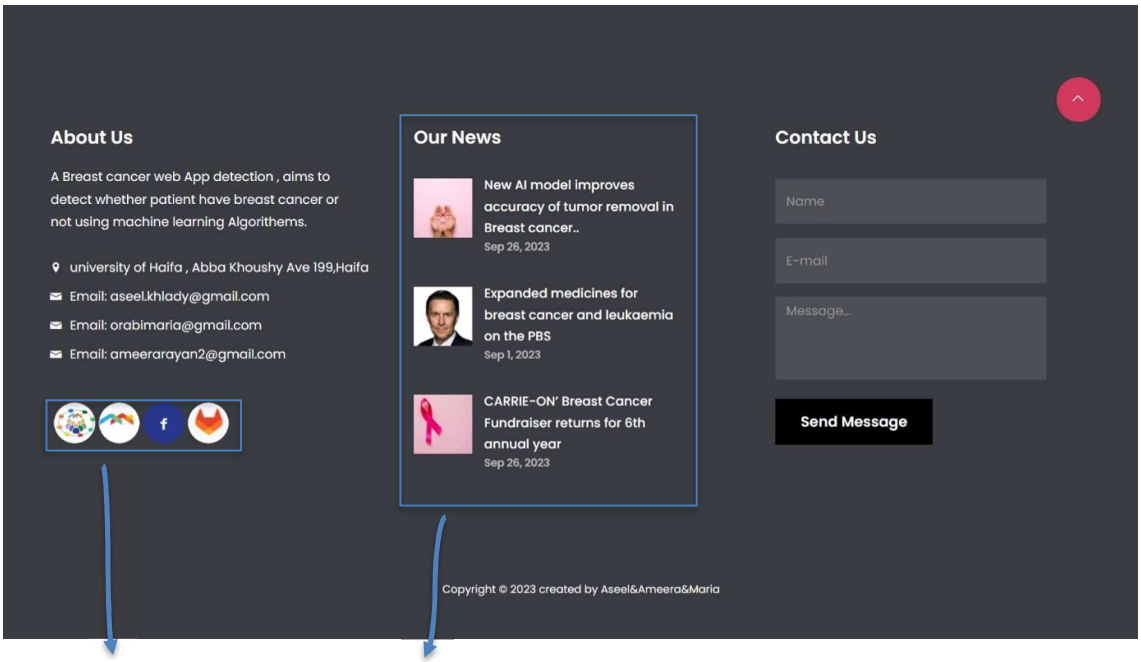


Reminder to raise awareness to women to go and check themselves every year and protect their health!



Tips and steps to support the breast cancer community.

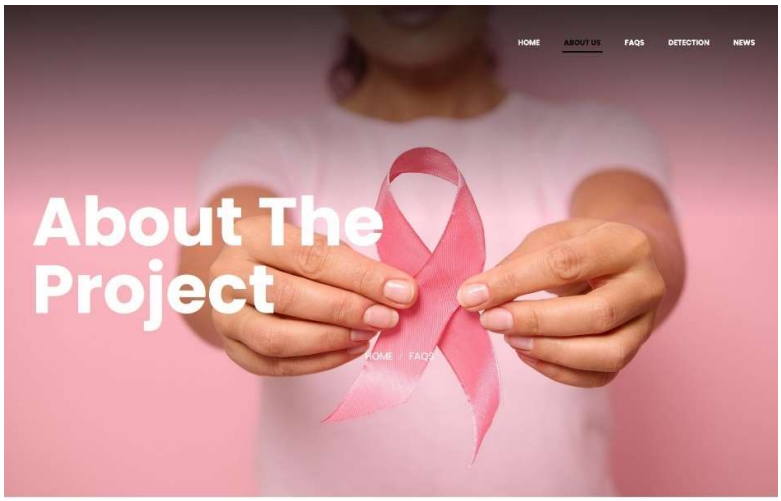
- **Last section: Footer**

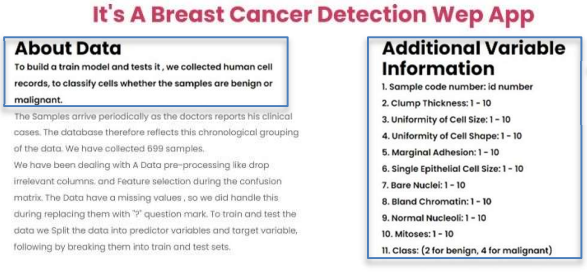


You can find us in our other social platform!

News on breast cancer.

- **About us page: first section**





In data section, here we have explained about data that we have collected.

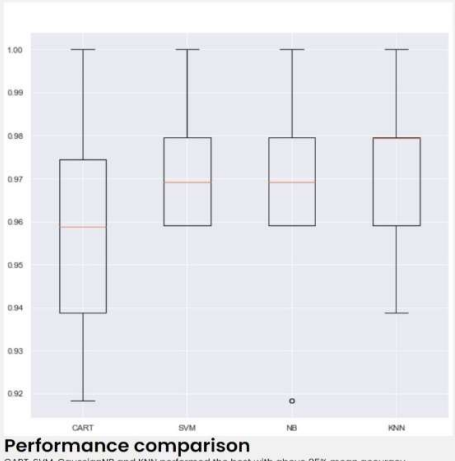
Here we explain about each feature that users have to input in order to make data scanning and prediction, also we explain the range of each value. we assume that user is familiar with data if not this section will help him.

- **Second section: how we predict.**

Model Selection

Baseline algorithm checking
* Analyse and build a model to predict if a given set of symptoms lead to breast cancer. This is a binary classification problem, and a few algorithms are appropriate for use.
* As we do not know which one will perform the best at the point, we will do a quick test on the few appropriate algorithms with default setting to get an early indication of how each of them perform.
* We will use 10 fold cross validation for each testing.
* The following non-linear algorithms will be used, namely:
* Classification and Regression Trees (CART)
* Linear Support Vector Machines (SVM)
* Gaussian Naive Bayes (NB)
* k-Nearest Neighbors (KNN).

In this section we explain about different model that we implemented on our train data, eventually have selected the model that led us to the best accuracy.



Performance comparison
CART, SVM, GaussianNB and KNN performed the best with above 95% mean accuracy

```
Model: CART
Accuracy score: 0.9047619047619048
Classification report:
              precision    recall  f1-score   support

           2       0.90      0.96      0.93       133
           4       0.93      0.81      0.86        77

    accuracy                           0.90       210
   macro avg       0.91      0.88      0.89       210
weighted avg       0.91      0.90      0.90       210


Model: SVM
Accuracy score: 0.9714285714285714
Classification report:
              precision    recall  f1-score   support

           2       0.98      0.98      0.98       133
           4       0.96      0.96      0.96        77

    accuracy                           0.97       210
   macro avg       0.97      0.97      0.97       210
weighted avg       0.97      0.97      0.97       210
```

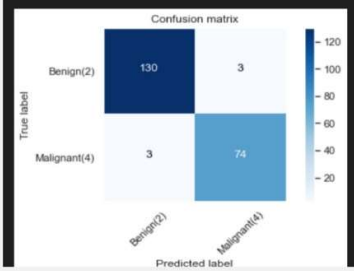
Different evaluation metrics on train data

Make predictions on validation dataset I
Accuracy - ratio of correctly predicted observation to the total observations.
Precision - ratio of correctly predicted positive observations to the total predicted positive observations
Recall (Sensitivity) - ratio of correctly predicted positive observations to the all observations in actual class - yes.
F1 score - F1 Score is the weighted average of Precision and Recall.

Eventually we have selected SVM due to high accuracy he gave.

Support Vector Machines
Confusion matrix of SVM without normalization

```
              precision    recall  f1-score   support

           2       0.98      0.98      0.98       133
           4       0.96      0.96      0.96        77

    accuracy                           0.97       210
   macro avg       0.97      0.97      0.97       210
weighted avg       0.97      0.97      0.97       210

Confusion matrix, without normalization
[[130   3]
 [  3  74]]
```



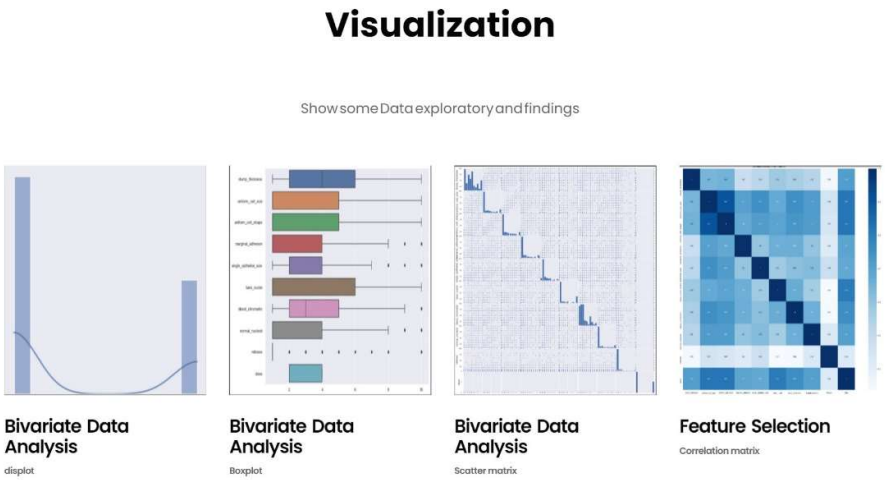
Make predictions on validation dataset II
Values for rest of the Algorithms

```
Model: NB
Accuracy score: 0.9523809523809523
Classification report:
              precision    recall  f1-score   support

           2       0.96      0.96      0.96       133
           4       0.94      0.94      0.94        77

    accuracy                           0.95       210
   macro avg       0.95      0.95      0.95       210
weighted avg       0.95      0.95      0.95       210


Model: KNN
Accuracy score: 0.9571428571428572
Classification report:
              precision    recall  f1-score   support

           2       0.96      0.97      0.97       133
           4       0.95      0.94      0.94        77

    accuracy                           0.96       210
   macro avg       0.96      0.95      0.95       210
weighted avg       0.96      0.96      0.96       210
```

Different evaluation metrics on test data.

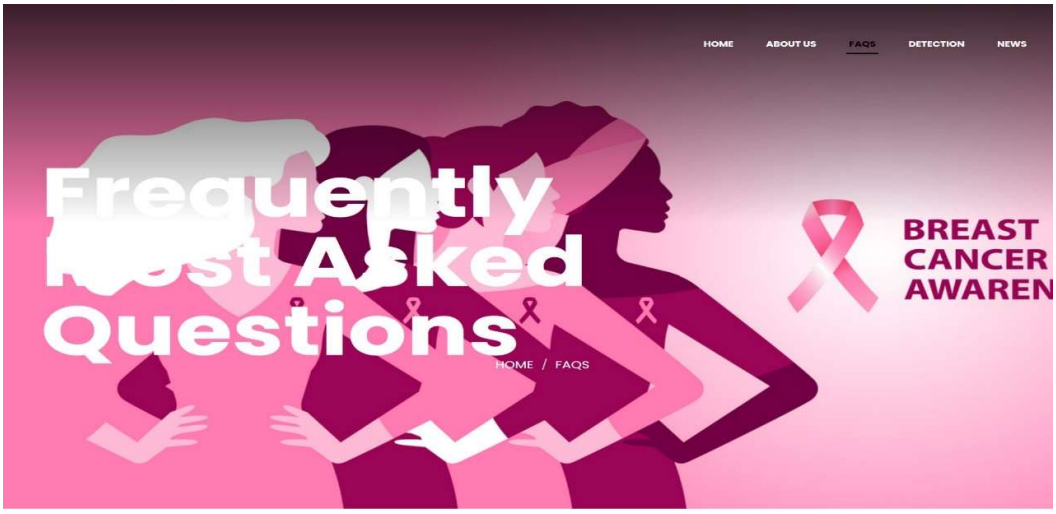
16	699	95%	97%
Missing Values	Samples collected	Accuracy Score	Test Accuracy

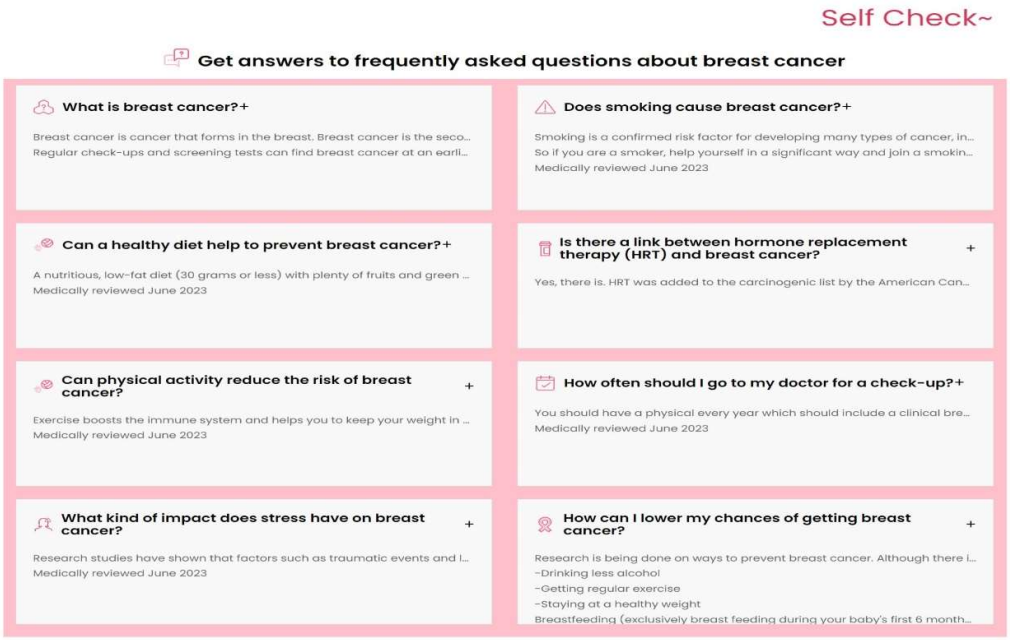
- **Third section: visualization.**



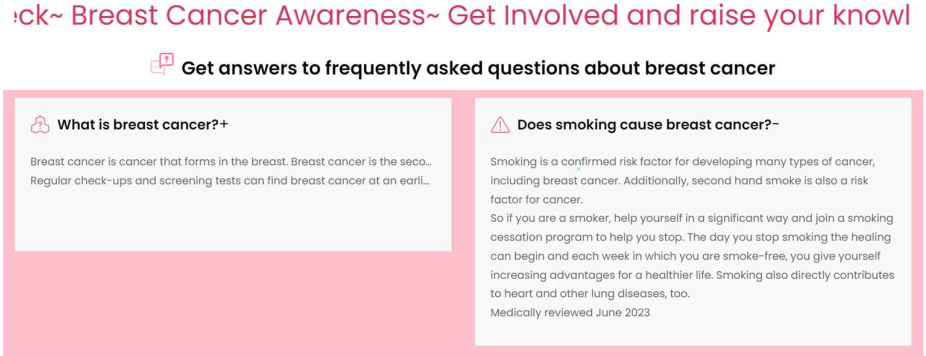
We implemented different visualizations of our data before we built the model in order to explore more the data.
here is some of our visualization.

- **FAQs page:**

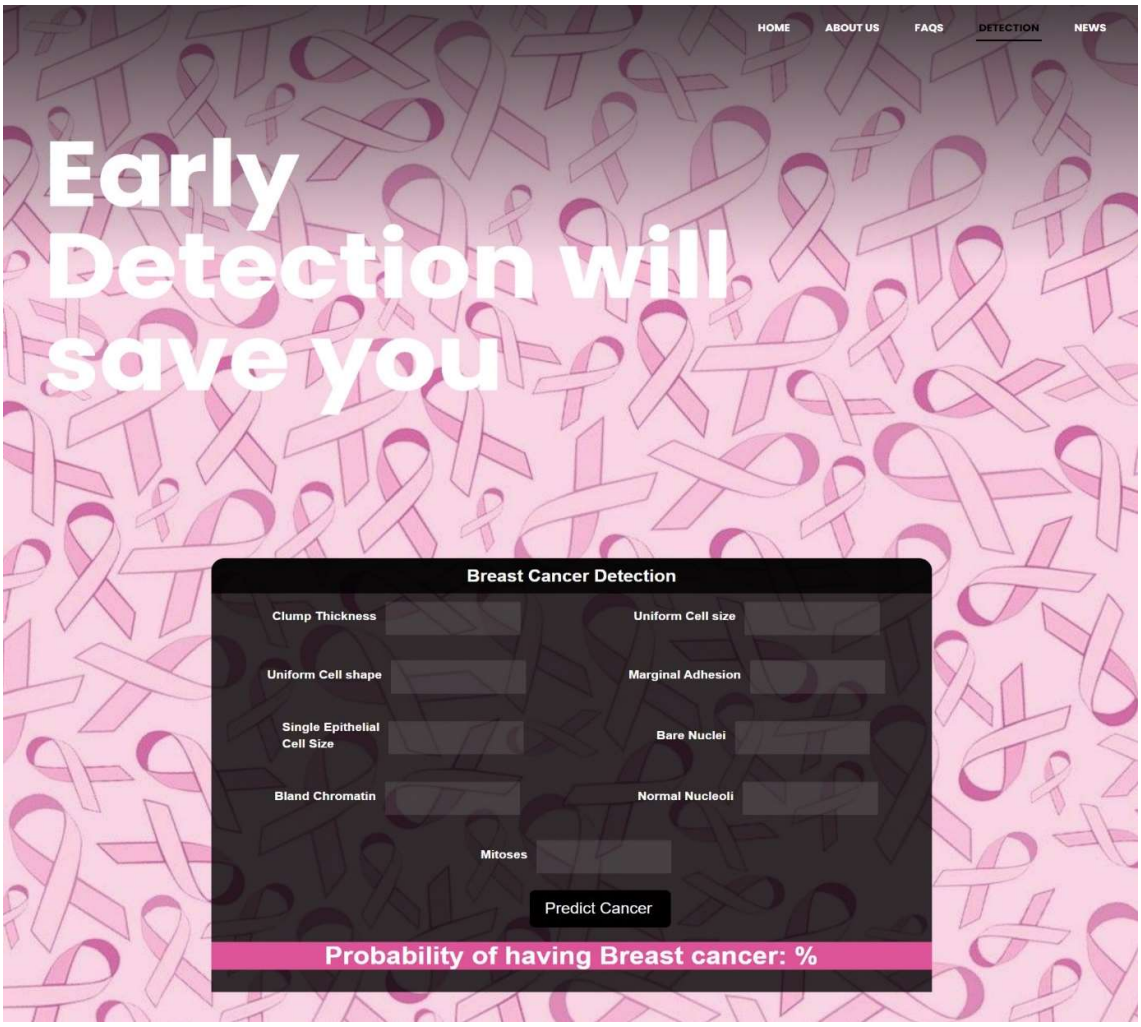




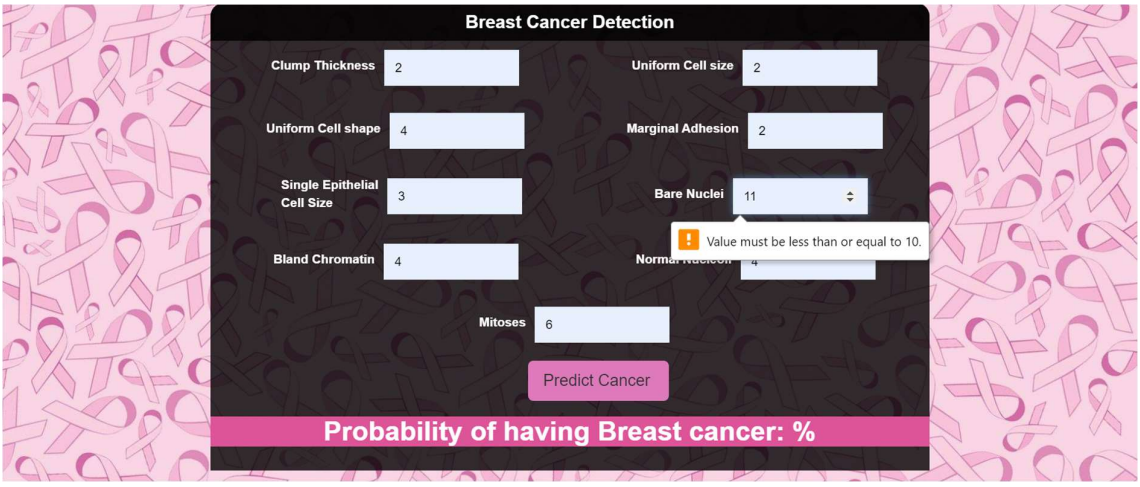
This page represents part of the frequently asked questions that patients asked before. by clicking on “+” user can see the whole elaborated answer. **For example:**



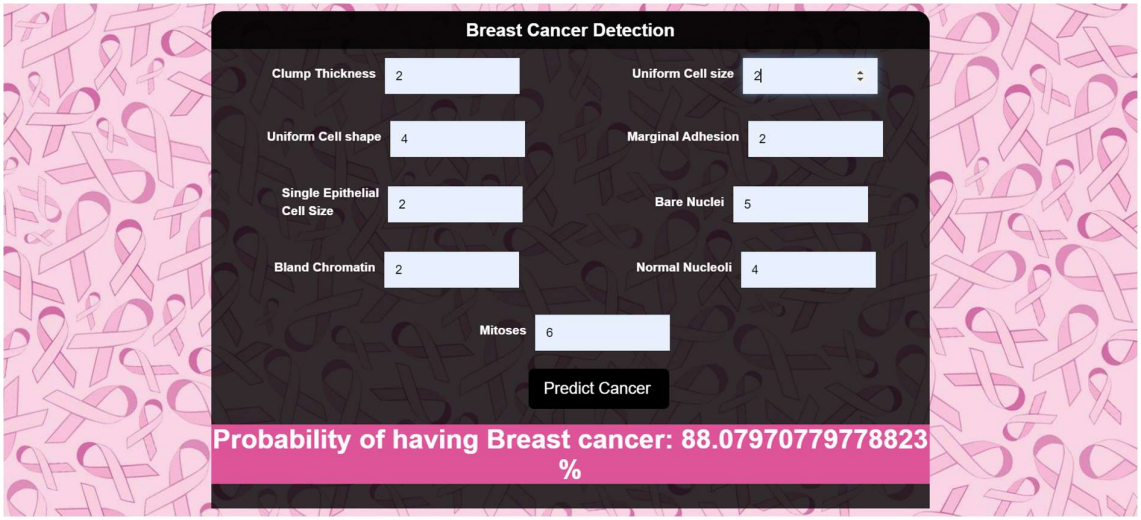
- **Detection page:**



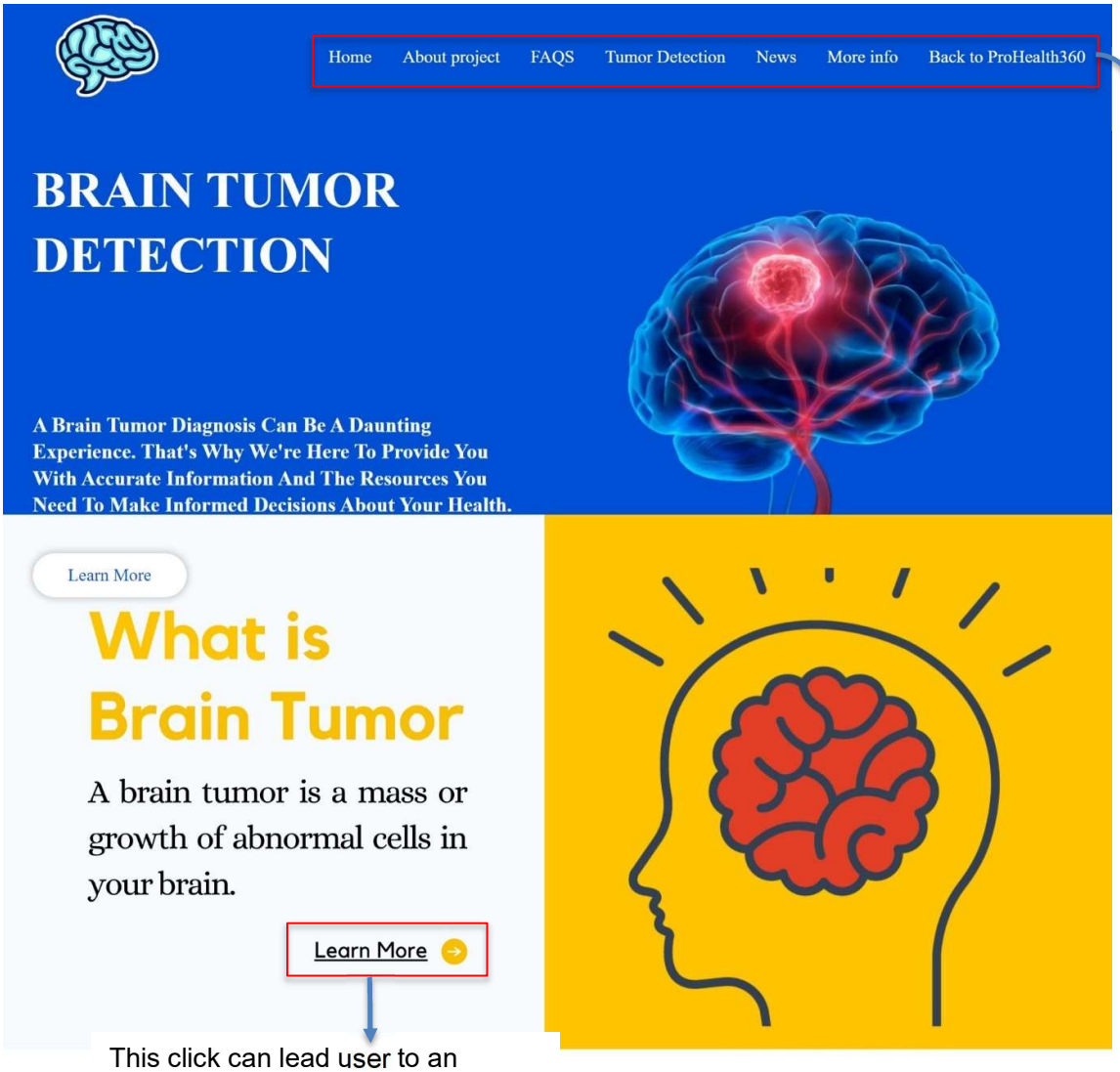
The user to detect himself should input 9 attributes, each one of them is ranged from 1 to 10.
for example :



Another example:



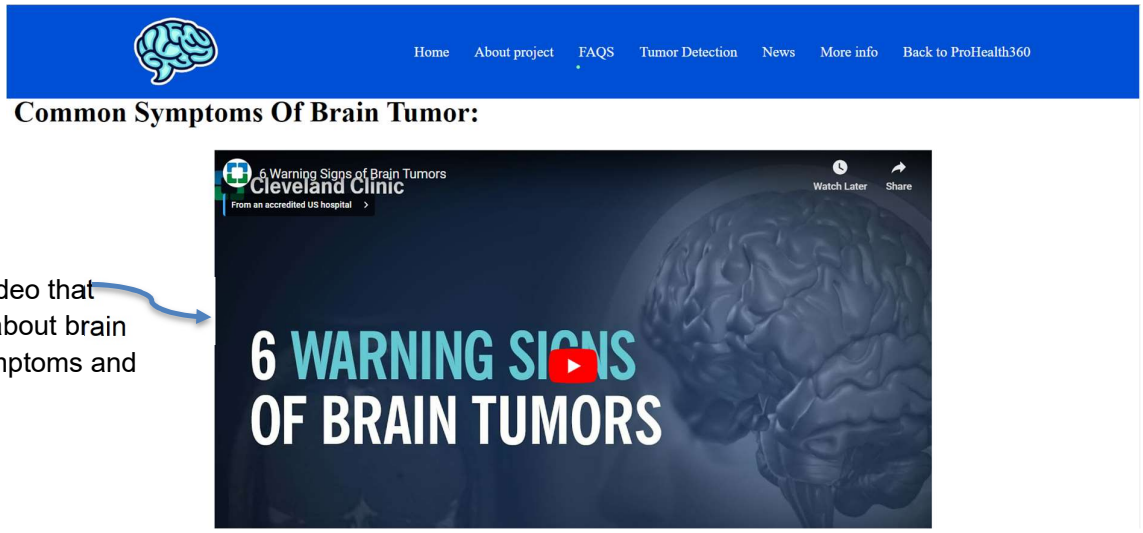
- **Brain tumor home page:**



navigator to brain tumor web. Users have 7 options each option lead to a specific page.

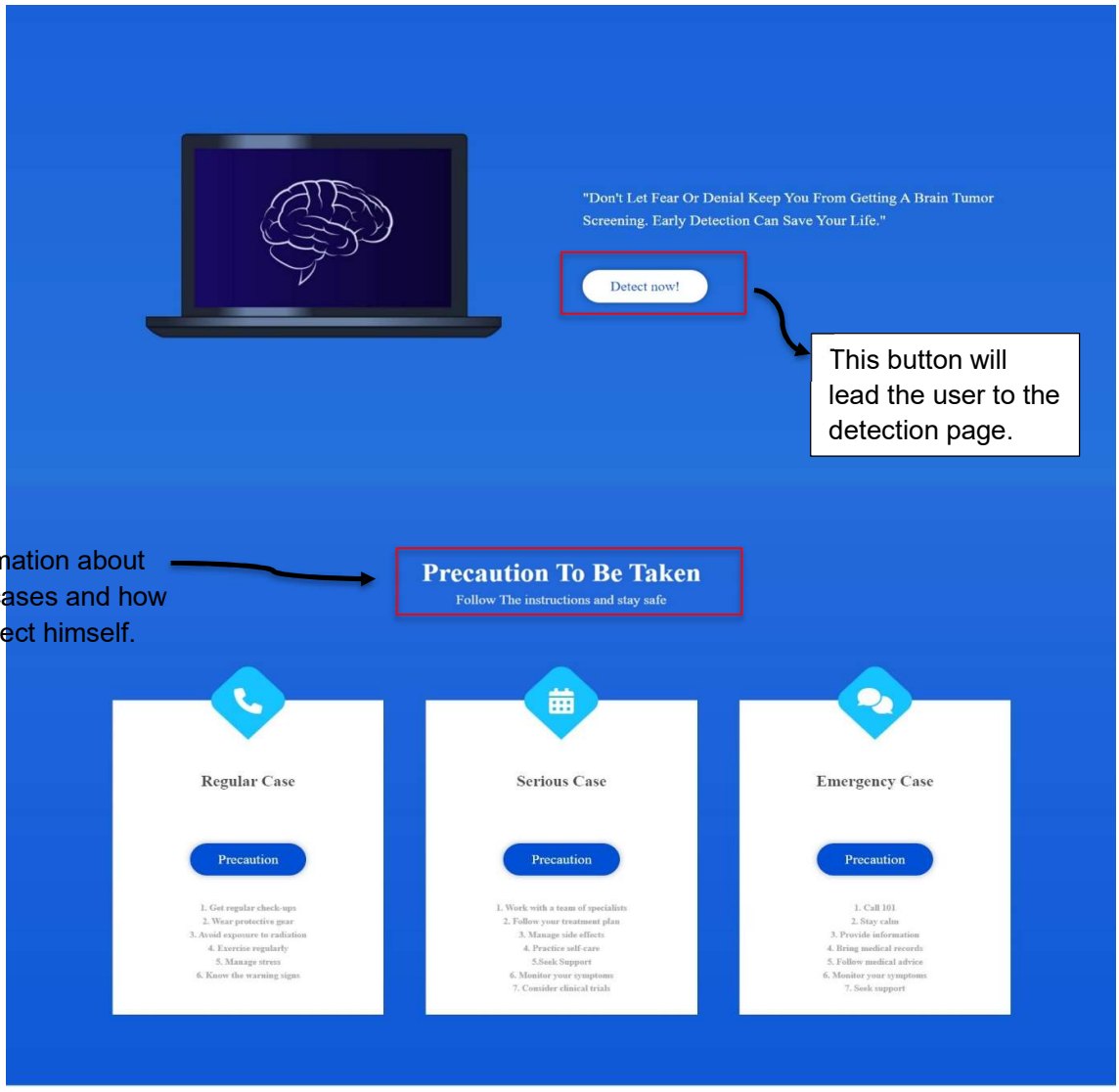
This click can lead user to an external web that have an general information about the disease.

- **Second section: short video**



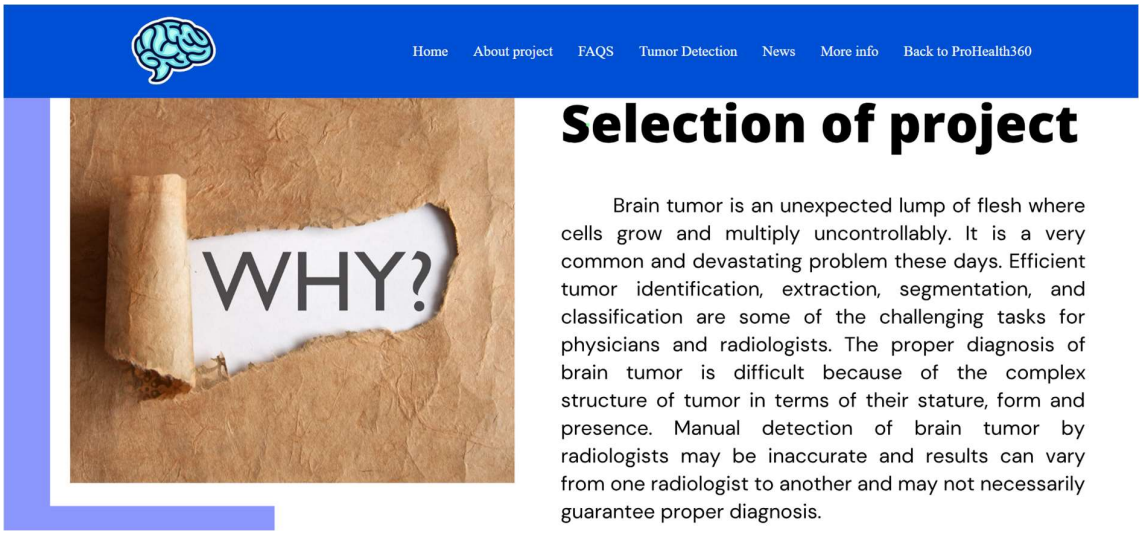
A short video that explains about brain tumor symptoms and warnings.

- **Third section:**



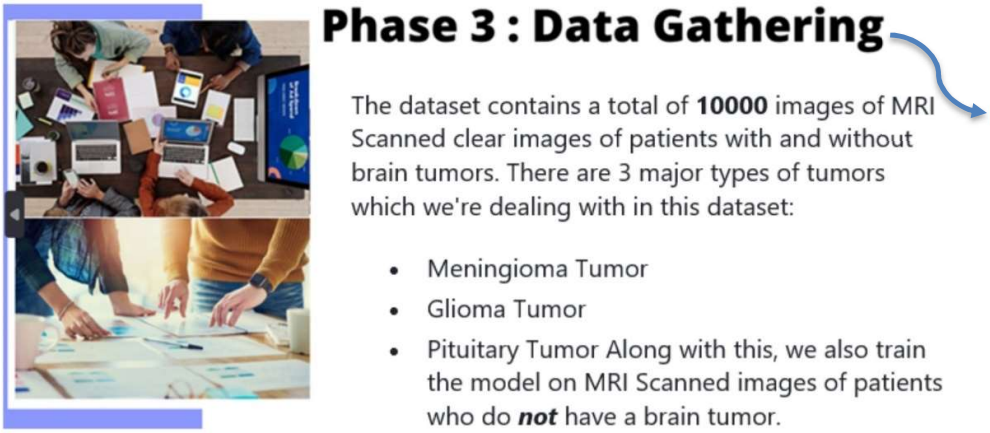
A more information about the disease cases and how user can protect himself.

- **About us page: first section:**

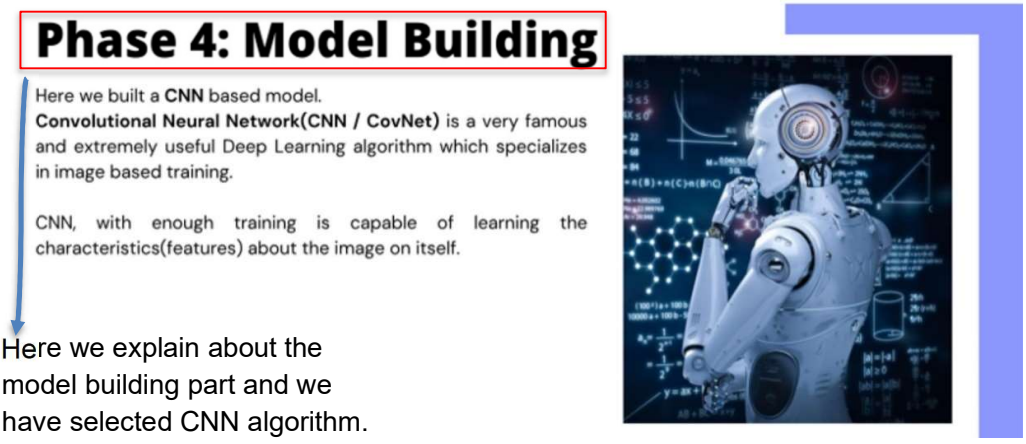


In this section we provided an explanation to why we choose to detect brain tumour diseases and how we ended up with this idea.

- **Second section :**



In this section we elaborate on our data gathering and the labels for the train set (the classes).



Here we explain about the model building part and we have selected CNN algorithm.

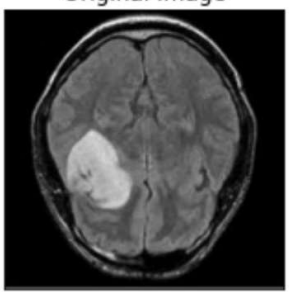
- **Third section: trained data**

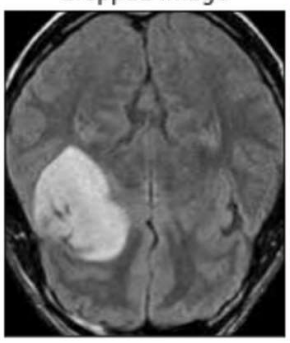
We provided a glimpse of data pre-processing we have done.

How we trained our model?

While Preprocessing, we converted our RGB images to grayscale, in order to reduce computation time.

Then the images were resized to a size of 240 X 240.

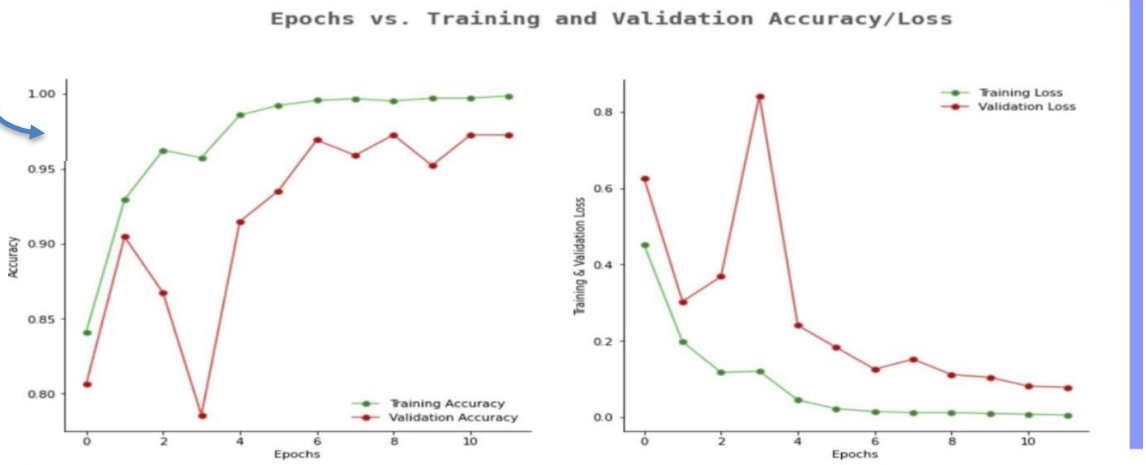




Evaluation metrics on training set.

Training

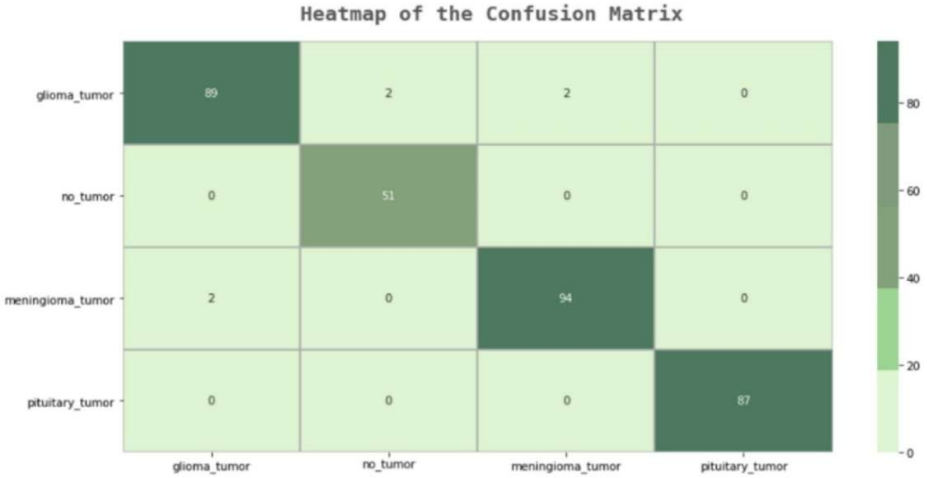
The model was trained **12 Epochs** .At the end of 12 epochs ,the accuracy and loss graph:



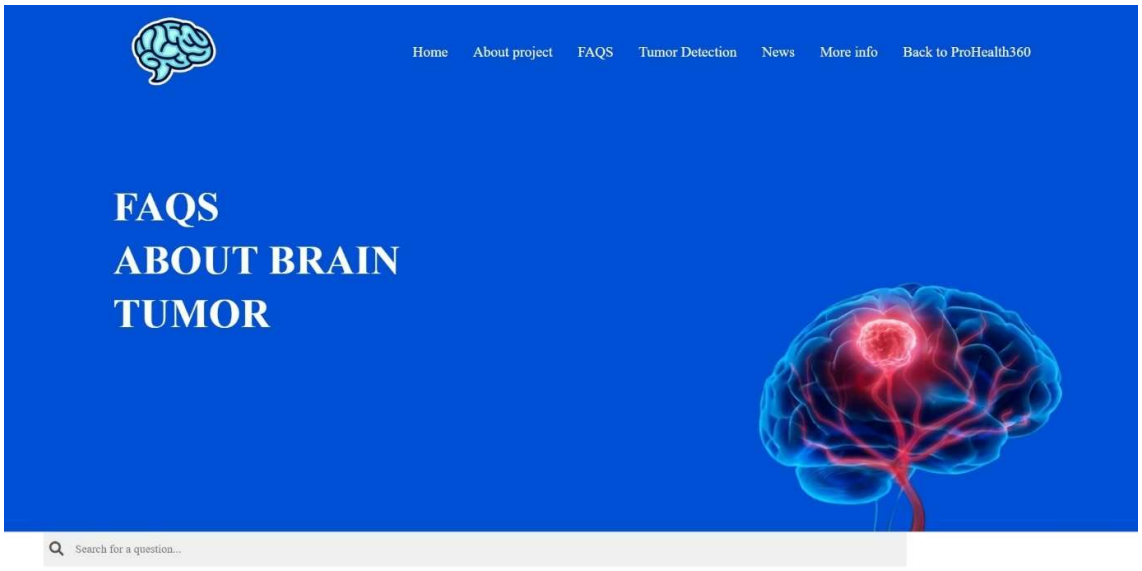
Evaluation metrics on test set.

Results:

We got an accuracy of around 98%.



- **FAQ's page :**

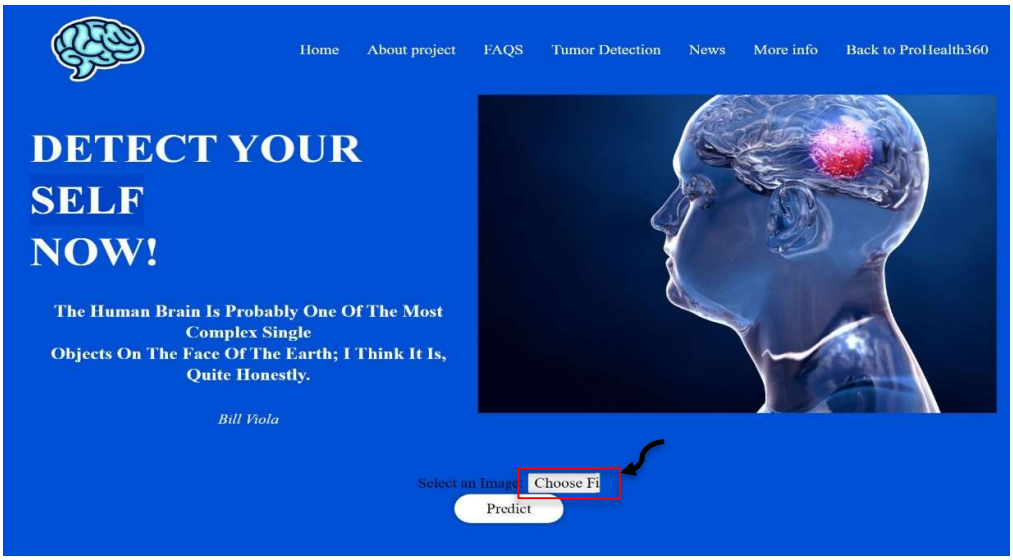


General Questions:

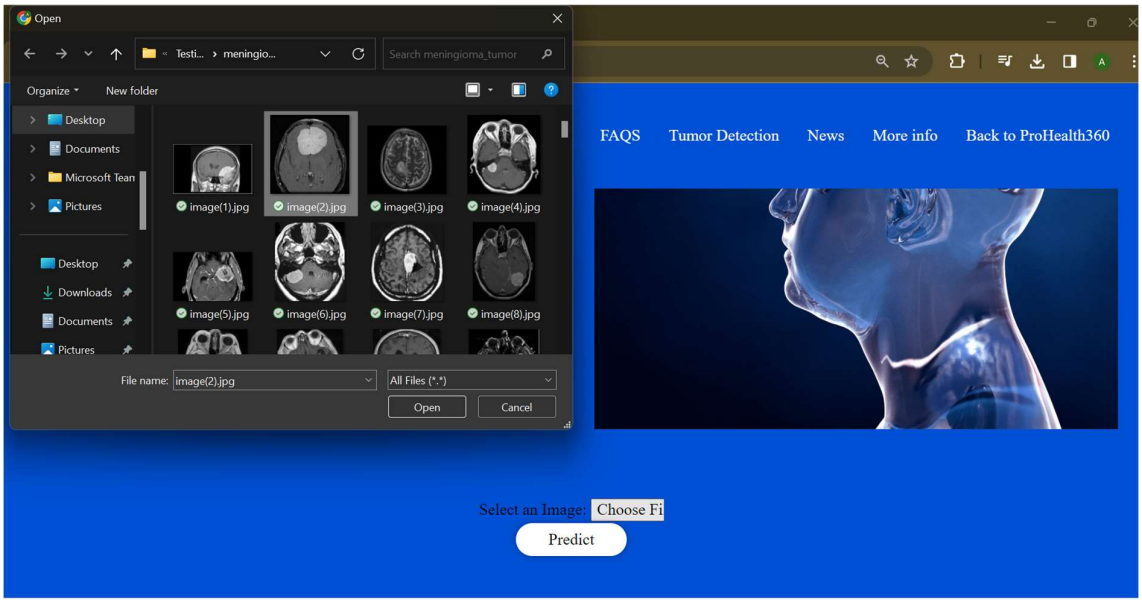
What Is A Brain Tumor?
A brain tumor is an abnormal growth of cells in the brain. It can be benign (non-cancerous) or malignant (cancerous).
What Are The Common Symptoms Of A Brain Tumor?
Common symptoms may include headaches, seizures, changes in vision or hearing, and personality changes.
How Are Brain Tumors Diagnosed?
What Are The Treatment Options For Brain Tumors?
What Is The Success Rate Of Brain Tumor Surgery?
Is Radiation Therapy Always Required After Brain Tumor Surgery?
Are There Alternative Or Complementary Therapies For Brain Tumor Treatment?
Can Brain Tumors Be Hereditary?
What Are The Different Types Of Brain Tumors?
What Are The Potential Complications Of Brain Tumor Surgery?
Are There Any Preventive Measures To Reduce The Risk Of Brain Tumors?
What Support And Resources Are Available For Individuals And Families Affected By Brain Tumors?

This page provided the frequently asked questions by the community. Clicking on the question will show the user the answer to the specific question.

- **Detection page :**

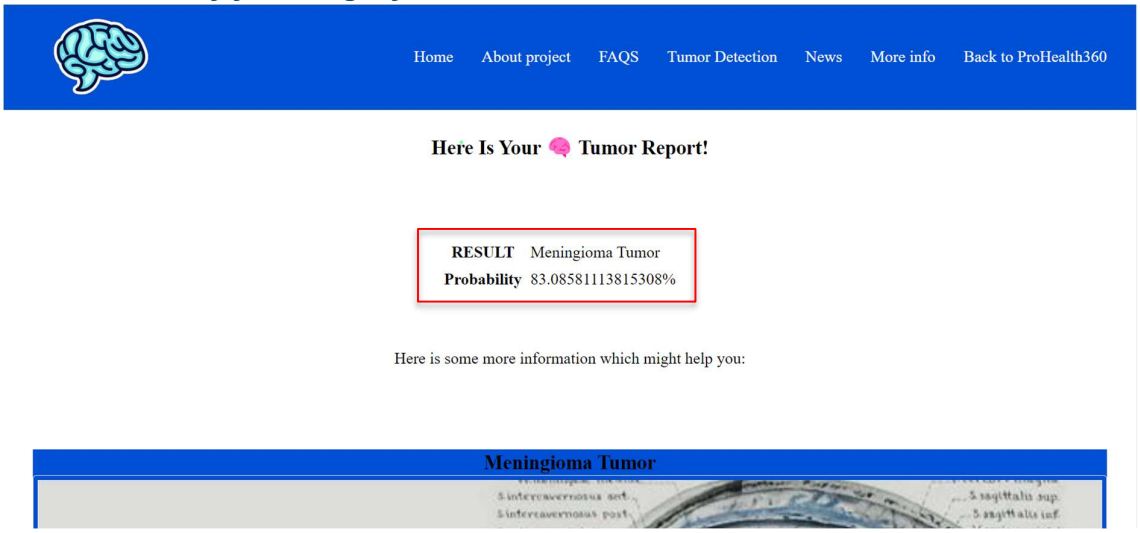


This page user can upload his MRI image by clicking on "choose file" button for example:



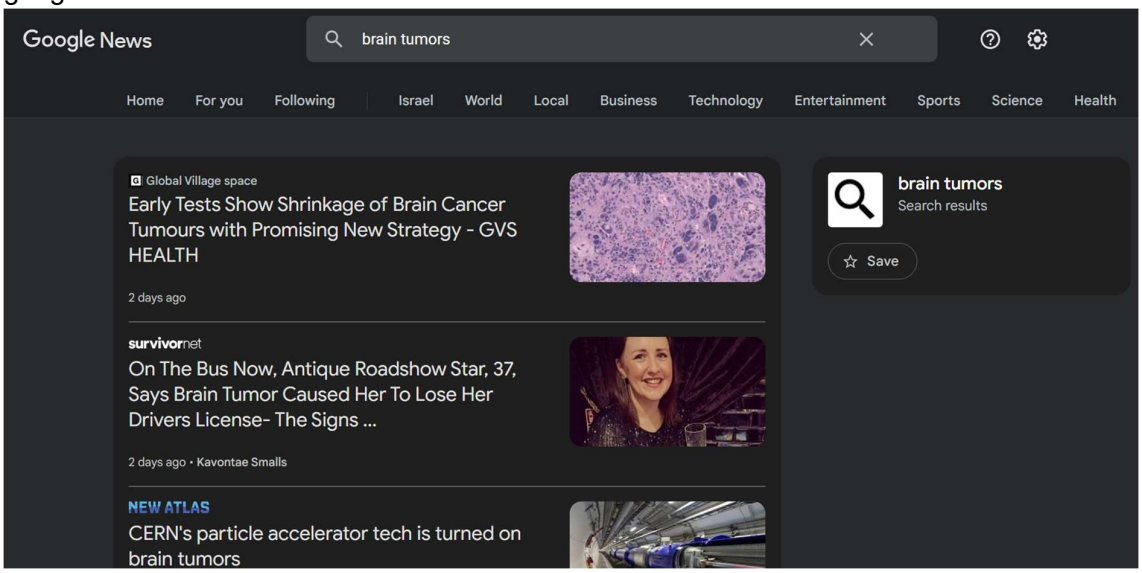
Select your MRI image and click on the "predict" button.

And immediately you will get your result :

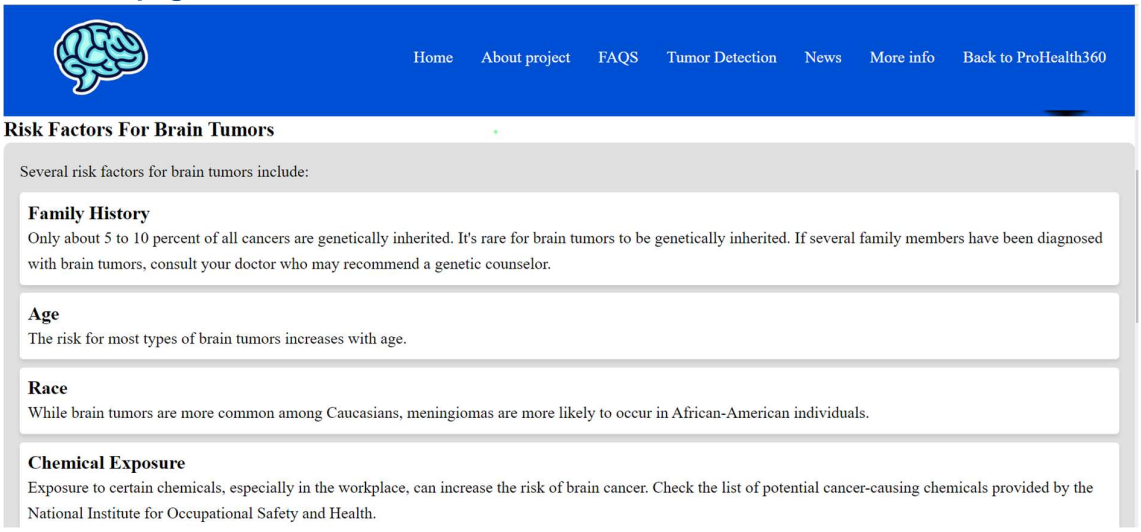


and at the bottom will be presented info on the predicted type of brain tumor disease and how you can treated it (unless you got no tumor result 😉).

- **News page:**
  When the user clicks on news in the navigator section of each page will lead him to google news about brain tumor diseases.

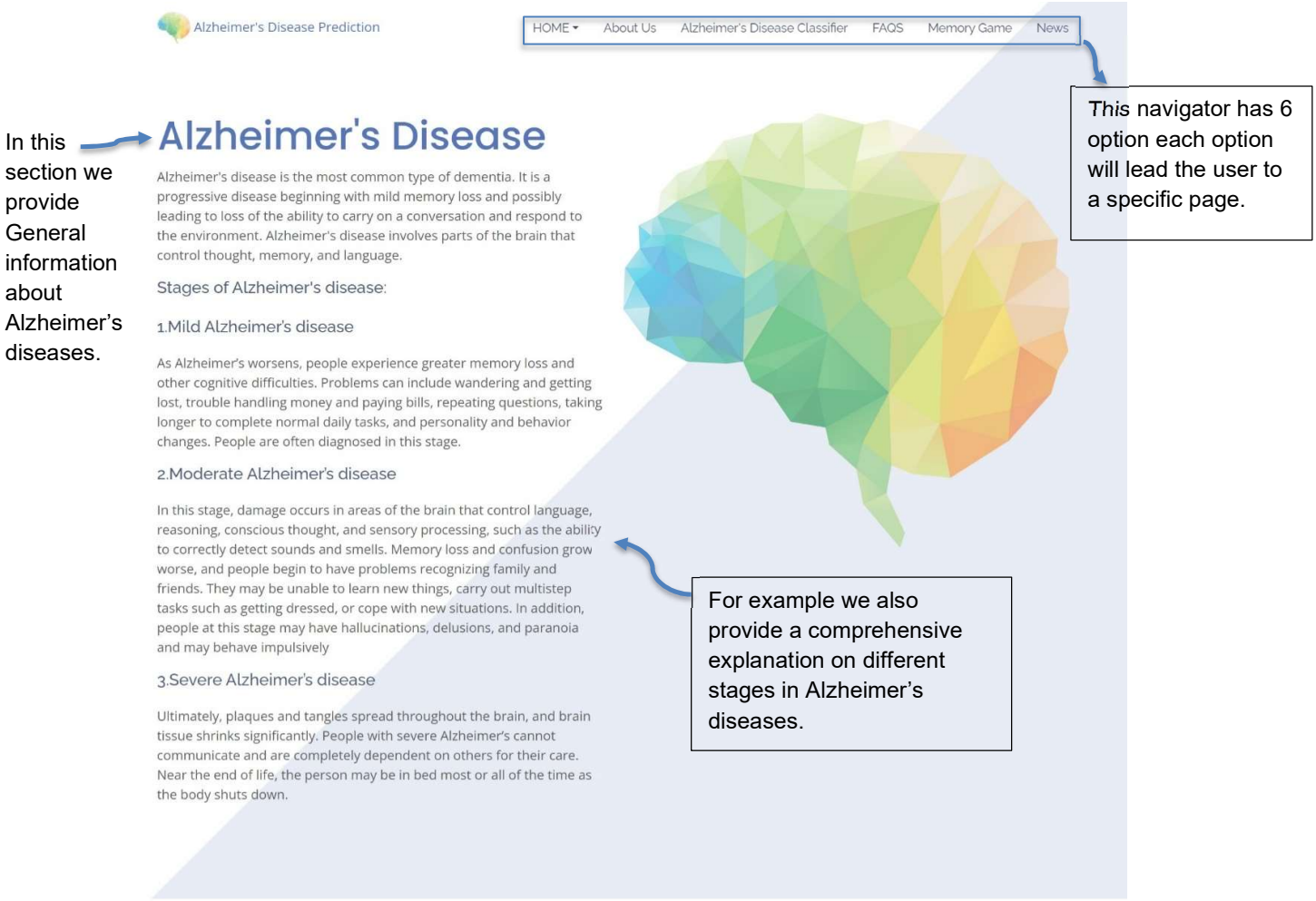


- **More info page:**



This page provides more information about brain tumor risks and how to treat the disease.

- **Alzheimer's web homepage: first section**



In this section we provide General information about Alzheimer's diseases.

This navigator has 6 option each option will lead the user to a specific page.

For example we also provide a comprehensive explanation on different stages in Alzheimer's diseases.

- **Second section: more information.**

In this section provided the common signs of different stages of Alzheimer's.

What are the warning signs of Alzheimer's disease?

Alzheimer's disease is not a normal part of aging. Memory problems are typically one of the first warning signs of Alzheimer's disease and related dementias. In addition to memory problems, someone with symptoms of Alzheimer's disease may experience one or more of the following:

- Memory loss that disrupts daily life, such as getting lost in a familiar place or repeating questions.
- Trouble handling money and paying bills.
- Difficulty completing familiar tasks at home, at work or at leisure.
- Decreased or poor judgment.
- Misplacing things and being unable to retrace steps to find them.
- Changes in mood, personality, or behavior.

Even if you or someone you know has several or even most of these signs, it doesn't mean it's Alzheimer's disease.

Short explaining Video. about the disease and what would cause !

Memory loss explaining video

A short explanation about what are the common causes Alzheimer's that researchers discuss.

What causes Alzheimer's disease?

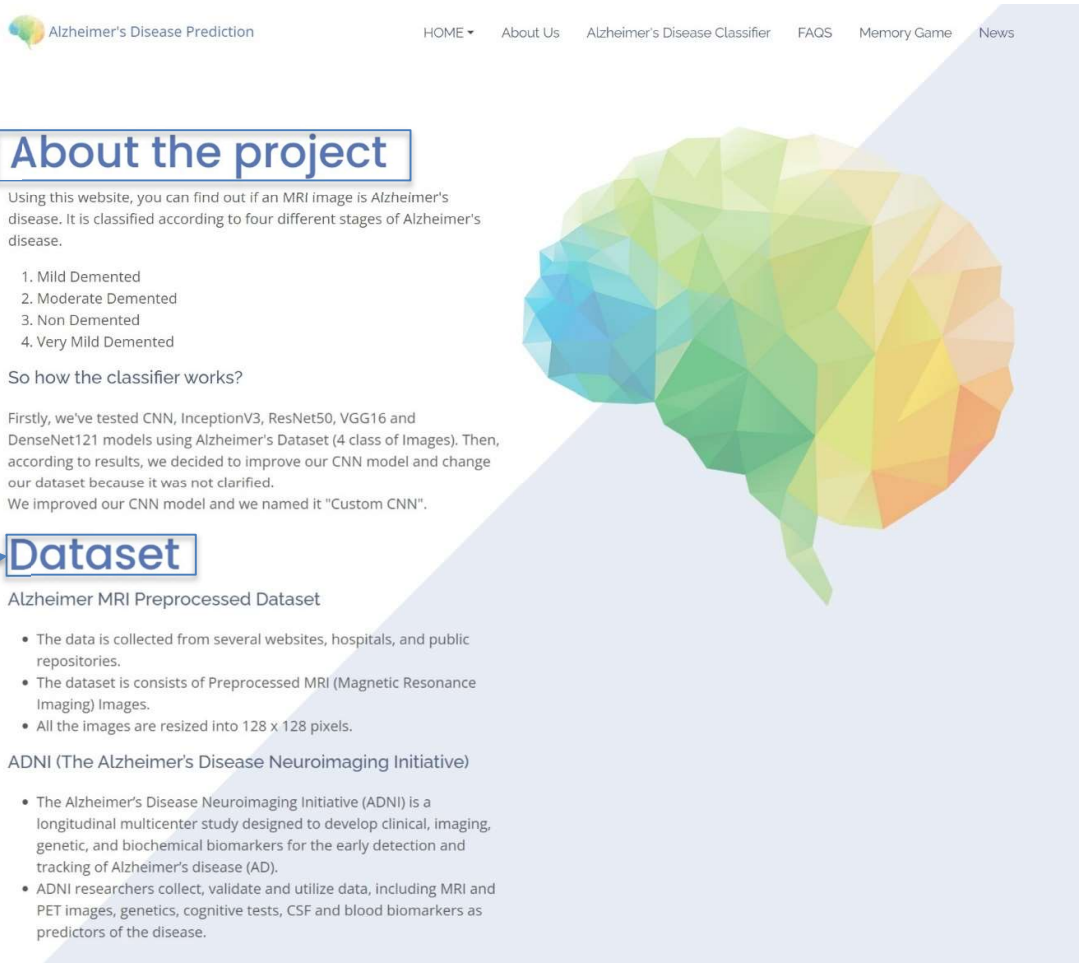
In recent years, scientists have made tremendous progress in better understanding Alzheimer's and the momentum continues to grow. Still, scientists don't yet fully understand what causes Alzheimer's disease in most people. The causes probably include a combination of age-related changes in the brain, along with genetic, environmental, and lifestyle factors. The importance of any one of these factors in increasing or decreasing the risk of developing Alzheimer's may differ from person to person.

Self Protect~ Alzheimer Disease detection~ Get Involved and raise)

- **About us page: first section**

In this section, we explain about the labels and models in a short way.

Here we explain about the data gathering and preprocessed dataset.



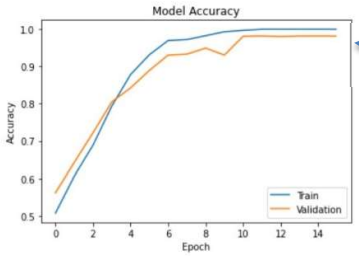
- **Second section: evaluation to data**

Acuuracy result for each Model

In this section, we present each model and its accuracy , here we can see CNN made the highest accuracy.

Model	Accuracy
Custom CNN	%98.18
CNN	%86.48
DenseNet121	%88.36
InceptionV3	%76.80
ResNet50	%78.20
VGG16	%79.45

As we see We improved our CNN model and we named it "Custom CNN".

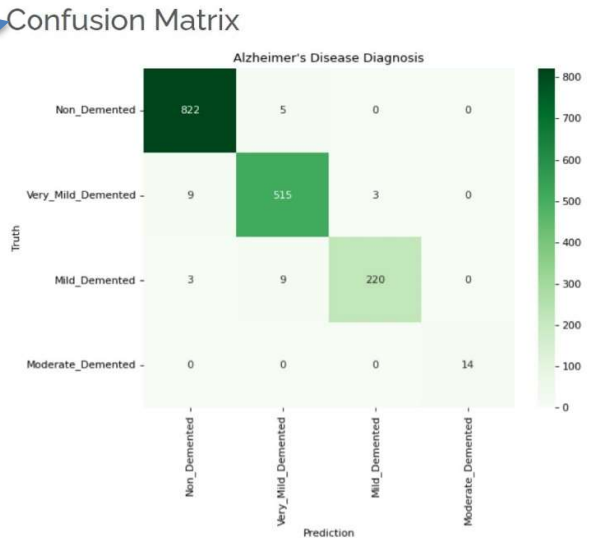


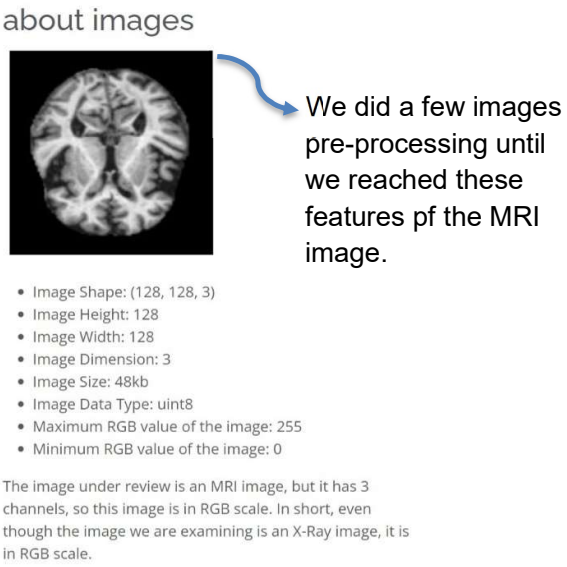
In this section, we present accuracy on train and validation set.

We can see a high acuuracy on validation and train set but after testing it on test set we have 0.981875 Accuracy. According to results, we see that Custom CNN model is trained properly and tested well.

- **Third section:**

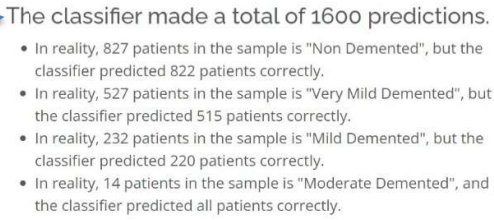
Confusion matrix on test set after prediction.



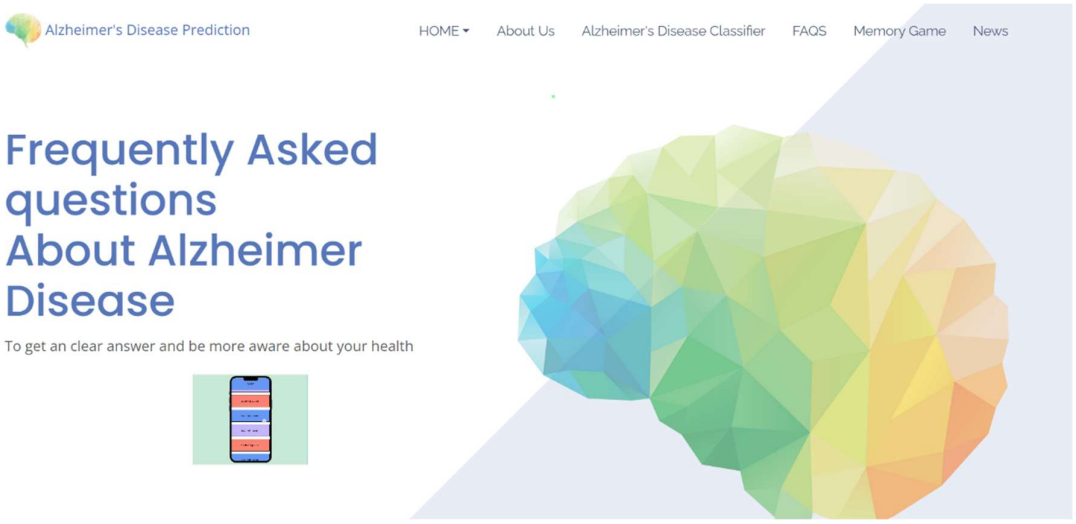


We did a few images pre-processing until we reached these features pf the MRI image.

More about prediction results.



- **FAQ's page: first section**



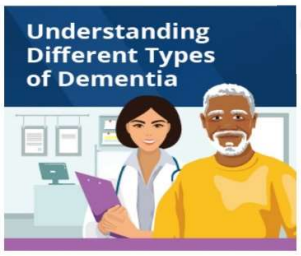
Scroll down to see all the questions.

Second section: question and answers.

1. What is the difference between Alzheimer's disease and dementia?

Alzheimer's disease is a type of dementia. Dementia is a loss of thinking, remembering, and reasoning skills that interferes with a person's daily life and activities. Alzheimer's disease is the most common cause of dementia among older people. Other types of dementia include frontotemporal disorders, Lewy body dementia, and vascular dementia.
Learn more about Alzheimer's disease and dementia.

About dementia

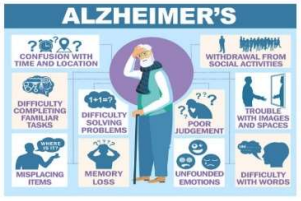


In this section presented all the frequently asked question by the community and the answer below each question.

2. Is Alzheimer's disease hereditary?

ust because a family member has Alzheimer's disease does not mean that you will get it, too. Most cases of Alzheimer's are late-onset. This form of the disease occurs in a person's mid-60s and is not linked to a specific change in genes. However, genetic factors appear to increase a person's risk of developing late-onset Alzheimer's. Early-onset Alzheimer's disease, which is rare, can be caused by genetic variants, or changes in certain genes. If one of the genetic variants is passed down, the child will usually — but not always — have the disease. For other cases of early-onset Alzheimer's, research shows other genetic components are involved.

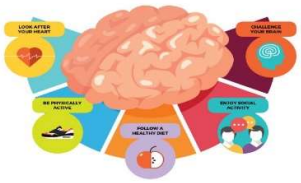
About assessing risk for Alzheimer's disease.



3. Is there a way to prevent Alzheimer's disease?

Currently, there is no definitive evidence about what can prevent Alzheimer's disease or age-related cognitive decline. What we do know is that a healthy lifestyle — one that includes a healthy diet, physical activity, appropriate weight, and control of high blood pressure — can lower the risk of certain chronic diseases and boost overall health and well-being. Scientists are very interested in the possibility that a healthy lifestyle might delay, slow down, or even prevent Alzheimer's. They are also studying the role of social activity and intellectual stimulation in Alzheimer's disease risk.

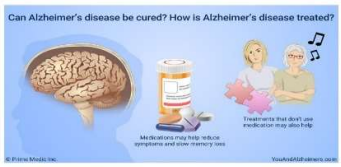
About reducing your risk for Alzheimer's disease.



4.Is there a cure for Alzheimer's disease?

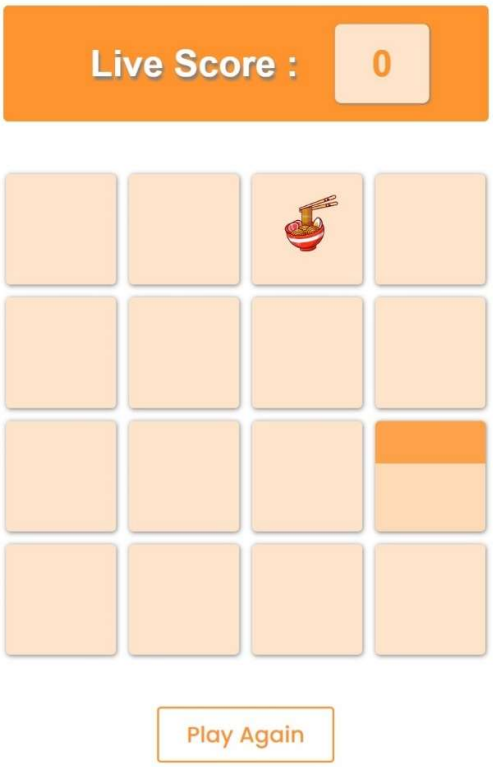
Currently, there is no cure for Alzheimer's disease. Some sources claim that products such as coconut oil or dietary supplements can cure or delay Alzheimer's. However, there is no scientific evidence to support these claims. The U.S. Food and Drug Administration (FDA) has approved several drugs to treat people with Alzheimer's disease, and certain medicines and interventions may help control behavioral symptoms. Scientists are developing and testing possible new treatments for Alzheimer's. you can Learn more about taking part in clinical trials that help scientists learn about the brain in healthy aging and what happens in Alzheimer's and other dementias. Results of these trials are used to improve diagnosis, treatment, and prevention methods.

About how Alzheimer's disease is treated.



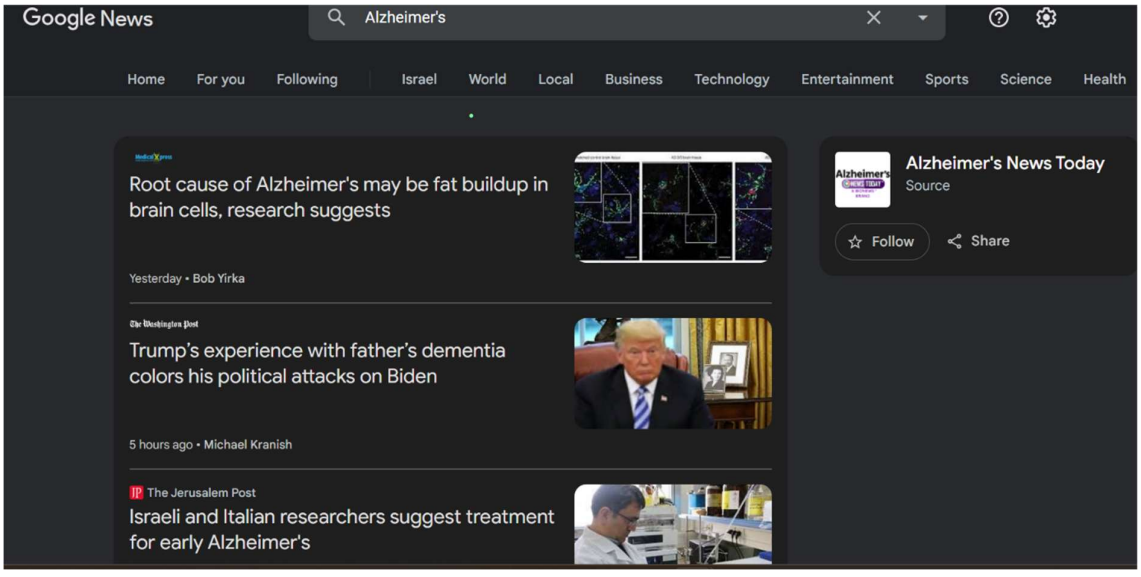
- **Memory game page:**

On this page, we developed a little game to check the user memory (to make it extraordinary).

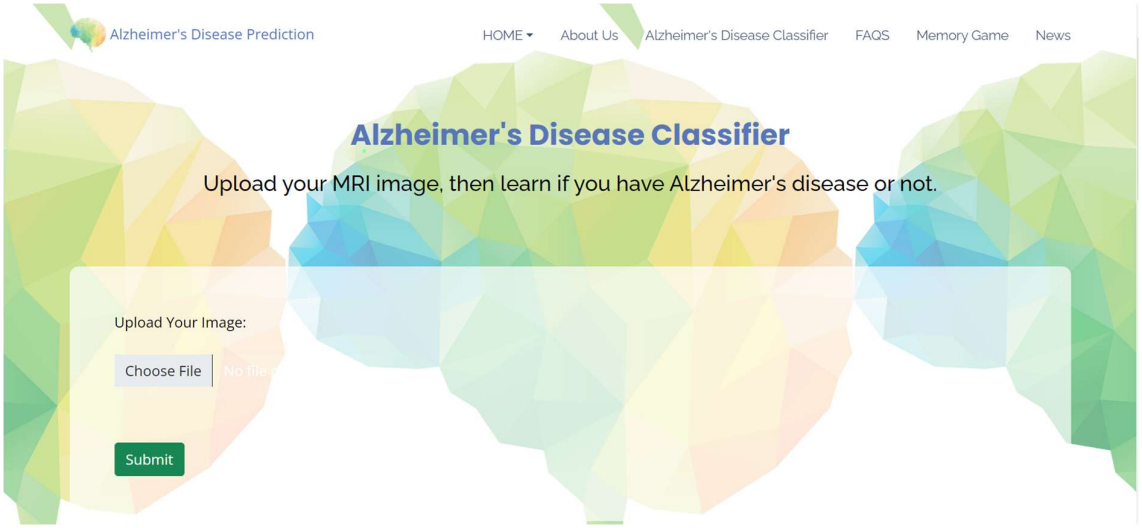


- **New pages:**

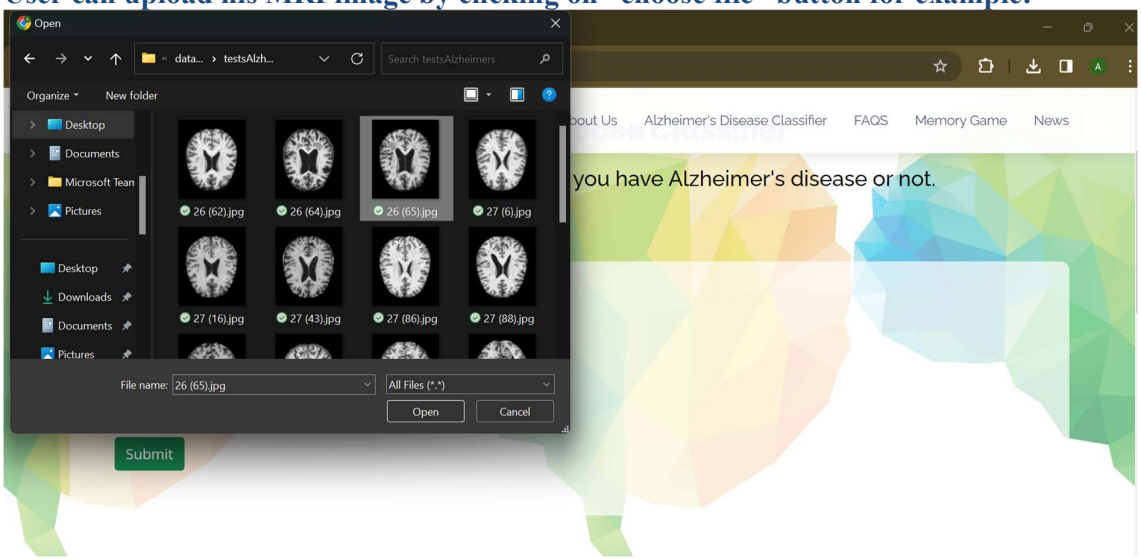
  when the user clicks on the news navigator, then will lead him to google news about Alzheimer's disease. For example:



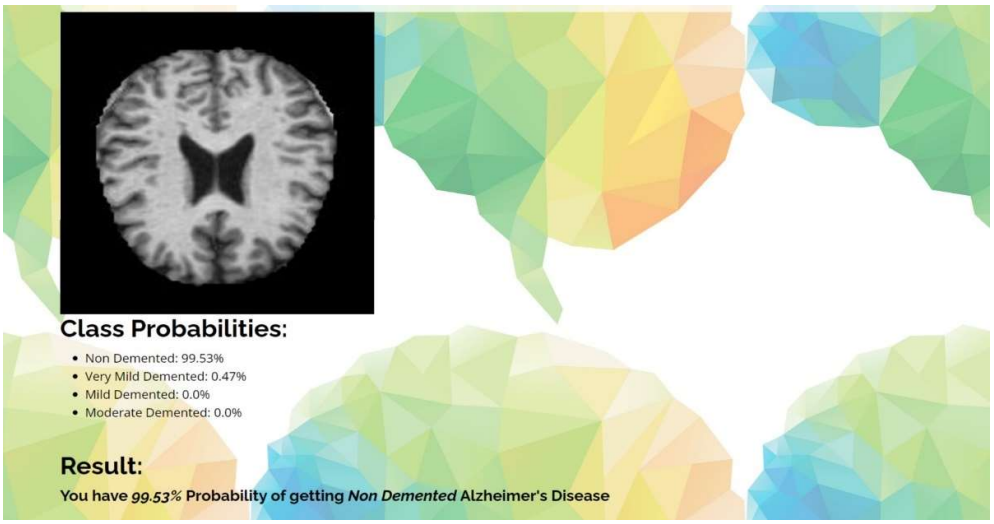
- **Alzheimer's classifier:**



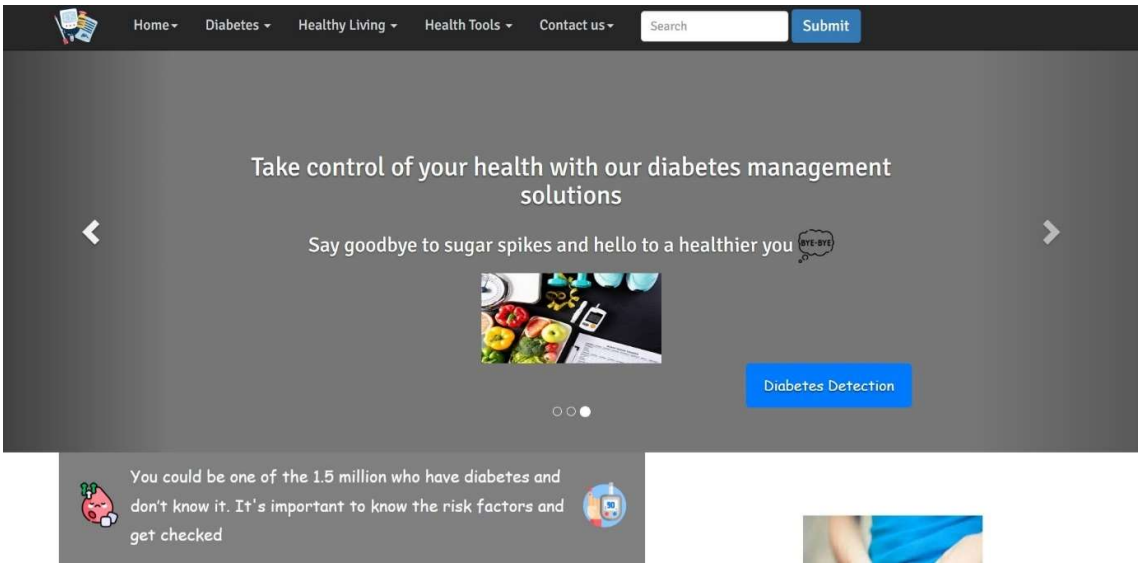
User can upload his MRI image by clicking on "choose file" button for example:



after he clicks on "submit" button immediately will see the result like this:



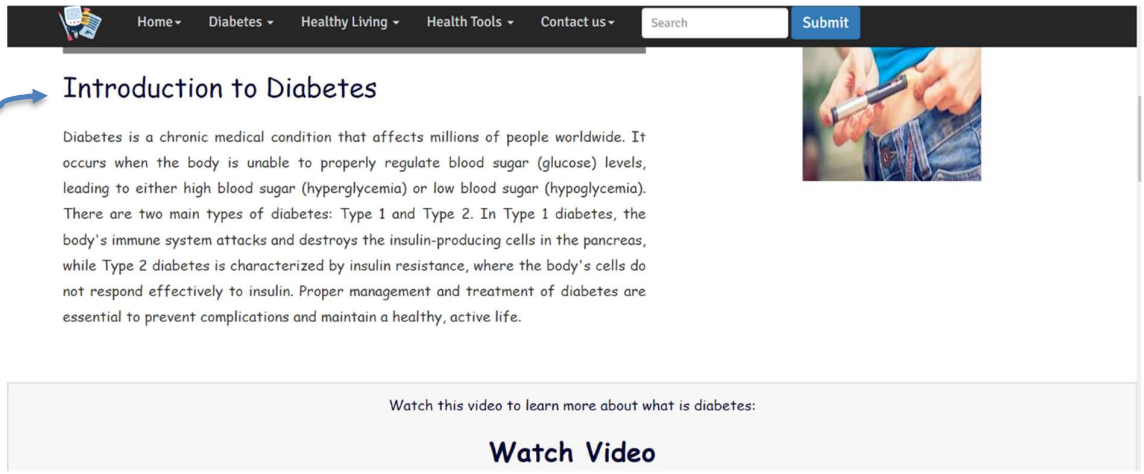
- **Diabetes home page:**



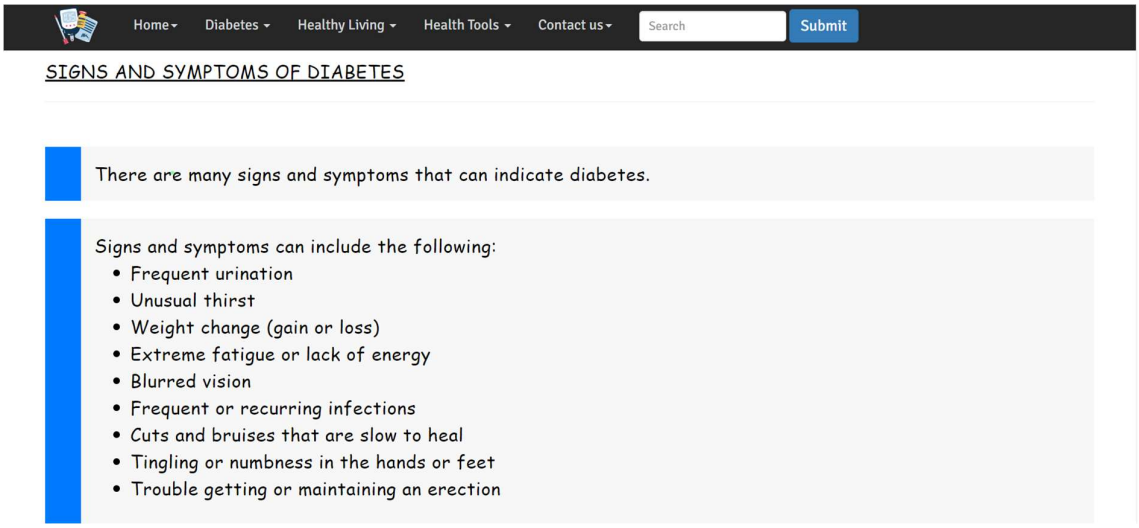
In this page user will find an introduction of diabetes disease and general information.

- **First section:**

General information each person should know.

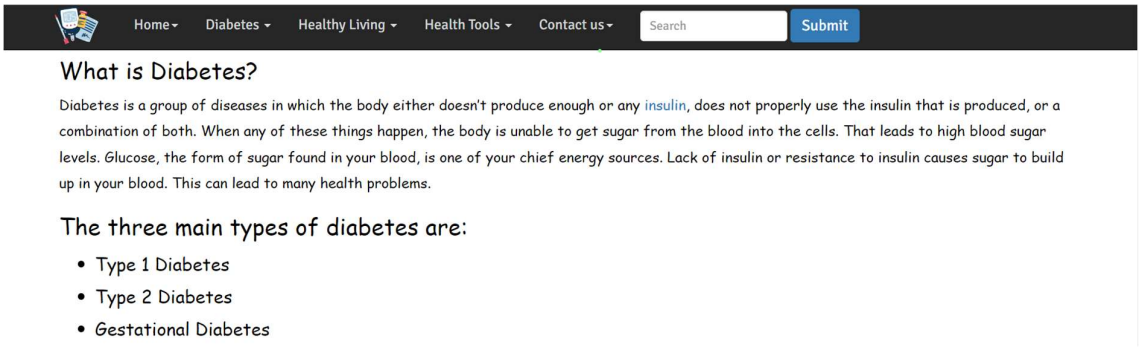


- **Signs and symptoms page:**



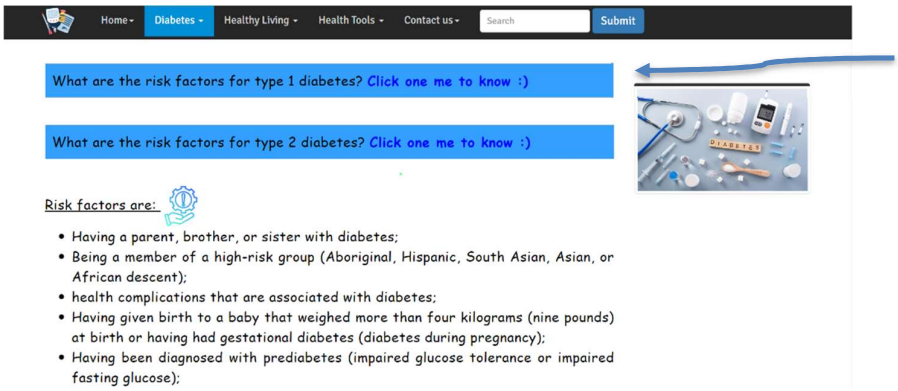
On this page, we describe all the signs and symptoms that the patient would have, which help him to protect himself and to care about this more.

- **Types of diabetes page:**



on this page we present 3 types of diabetes, explaining each type and its complications.

- **Risk factors page:**

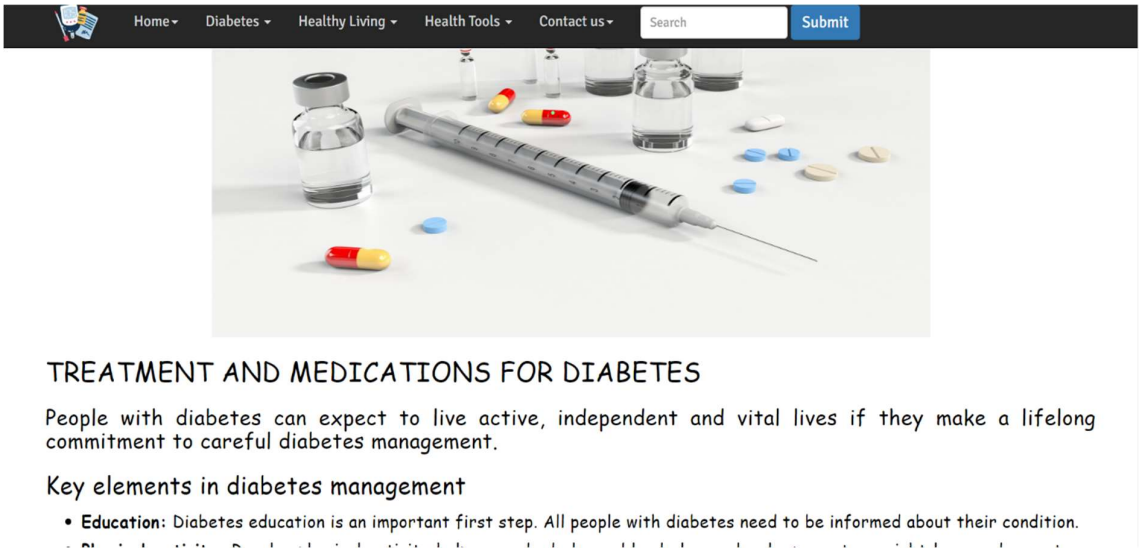


This page represented the risks of diabetes disease. each type of diabetes and its factors.

- **Diabetes and hypertension page:**

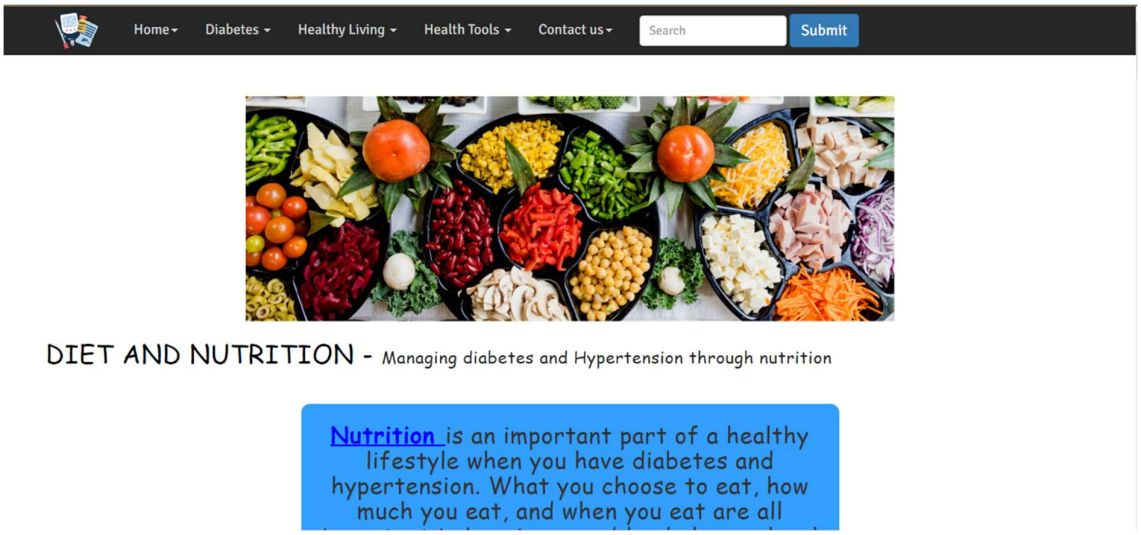
On this page, we provide the relationship between diabetes and hypertension and how diabetes affects patient blood pressure. How this operation happens is explained on this page in a comprehensive way.

- **Treatments page:**



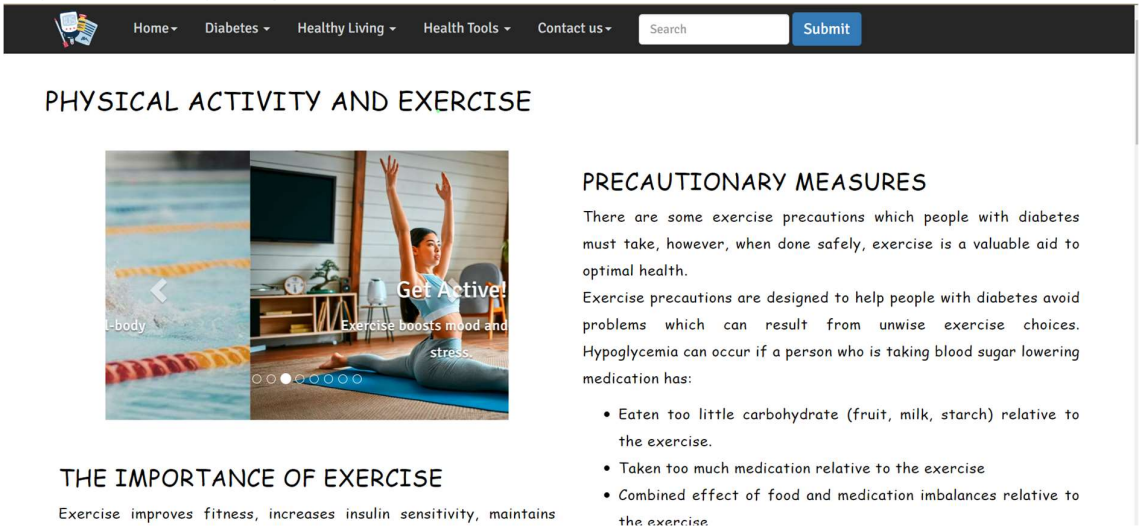
this page represents the treatment of diabetes of each type and how patients can treat it. However, always ensure that you see a doctor before taking any medications for diabetes.

- **Diet and Nutrition page:**



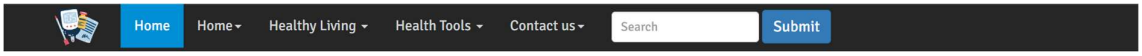
In Healthy Living Navigator included this page which represents the healthy nutrition each diabetes patient should eat and follow. Diet and nutrition are a part of treatment for patients, so this page provides so many tips and instructions for a healthy diet.

- **Physical activity page:**



Also in the healthy living navigator included this page "physical activity". This page provides how physical activity can reduce and improve the patient's status and make him feel better. Following the instructions on this page will make the user already feel better.

- **About us page: first section**



Selection of Project

In this section we explain why we choose diabetes disease to be detected.

Diabetes is a chronic metabolic disorder characterized by elevated levels of blood glucose (sugar). This occurs either because the body does not produce enough insulin (a hormone responsible for regulating blood sugar) or because the cells do not respond effectively to the insulin produced, leading to a condition known as insulin resistance.Diabetes can have serious health consequences if not properly managed, including cardiovascular problems, kidney disease, vision impairment, nerve damage, and more. Effective management through medication, lifestyle changes, and regular monitoring of blood sugar levels is crucial in mitigating the risks associated with diabetes.

So why did we choose to focus on this disease?

First and foremost, diabetes is a prevalent and growing health concern globally, affecting millions of people and placing a substantial burden on healthcare systems. By addressing diabetes, we have an opportunity to make a meaningful impact on public health.

- **Second section: model building**

Building the Model

Note : We will display now how we Building the model/models to predict if someone has diabetes or not and its the same for pridect the other diseases , so we will display one of them :)

Then, we separating the data and labels

```
#X has all the columns except for 'Outcome'
#Y only has 'Outcome'

X = diabetes_dataset.drop(columns = 'Outcome', axis=1)
Y = diabetes_dataset['Outcome']
```

The label is "Outcome," and it consists of two values: 0 and 1.

```
diabetes_dataset['Outcome'].value_counts()
```

```
0    500
1    268
Name: Outcome, dtype: int64
```

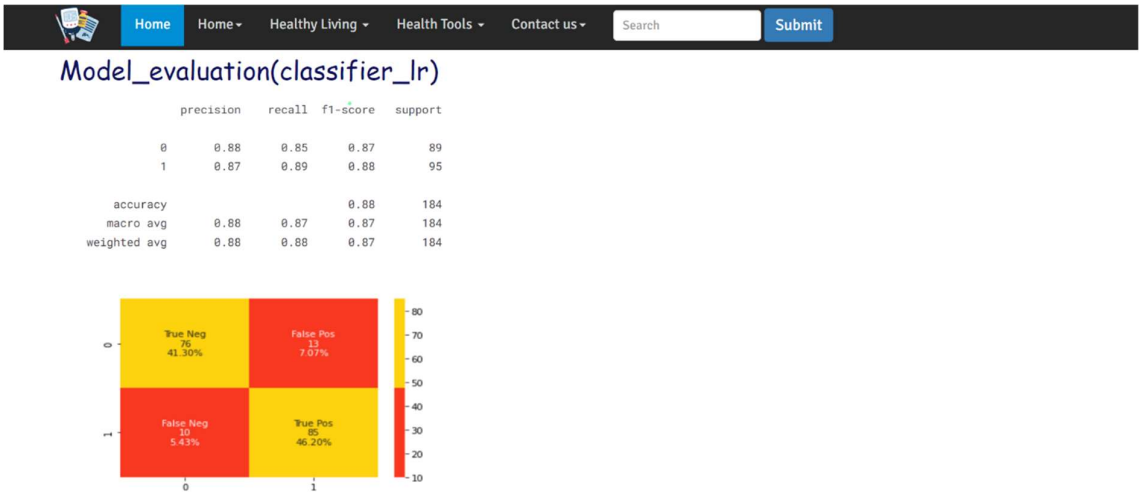
```
diabetes_dataset.shape
```

```
(768, 9)
```

After that, we used **StandardScaler** inorder to ensure that the input features are appropriately scaled and centered, making the machine learning model more effective and stable. It's a standard practice to improve the performance and interpretability of various machine learning algorithms.

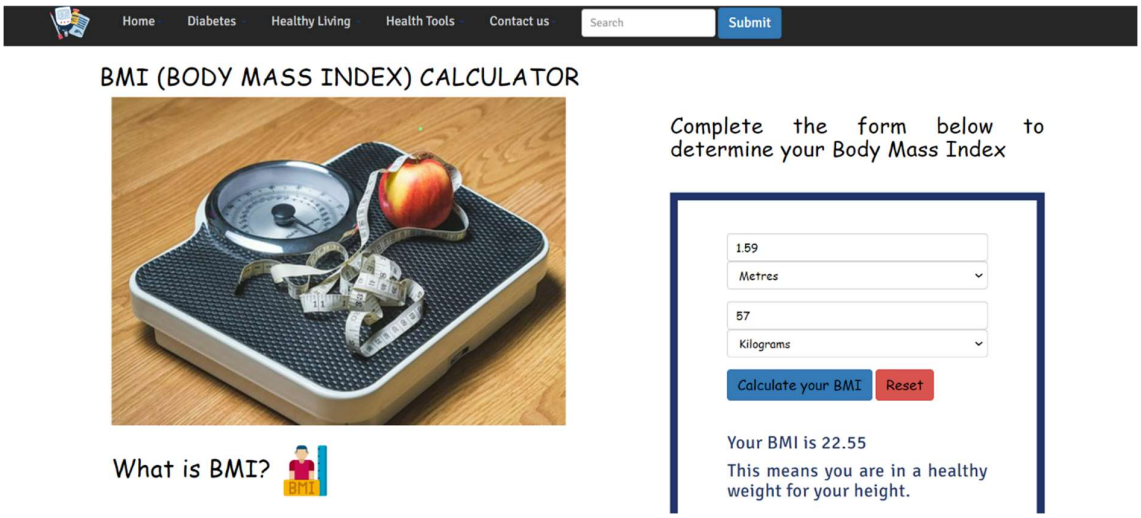
In this section, we explain all the data pre-processing we did on a data set that we gathered before we developed the model. Then we split the data to train and make predictions on the test set.
we implemented more of the model but eventually, we chose the SVM model.

- **Third section: model evaluation**



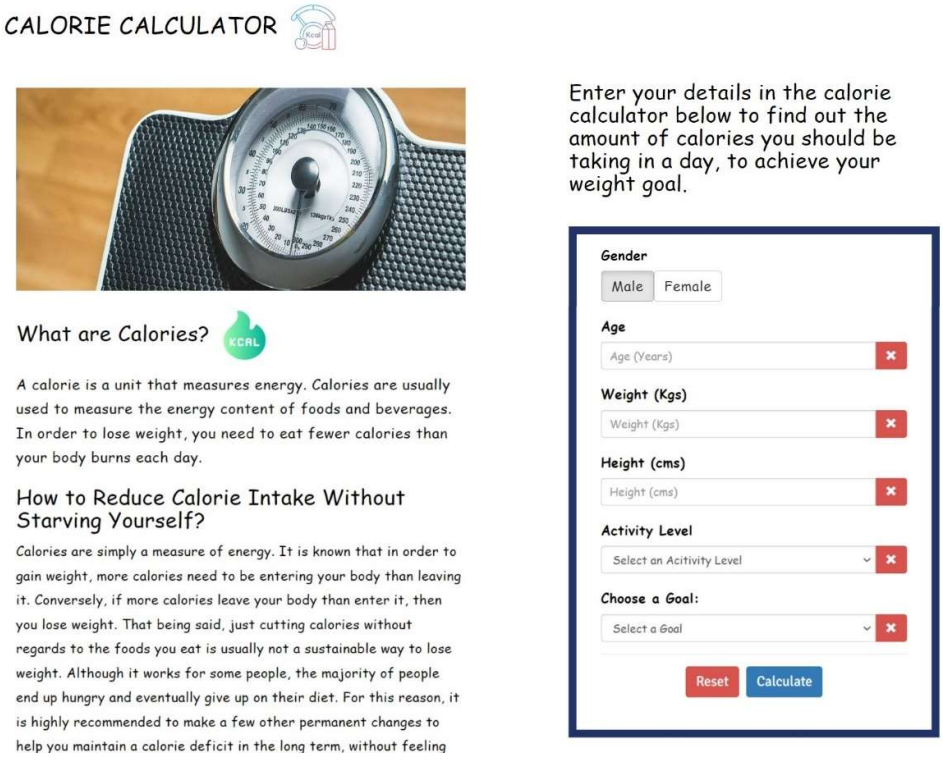
as we can see in this section we computed more than one evaluation metric. That's why we chose SVM because it gave us the highest accuracy.

- **BMI calculator:**



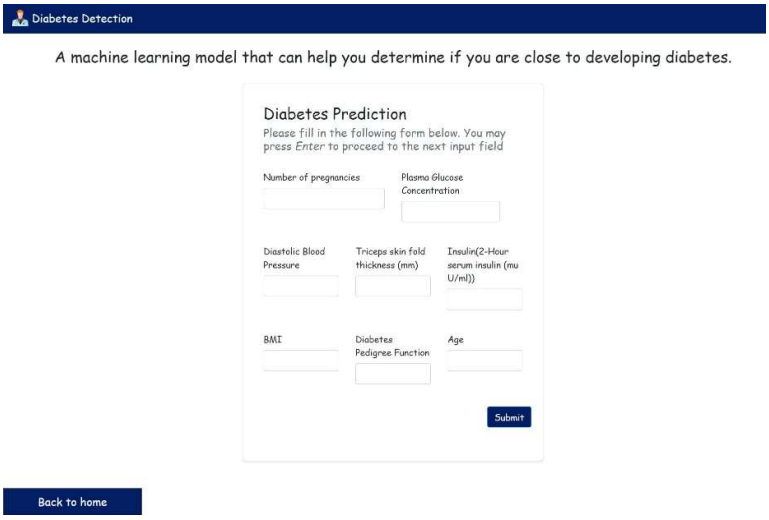
On this page user can calculate his BMI by entering his height and weight. Immediately user will know his BMI and if he has a healthy weight and height. And on the bottom of the page users can read more about what is under-average BMI and what is over-average BMI.

- **Calorie calculator page:**



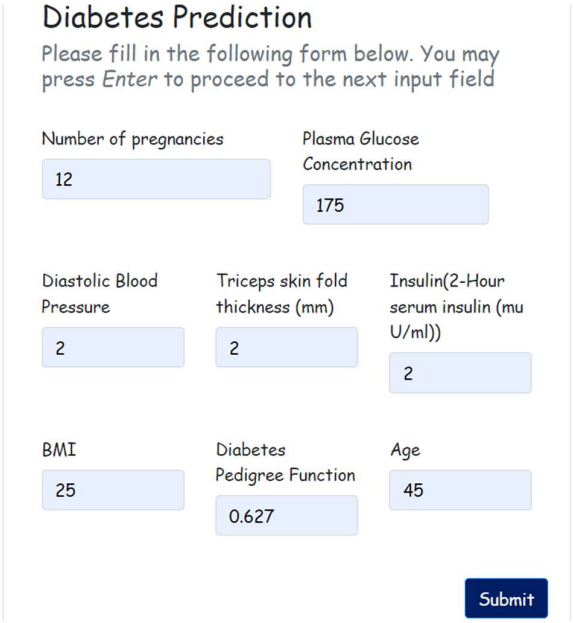
Users can enter their data (age, weight, height, activity level and theirs goal how much they want to lose or gain) and based on that will calculate the user how much their body burns calories each day.

- **Diabetes detection page:**

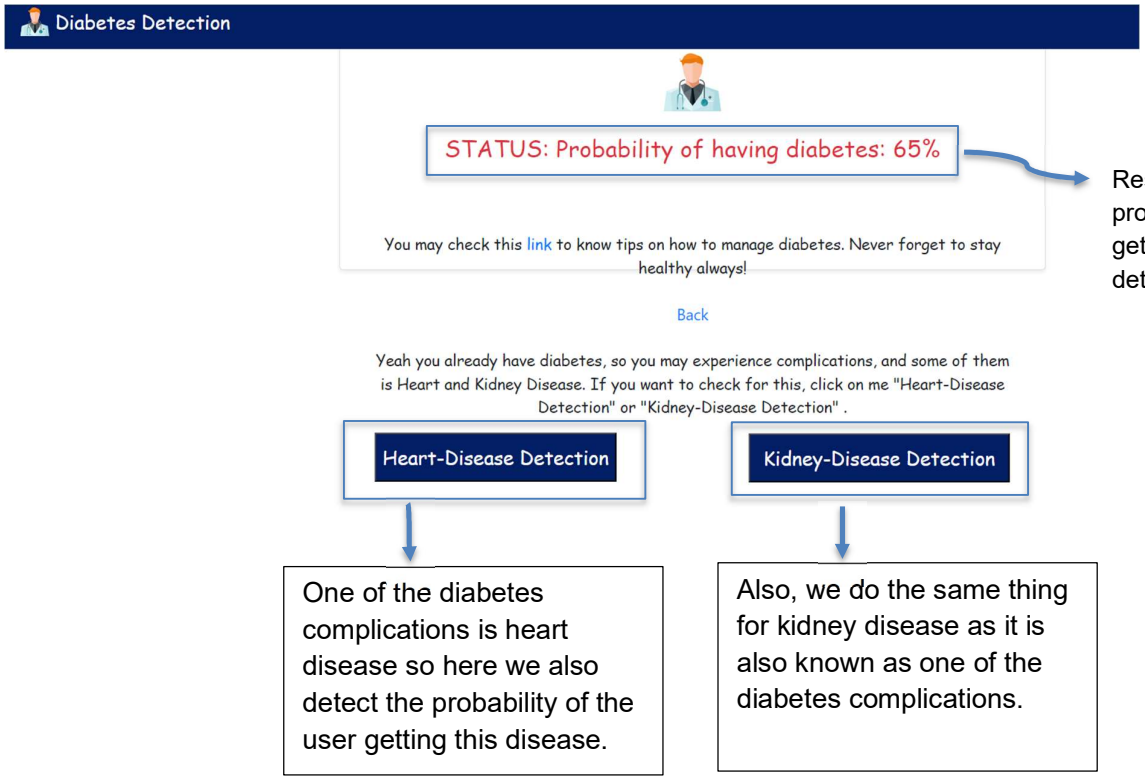


Users can enter their data on this page and data scanning and all the used algorithms we

have done will present to the user the probability of getting diabetes for example:



clicking on the "submit" button immediately will present the user result:



And it is an end!!!✓