

# SWAYAM: A Smart Medical Report

Be Your Own Doctor

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## **1. Problem Statement:**

The aim of this project is to develop a Smart medical report which will analyze a medical test report and generate the concerns and give a health advisory.

## **2. Abstract:**

Nowadays due to our lifestyle, eating habits, extreme climatic conditions, pollution, stress, use of chemicals for agricultural products has led to various disorders. For the diagnosis of these disorders doctors suggest various medical tests such as haemogram, urine, Vitamin B-12, thyroid, vitamin D, sugar etc. The conventional reports give parameter value along with a normal reference range. The parameter values exceeding the normal range are highlighted. To draw an inference from the conventional reports is sometimes difficult for some. Also sometimes the abnormal values in the report are a reason for worry due to unawareness about it. So to solve this problem a software based system titled SWAYAM: Smart Medical report is developed. The developed system reports the concerns in a medical report in a format which is easily understandable and gives health advisory. The scope of the system is restricted to analysis of the parameters related to blood report. The user interface consists of a login page in which he/she has to enter his/her personal details. After the login if the user's report is ready then the system displays the report, the concerns along with a health advisory which will be a guideline for the patient. The system can be extended for other recommendations such as medications and when to repeat the tests.

## **Keywords:**

Medical test report, Analysis, Concerns, Health advisory, Smart report.

### 3. Introduction:

With advancement in technology, nowadays a lot of health tests are available which helps the doctor for proper diagnosis of the disorder and deciding the line of treatment. Nowadays it is not that the tests are done only if there is disorder. People of a certain age undergo yearly health check ups. This helps to know about certain disorders at an early stage. This will help to make corrections in the lifestyle and prevent that disorder from growing. Haemogram, Urine test, Sugar test, Vitamin D, B 12 , Thyroid test are such routine tests. In the conventional pattern of the test report we have the value of the parameter and the normal range of that parameter. If the parameter is not within this range it is indicated in bold. Sometimes till we show the report to the doctor we are in a state of worry. Many times it happens that we have exceeded the range marginally and it is not that serious. Also there is a lack of awareness about these test parameters. So the conventional report can be made smart to suggest some health advisory and medications. The system developed reads the test report, and reports the concerns in a more understandable format. It also gives health advisory in case the parameter is not normal.

### 4. Literature review:

For developing the system, reports of some labs were referred. The reports of Healthians lab were referred to add some features in the smart report. Figure 1 shows the conventional report in which the value is seen is not within the normal range. So it is shown in bold.

Patient Name : 52051		Barcode : H7276662	
Age/Gender : 48/Female		Sample Collected On : 30/Oct/2022 08:51AM	
Order Id : 6745036150		Sample Received On : 30/Oct/2022 05:38PM	
Referred By : Self		Report Generated On : 30/Oct/2022 09:03PM	
Customer Since : 30/Oct/2022		Sample Temperature : Maintained ✓	
Sample Type : Whole Blood EDTA		Report Status : Final Report	
DEPARTMENT OF BIOCHEMISTRY HBA1C			
Test Name	Value	Unit	Bio. Ref Interval
HbA1c - Glycosylated Hemoglobin			
Hba1c (Glycosylated Hemoglobin)	5.80	%	4.2 - 5.7
Method: HPLC			
Average Estimated Glucose - plasma	119.76	mg/dl	
Method: Calculated			

Figure 1: Conventional report

The parameters are shown graphically in Figure 2. Normal values lie in green band and abnormal ones in the red band. This way of representation is better understood.

### HEALTH ANALYSIS

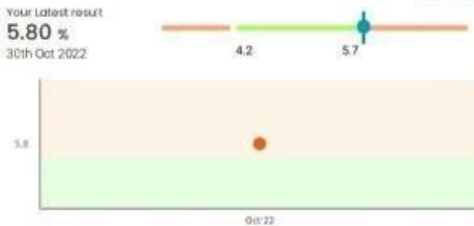
### HISTORICAL CHARTS

Booking ID : 6745036150

#### Glycated Hemoglobin (HbA1c)

Concern

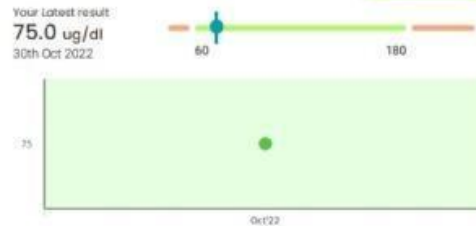
Your latest result  
5.80 %  
30th Oct 2022



#### Iron, Serum

Everything looks good

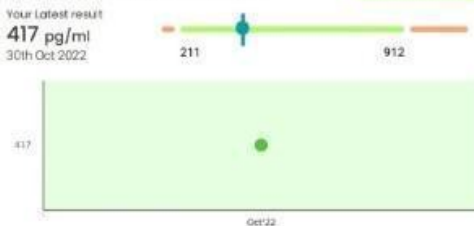
Your latest result  
75.0 ug/dl  
30th Oct 2022



#### Vitamin B12 Cyanocobalamin

Everything looks good

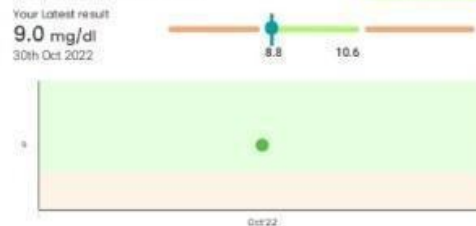
Your latest result  
417 pg/ml  
30th Oct 2022



#### Calcium Total, Serum

Everything looks good

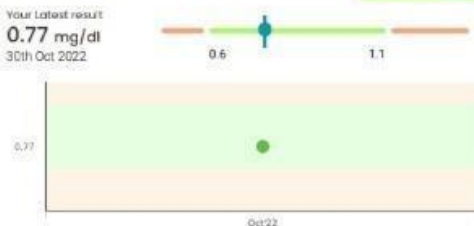
Your latest result  
9.0 mg/dl  
30th Oct 2022



#### Creatinine, Serum

Everything looks good

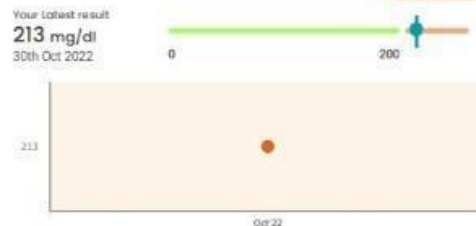
Your latest result  
0.77 mg/dl  
30th Oct 2022



#### Cholesterol-Total, Serum

Borderline Result

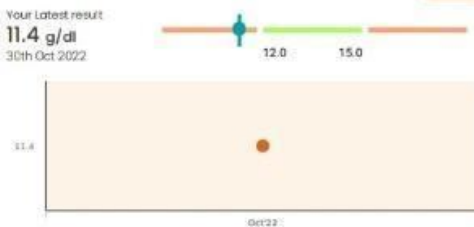
Your latest result  
213 mg/dl  
30th Oct 2022



#### Hemoglobin Hb

Concern

Your latest result  
11.4 g/dl  
30th Oct 2022



#### TSH Ultra - Sensitive

Everything looks good

Your latest result  
1.8670  
μIU/ml  
30th Oct 2022

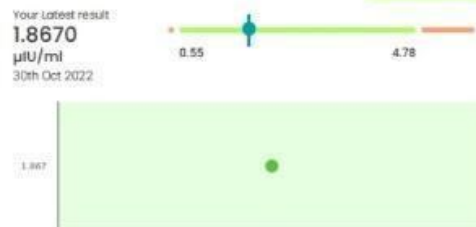


Figure 2: Graphical representation of the report

HEALTH ANALYSIS

Personalized Summary & Vital Parameters

Congratulations, We have successfully completed your health diagnosis. This is a big step towards staying on top of your health and identify potential to improve!

10 Vital Health Parameters of a Human Body Ecosystem

Below are the health parameters which require routine checkups for primary healthcare. The view also includes personalised information depending on the tests you have taken.

Comorbidities: Yes

\* Adults of any age with Comorbidities are at increased risk of severe illness from the virus that causes COVID-19.

Your Health Score

81  
Out of 100

\* Calculated from test reports



Thyroid Function

Thyroid Stimulating Hormone (TSH) - Ultrasensit : 1.8670  $\mu$ U/ml

Everything looks good



Cholesterol Total

213 mg/dl

Concern



Kidney Function

Serum Creatinine : 0.77 mg/dl

Everything looks good



Vitamin D

18.71 ng/ml

Concern



HbA1c

5.80 %

Concern



Vitamin B12

417 pg/ml

Everything looks good



Liver Function

Alanine Aminotransferase (ALT/SGPT) : 12.00 U/L

Everything looks good



Calcium Total

9.0 mg/dl

Everything looks good



Iron studies

Serum Iron : 75.0  $\mu$ g/dl

Everything looks good



Complete Hemogram

Haemoglobin (Hb) : 11.4 g/dl

Concern



Figure 3: Summary of the report

The summary of all the reports can be seen in figure 3. This helps to understand the significance of the test i.e. which test is related to which organ. Also concerns and normal parameters are highlighted. Figure 4 gives the health advisory related to nutrition, lifestyle and future tests.



Figure 4: Health advisory

In figure 5 we see that the report also suggests the medicines.

Your test report has indicated that you have certain deficiencies in your body which may hamper your health & wellbeing in the longer run.

In order to fulfill the gaps in nutrition and promote a healthier body we suggest you the following supplements mentioned below:

Deficiency/Out of Range Parameter(s)	Suggested Supplement
Glycated Hemoglobin (HbA1c)	DIABEAT-EASE
LDL Cholesterol -Direct	HEARTUP

To order, call 1800-572-000-4

### Suggestions for Improving Deficiencies



#### DIABEAT-EASE

Manage diabetes the all-natural way!

An all-natural supplement that helps in lowering your blood sugar levels, thus preventing the onset of diabetes and managing it if you are already a diabetic. By reducing blood sugar levels, this naturally-sourced diabetes supplement enables you to lead a productive life, while managing your diabetes in a safe and natural way.

Remember, ignoring diabetes can cause a lot of serious complications, including:

• Vision & Hearing Loss | • Nerve Damage | • Heart Attack | • Stroke | • Dementia

Infused with the ages-proven goodness of all-natural ingredients, DIABEAT-EASE is the perfect supplement to help you control diabetes without having to worry about side-effects. Sourced from nature's own pharmacy of herbs, the ingredients in DIABEAT-EASE present the following benefits:

##### Saunf

Helps control blood pressure & manage diabetes

##### Karela

Reduces blood sugar & reduces cholesterol levels

##### Chirata

Helps manage high blood pressure, diabetes & detoxifies blood

##### Ashwagandha

Reduces blood sugar, cholesterol, & triglycerides levels

##### Vijayasar

Helps manage diabetes by lowering down sugar cravings



#### HEARTUP

Improve your heart health, the natural way!

Lower your blood pressure and give your heart a healthy beat with HEART-UP, an all-natural supplement developed especially to promote good heart health. Harnessing the remedial properties of garlic, peepal, and cinnamon, this clinically proven natural supplement lowers your blood pressure, thus ensuring a healthy heart, which in turn means a healthy you.

If left unchecked, hypertension can lead to:

• Heart Failure | • Kidney Diseases | • Heart Attack | • Stroke | • Vascular Dementia

Infused with the ages-proven goodness of all-natural ingredients, HEART-UP is the perfect supplement to help you control hypertension or high blood pressure without having to worry about side effects. Sourced from nature's own pharmacy of herbs, the ingredients in HEART-UP present the following benefits:

##### Arjun Tree Extract

Reduces the risk of heart diseases with anti-hypertensive properties

##### Garlic

Helps manage blood pressure and lowers cholesterol

##### Peepal

Purifies the blood and boosts cardiac health

##### Jatamansi

Helps in alleviating anxiety, thus reducing the risk of high blood pressure

##### Cinnamon

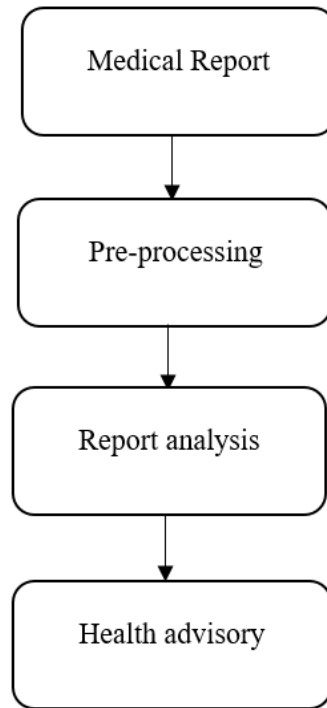
Has anti-viral properties, reduces blood pressure, and lowers the risk of Type 2 diabetes

Figure 5: Suggested Medicines



## 5. System Overview:

Figure 6 shows the system overview. The developed system reads the report (csv format) and converts it to a form so that required data in the report can be extracted and be further processed. Then the extracted data is compared with normal range and any concern is then reported along with health advisory.



**Figure 6: System Overview**

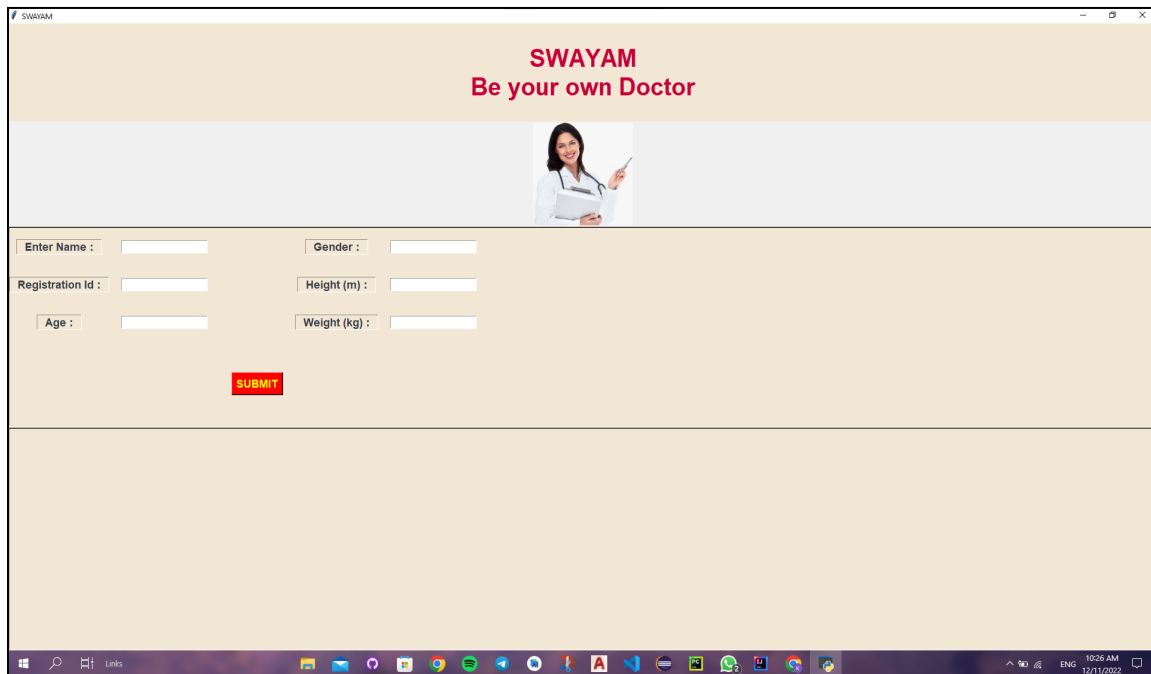
## 6. System Details:

The blood report is generated as a CSV file which is accessed in the python program. The data stored in the CSV file is processed by using list data structure. To read the CSV file ,the pandas library of python is used The Tkinter module of python has been used to develop the GUI. On the first page of the interface the user has to enter his/her personal details which have been developed using the functions of the Tkinter module. According to the registration number entered by user the details of the report, disorders predicted and remedies suggested are printed on the next page which pops up.

## 7. Experimentation & Observations:

Figure 7 shows the login page of the developed system. Once the details of the login page are entered and if the user report is generated then the analysis page is displayed to the user as seen in Figure 8. The system also calculates BMI as shown in Figure 8. The health advisory for high

BMI is shown in Figure 9. In case the user is not registered the screen shown in Figure 9 is displayed.



**SWAYAM**  
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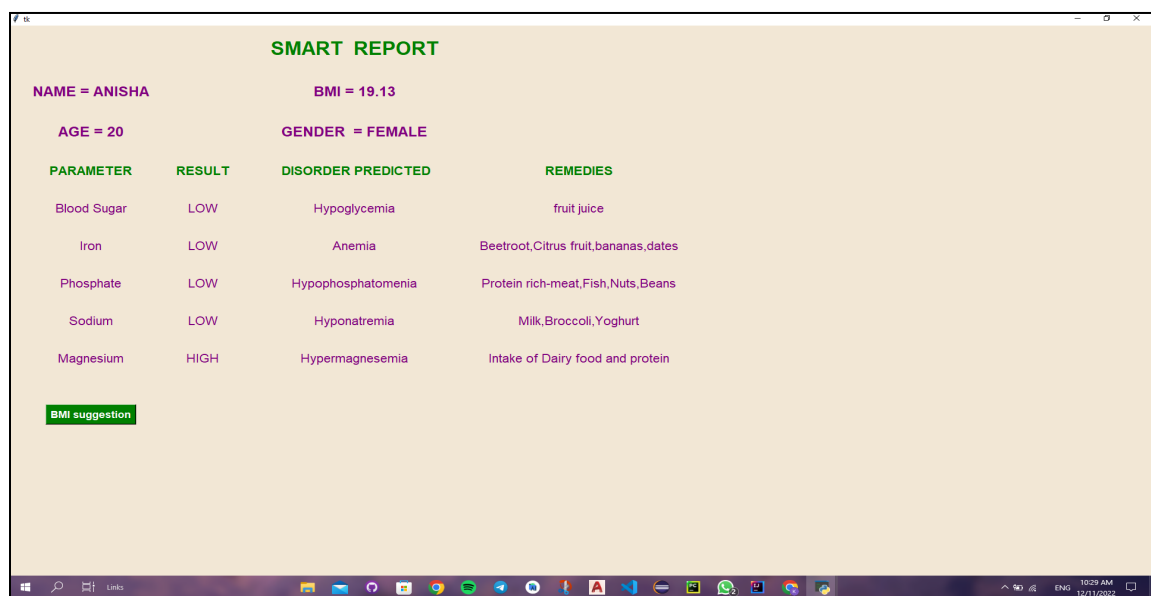
Enter Name :  Gender :

Registration Id :  Height (m) :

Age :  Weight (kg) :

**SUBMIT**

Figure 7: Login Page of the GUI



**SMART REPORT**

**NAME = ANISHA** **BMI = 19.13**

**AGE = 20** **GENDER = FEMALE**

PARAMETER	RESULT	DISORDER PREDICTED	REMEDIES
Blood Sugar	LOW	Hypoglycemia	fruit juice
Iron	LOW	Anemia	Beetroot,Citrus fruit,bananas,dates
Phosphate	LOW	Hypophosphatomenia	Protein rich-meat,Fish,Nuts,Beans
Sodium	LOW	Hyponatremia	Milk,Broccoli,Yoghurt
Magnesium	HIGH	Hypermagnesemia	Intake of Dairy food and protein

**BMI suggestion**

Figure 8: Report along with Health advisory of the system developed

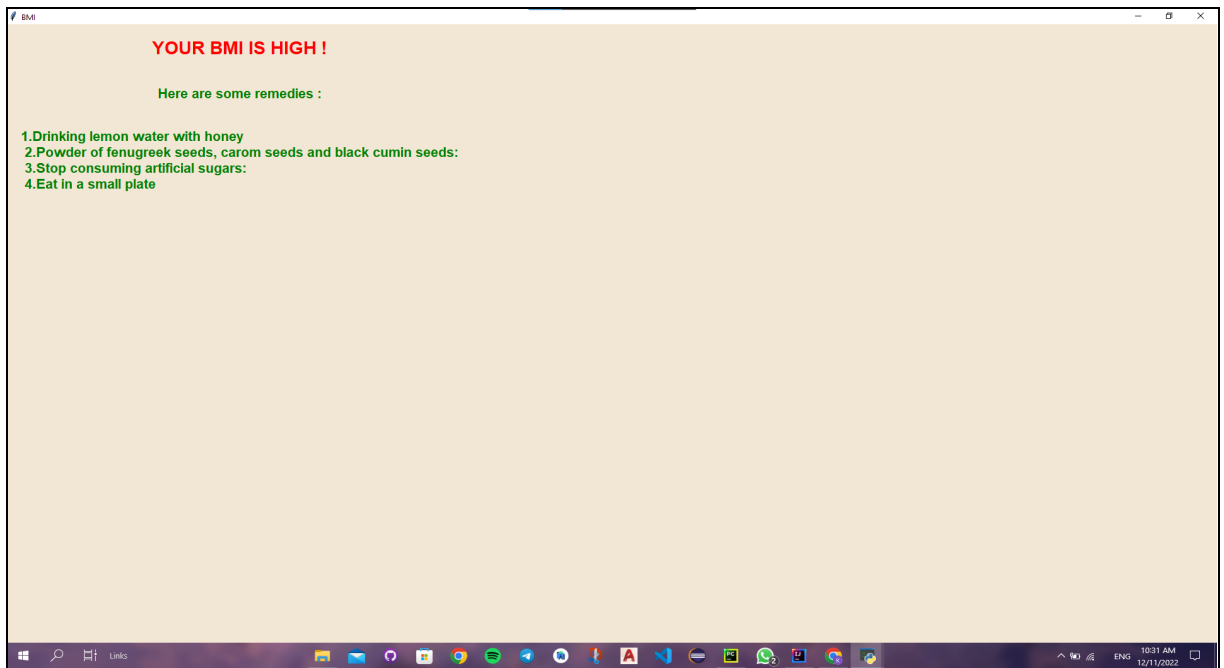


Figure 9: BMI calculation along with Health advisory

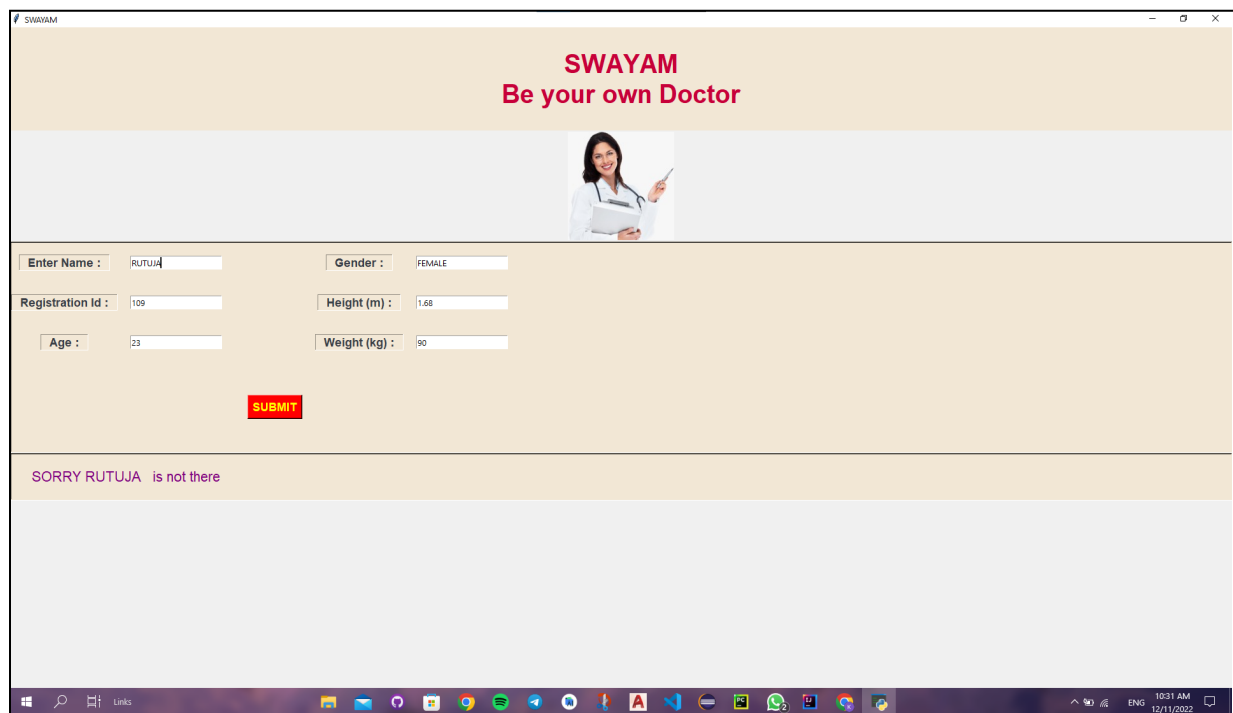


Figure 10: Login page when user is not registered

## **8. Conclusion and Future Scope:**

The system developed generates a smart medical report which not only provides the conventional data along with health advisory. The system can be extended for graphical representation and suggestion of medicines.

## **References**

1. Healthians test reports
2. Online help of python