Minor Project
Coronavirus Probability Detector

Submitted in partial fulfilment of the

Requirements for the award of degree

Of

Bachelor of Technology

in

INFORMATION TECHNOLOGY

.

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DECLARATION

We hereby declare that all the work presented in this Minor Project Report for the partial fulfilment of the requirements for the award of the degree of Bachelor of Technology in Information Technology & Engineering, Guru Tegh Bahadur Institute of Technology, affiliated to Guru Gobind Singh Indraprastha University Delhi is an authentic record of our own work.

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Date: 30 December,2021

ABSTRACT

Coronavirus disease 2019 (COVID-19) is a disease caused by severe acute respiratory syndrome coronavirus 2 (SARS CoV-2). It was declared on March 11, 2020, by the World Health Organization as pandemic disease. The disease has neither approved medicine nor vaccine and has made governments and scholars search for drastic measures in combating the pandemic. Regrettably, the spread of the virus and mortality due to COVID-19 has continued to increase daily. Hence, it is imperative to control the spread of the disease particularly using nonpharmacological strategies such as quarantine, isolation, and public health education. This work studied the effect of these different control strategies as time-dependent interventions using mathematical modeling and optimal control approach to ascertain their contributions in the dynamic transmission of COVID-19. The model was proven to have an invariant region and was well-posed. The basic reproduction number and effective reproduction numbers were computed with and without interventions, respectively, and were used to carry out the sensitivity analysis that identified the critical parameters contributing to the spread of COVID-19. The optimal control analysis was carried out using the Pontryagin's maximum principle to figure out the optimal strategy necessary to curtail the disease. The findings of the optimal control analysis and numerical simulations revealed that time-dependent interventions reduced the number of exposed and infected individuals compared to time-independent interventions. These interventions were time-bound and best implemented within the first 100 days of the outbreak. Again, the combined implementation of only two of these interventions produced a good result in reducing infection in the population. While, the combined implementation of all three interventions performed better, even though zero infection was not achieved in the population. This implied that multiple interventions need to be deployed early in order to reduce the virus to the barest minimum.

CONTENTS

Chapter	***Page No.***
Title page	*i*
Declaration	*ii*
Acknowledgement	*iii*
Abstract	*iv*
1. Introduction	**3**
1.1 Background	
1.2 Problem Statement	
1.3 Objectives	
1.4 Scope	
2. Methodology	**9**
2.1 Literature Review	
2.2 Work Flow	
2.3 Data Collection	
2.4 Data Analysis	
2.5 Requirement	
3. Tools And Technology Used	**12**
3.1 Python	
3.2 Machine Learning	
3.3 Open CV	
3.4 Image Processing	
3.5 Jupyter Notebook	
4. Testing	**29**
4.1 Introduction	
4.1.1 Objective	
4.1.2 Feature to be tested	
4.2 Testing Scope	
4.3 Testing Entry	
4.4 Defect Management	
4.5 Criteria	
4.6 Test cases	

5. Results And Observation **37**
5.1 Phase one
5.2 Living with long covid

6. Future Scope and Conclusion **39**

7. References **42**

8. Appendix **44**

CHAPTER 1

INTRODUCTION

As we know that the whole world is affected by the coronavirus. In this project, we will learn to program a **"Coronavirus Probability Detector**" using python and machine learning concepts. This project is very different yet helpful for all of us in such a pandemic situation. As this project is about the programming solution related to the Coronavirus Outbreak, so this project is going to be very special

We will be using Jupyter Notebook for the initial development and then create UI which tells
whether the person has an infection or not based on input features using Virtual Studio Code IDE.

My Idea for the solution of the coronavirus outbreak is:

- Stop the transmission by prioritizing tests and hence detecting the cases quickly.
- Data can be collected on the symptoms of COVID-19.

A machine learning model is then trained on the data to find out the probability of a person having the infection. The project is then used to find out whom to test for the infection first under a limited testing capacity. The same project can be used to find the potential candidate for conducting random tests.

Machine Learning model parameters:-

A team of doctors can sit down to find out the best model parameters. A sample set of parameters is as follow:

Features:

Average Fever - Continous

Body Pain - 0/1 Binary

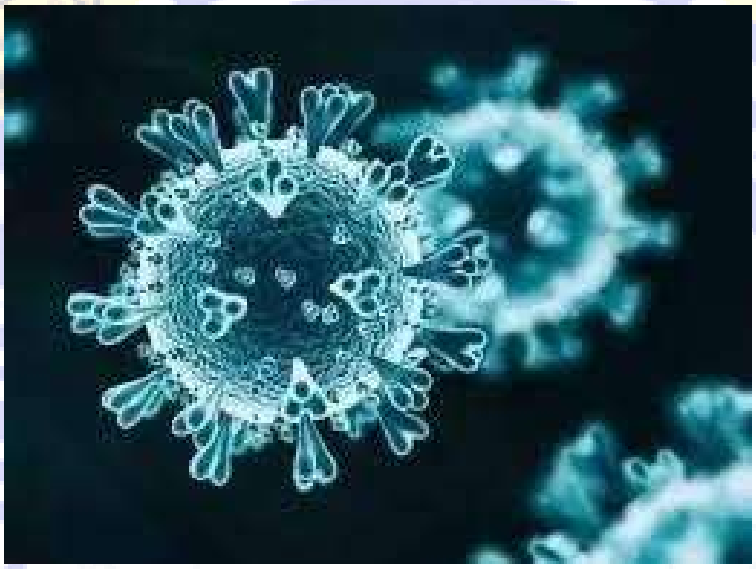
Age - Discrete

Runny Nose

Breathing Problem - Categorical:0/1

1.1 Background

Corona virus widely known as COVID-19 are a large family of viruses that are known to cause illness ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and



Severe Acute Respiratory Syndrome (SARS).

The virus out-braked on Nov-2019 from Wuhan city of china. The virus affected south China for about a month and then it spread throughout the world making the path through Europe. The champion's league game between Atlanta and Valencia became the poison for spreading the virus in Europe as more than 80,000 spectators were in stadium. Till date, the virus had spread in about 235 territories affecting more than 55 million of population. Nepal also reported its first COVID-19 case on 23 January 2020 which today tallied to 208,299 cases. The timely imposing of the lockdown controlled the chances of rapid incrementation of infected population till June. But with the foreign manpower being brought to home country and loosening of lockdown after July, the number of infected population increased

in the exponential way. The large number of people are being infected and killed on daily basis all over the world. And the data of death, infected and recovered cases are being provided on 2 different websites, Google, webpages etc. But these data are only limited to national and international level. Therefore, with the necessity to bring the data of local level with effective analysis, and to make a project work possible through virtual classes we the students of Geomatics engineering were assigned with project “Emergency Handling of COVID-19 in Home Districts”. We all were divided into different groups with 5 members from 5 different districts in each. Hence, with the guidelines of supervisors and strong group work, we have finally completed our engineering project.

1.2 Problem Statement

With an outbreak of COVID -19 in Nepal, 'Ministry of Health and Population' is providing the data on daily basis through websites, newspaper, Facebook and different Medias. But these data are only based on national level. Such sites highlight the national level infected, recovered, death cases. But it doesn't provide systematic district level data. Thus proper analysis of district level data through pictorial representation are not available in these sites. Hence, with the need to highlight the district, local level data and to do effective analysis and evaluation we were assigned with the project on study of COVID-19 in our home districts. During the project every student did the thorough study of COVID-19 cases in their home districts with help of available sites, web-pages, newspapers and virtual communication with local bodies like municipality , Rural Municipality, etc. From these we collect different random data and refined it in systematic form like gender wise, age wise infected people of every month .similarly to visualize the timely trend of Covid-19 in our home districts along with the comparative study of situations, we present these data in the pictorial form like bar graph, pie chart, and line chart and so on. Hence, our project addressed the district level data and present it in an effective way.

1.3 Objectives

The primary objective of our project is:

- To study timely trend of Covid-19 in our home districts along with the comparative study of situations, The secondary objectives of our project are:
- To determine the possible analytical outcomes of COVID-19 situations based on different age groups and other divisions.
- To study and evaluate the provided facilities, works done to minimize the effect and spreading of virus from a local level.
- To develop the idea and concept of teamwork, field project and analytical skills to us.

1.4 Scope

We have collected the COVID-19 data through different sources. We have used the official website of Ministry of Health and Population, CDO Offices of individual home districts, and Municipality's website. We have refined, and analyzed those data in different aspects and displayed it in a systematic form .So this report/project can be helpful to different students who are doing COVID -19 research and project of different districts. Similarly, local level bodies can utilized it to study the pattern of COVID-19 and formulate the further plans as per need.

Chapter 2

Methodology

2.1 Literature Review

COVID-19 is a disease caused by a new strain of corona virus. 'CO' stands for corona, 'VI' for virus, and 'D' for disease. Formerly, this disease was referred to as '2019 novel corona virus' or '2019-nCoV.' It was first detected in the Wuhan city located in South China which mend its way to America and throughout the world devastating central Europe. Its effect reached to our country in no time and now there are more than 200,000 cases in the country. The general public of the country have been facing lockdown since last six months and been going through numerous difficulties with lots of fear in their mind. Lots of data have been published nationally but the people are unaware about the situation in their locality. As, we being from all parts of the country are analyzing the situation in our home districts so that we could provide some relevant information to the local people. Thus we had picked up this project as emergency handling of covid- 19 in our home districts. There have been Mapathon and thematic competition regarding the presentation and exposing of COVID-19 data by different media. It contributed a lot for researchers like us in completing our project. As the local data were unavailable through the web- pages of governmental offices and we were unable to participate physically in extracting through primary sources these competition helped us a lot in extracting the un-highlighted data and analyze them in a systematic manner. The Mapathon held by the NGES, contributed us to get the data. There were many participants and they have presented the different Maps showing the COVID-19 Cases of different districts, municipalities and national level data.

2.2 Work-flow

Planning

After getting suggestion and ideas from our project orientation and respective supervisors we did discussion with our group members via Google meet. In our first phase of planning, we share our personal prospective regarding our project, discussed situation of COVID-19 in our home districts, and possible ways to get data like different web-pages, from nearest local level authorities or through different communication channels e. g. Phone, email. Similarly, we planned to do some research and study on different sites so to find an updated, accurate and authorized websites and pages from which we can extract reliable data. In our second phase of planning, we planned the ways to sort the data, analyzed them through different aspects and finally present them in a systematic form.

Data Collection

After some research we found that the website of "Ministry of Health and Population" websites of CDO and DAO Office of individual home districts are the most updated and accurate sites so we have followed this site for most of our data. Similarly, we have visited the nearest local level authorities and communicated via phone and email for local level data. Finally, we collected data on different basis like: Gender wise covid-19 data, Age wise, total infected, total recovered, total death, no of quarantine in our home district and no of PCR and RDT test.

Data Analysis

It was third and the last phase of our project. After collecting the data, as per our planning we prepared the different excel sheet and recorded them. We sorted the collected data and represent those using different visualization method like Bar graph, Pie charts ,Line Charts, columns and analyzed them making comparative study of the COVID -19 situation. Detailed analysis and output is described in the Output Section

Requirements-

1. **Operating system-** Windows/Linux/Mac-Os.
2. **Software-** Jupyter Notebook, VSCode ,Microsoft Excel
3. **Hardware-** Ram (4gb or above), Hard disk, Monitor ,Keyboard.

CHAPTER 3

TOOLS AND TECHNOLOGY USED

OVERVIEW OF PYTHON

The python programming language provides a model of memory and computation that closely matches that of most computers. In addition, it provides powerful and flexible mechanisms for abstraction; that is, language constructs that allow the programmer to introduce and use new types of objects that match the concepts of an application. Thus python is a very popular language. Programming that rely on fairly direct manipulation of hardware resources to deliver a high degree of efficiency plus higher-level styles of programming that rely on user-defined types to provide a model of data and computation that is closer to a human's view of the task being performed by a computer. These higher-level styles of programming are often called data abstraction, object-oriented programming, and generic programming.It is also used for web development , software development, mathematics and system scripting.

OVERVIEW OF MACHINE LEARNING

Machine learning is a field of study that looks at using computational algorithms to turn empirical data into usable models. The machine learning field grew out of traditional statistics and artificial intelligences communities. From the efforts of mega corporations such as Google, Microsoft, Facebook, Amazon, and so on, machine learning has become one of the hottest computational science topics in the last decade.

Through their business processes immense amounts of data have been and will be collected. This has provided an opportunity to re-invigorate the statistical and computational approaches to autogenerateuseful models from data.

Machine learning algorithms can be used to (a) gather understanding of the cyber phenomenon that produced the data under study, (b) abstract the understanding of underlying phenomena in the form of a model, (c) predict future values of a phenomena using the above-generated model, and (d) detect anomalous behavior exhibited by a phenomenon under observation. There are several open-source implementations of machine learning algorithms that can be used with either application programming interface (API) calls or nonprogrammatic applications. Examples of such implementations include Weka,1 Orange,2 and RapidMiner.3 The results of such algorithms can be fed to visual analytic tools such as Tableau4 and Spotfire5 to produce dashboards and actionable pipelines.

Important features of python

Source code to Byte code

Python source code is compiled directly to byte code without any intermediate steps. This makes Python script run on multiple platforms without requiring any additional tool.

Object Oriented

Python is 100% object oriented language. Everything in Python is an object. Furthermore, python provides an easy way to create new objects via classes.

Support for C/C++ Extension

Python code can be further extended in C and C++. Speed of a Python program can be significantly increased this way.

Dynamic Language

Python is a dynamic language. Values, instead of variables are bound to types. Furthermore, Method and function lookup is performed at runtime.

Automatic Garbage Collection

Garbage collection is performed automatically in Python. However, “gc” module can be used to perform garbage collection at any given time.

Highly Structured Language

Statements, functions, classes, modules and packages and most importantly Python’s indentation based syntax allows developers to write highly structured and readable code

Fast and Maintainable Compared to Other Languages

In comparison with other compiled languages, Python is faster, more structured and more maintainable.

Operators in python

Operators

Operators in programming are literals used to perform specific logical, relational or mathematical operations on the operands. Python operators can be divided into following five categories:

- Arithmetic
- Logical
- Comparison
- Assignment
- Membership operators

In this chapter we will discuss these operators with the help of examples

.

Arithmetic Operators

Take a look at the following example to see arithmetic operators in action:

```
N1 = 10
N2 = 5
print(N1 + N2)
print(N1 - N2)
print(N1 * N2)
print(N1 / N2)
print(N1 ** N2)
```

The output of the script above looks like this:

```
15
5
50
2.0
100000
```

Logical Operators

Logical operators are used to perform logical functions such as AND, OR and NOT on the operands. The following table contains Python logical operators along with their description and functionality. Suppose N1 is True and N2 is false

Take a look at the following example to see logical operators in action:

```
N1= True
N2 = False
print(N1 and N2)
print(N1 orN2)
print(not(N1andN2))
```

The output of the above script looks like this

```
False
True
True
```

Comparison Operator

Comparison operators are used to compare the values contained by the operands and returns true or false depending upon the relationship between the operands. Comparison operators are also commonly known as relational operators. Suppose N1 is equal to 10 and N2 is equal to 5, take a look a look at the following table to understand comparison operators.

Take a look at the following example to see comparison operators in action:

```
N1 = 10
N2 = 5
print(N1==N2)
print(N1 != N2)
 print(N1 > N2)
print(N1 < N2)
print(N1 >= N2)
print(N1 <= N2)
```

The output of the script above looks like this:

```
False
True
True
False
True
False
```

Assignment Operators

Assignment operators are used to assign values to the operand. The table below contains information about Python assignment operators. Suppose N1 is equal to 10 and N2 is equal to 5.

Take a look at the following example to see assignment operators in action:

```
N1 = 10; N2 = 5
R = N1 + N2
print(R)
N1 = 10; N2 = 5
N1 += N2
print(N1)
N1 = 10; N2 = 5
N1 -= N2
print(N1)
N1 = 10; N2 = 5
N1 *= N2
print(N1)
N1 = 10; N2 = 5
N1 /= N2
print(N1)
N1 = 10; N2 = 5
N1 %= N2
print(N1)
N1 = 10; N2 = 5
N1 **= N2
print(N1)
```

The output of the script above looks like this:

```
15
15
5
50
2.0
0
100000
```

Overview of OpenCV

Computer Vision

Computer vision is a process by which we can understand the images and videos how they are stored and how we can manipulate and retrieve data from them. Computer Vision is the base or mostly used for Artificial Intelligence. Computer-Vision is playing a major role in self-driving cars, robotics as well as in photo correction apps.

OpenCV

OpenCV is the huge open-source library for the computer vision, machine learning, and image processing and now it plays a major role in real-time operation which is very important in today's systems. By using it, one can process images and videos to identify objects, faces, or even handwriting of a human. When it integrated with various libraries, such as Numpuy, python is capable of processing the OpenCV array structure for analysis. To Identify image pattern and its various features we use vector space and perform mathematical operations on these features.

The first OpenCV version was 1.0. OpenCV is released under a BSD license and hence it's free for both **academic** and **commercial** use. It has C++, C, Python and Java interfaces and supports Windows,
Linux, Mac OS, iOS and Android. When OpenCV was designed the main focus was real-time applications for computational efficiency. All things are written in optimized C/C++ to take advantage of multi-core processing.

Applications of OpenCV:

There are lots of applications which are solved using OpenCV, some of them are listed below:

1. Face recognition
2. Automated inspection and surveillance
3. Number of people – count
4. Anamoly (defect) detection in the manufacturing process (the odd defective products)Street view image stitching
5. Video/image search and retrieval
6. Robot and driver-less car navigation and controlobject recognition
7. Medical image analysis
8. Movies – 3D structure from motion

OpenCV Functionality

- Image/video I/O, processing, display (core, imgproc, highgui)
- Object/feature detection (objdetect, features2d, nonfree)
- Geometry-based monocular or stereo computer vision (calib3d, stitching, videostab)
- Computational photography (photo, video, superres)
- Machine learning & clustering (ml, flann) CUDAacceleration (gpu)

Image-Processing

Image processing is a method to perform some operations on an image, in order to get an enhanced imageand or to extract some useful information from it.

If we talk about the basic definition of image processing then **"Image processing is the analysis and manipulation of a digitized image, especially in order to improve its quality".**

Digital-Image

An image may be defined as a two-dimensional function f(x, y), where x and y are spatial(plane) coordinates, and the amplitude of fat any pair of coordinates (x, y) is called the intensity or grey level of theimage at that point.

In another word An image is nothing more than a two-dimensional matrix (3-D in case of coloured images) which is defined by the mathematical function f(x, y) at any point is giving the pixel value at that point of an image, the pixel value describes how bright that pixel is, and what colour it should be.

Image processing is basically signal processing in which input is an image and output is image or characteristics according to requirement associated with that image.

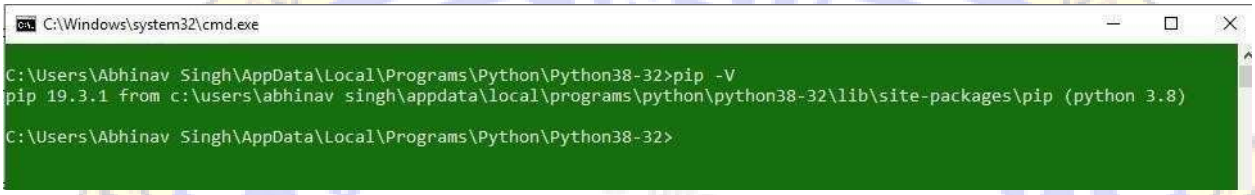
Image processing basically includes the following three steps:

1. Importing the image
2. Analysing and manipulating the image
3. Output in which result can be altered image or report that is based on image analysis

Resizing the image

Python. These files are stored in a large “on-line repository” termed as Python Package Index (PyPI).
To check if PIP is already installed on your system, just go to the command line and execute the followingcommand:

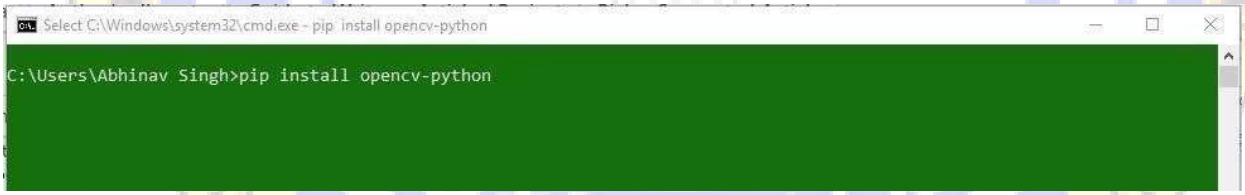
PIP -V



Downloading and Installing OpenCV:

OpenCV can be directly downloaded and installed with the use of pip (package manager). To install OpenCV, just go to the command-line and type the following command:

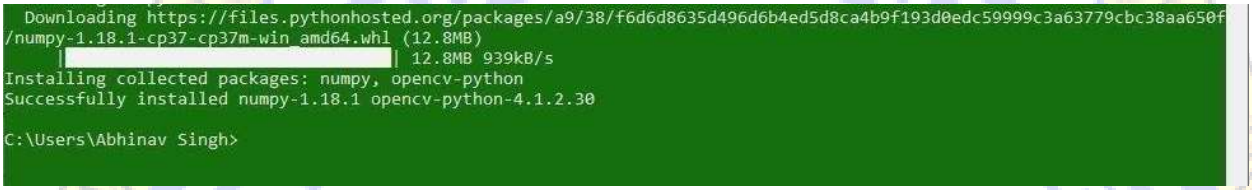
```
pip install opencv-python
```



Beginning with the installation:

Type the command in the Terminal and procees

Collecting information and downloading



To check if OpenCV is correctly installed, just run the following commands to perform a version check:

Jupyter Notebook

Jupyter (formerly IPython Notebook) is an open-source project that lets you easily combine Markdown text and executable Python source code on one canvas called a **notebook**. Visual Studio Code supports working with Jupyter Notebooks natively, and through Python code files. This topic covers the native support available for Jupyter Notebooks and demonstrates how to:

- Create, open, and save Jupyter Notebooks
- Work with Jupyter code cells
- View, inspect, and filter variables using the Variable Explorer and Data Viewer
- Connect to a remote Jupyter server
- Debug a Jupyter Notebook

Setting up your environment

To work with Python in Jupyter Notebooks, you must activate an Anaconda environment in VS Code, or another Python environment in which you've installed the Jupyter package. To select an environment, usethe **Python: Select Interpreter** command from the Command Palette (Ctrl+Shift+P).

Once the appropriate environment is activated, you can create and open a Jupyter Notebook, connect to aremote Jupyter server for running code cells, and export a Jupyter Notebook as a Python file.

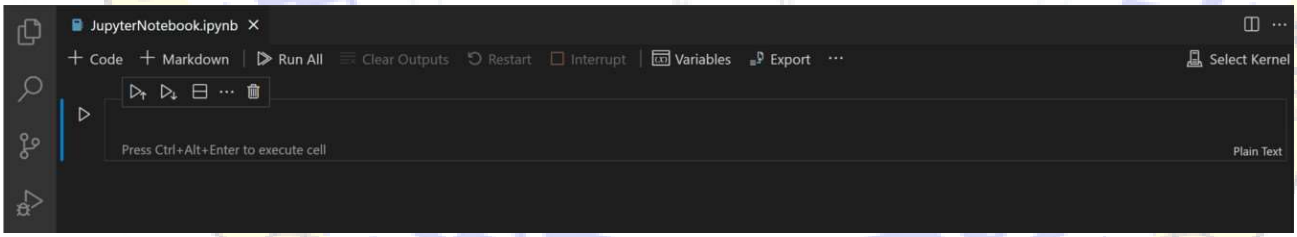
Workspace Trust

When getting started with Notebooks, you'll want to make sure that you are working in a trusted workspace. Harmful code can be embedded in notebooks and the Workspace Trust feature allows you toindicate which folders and their contents should allow or restrict automatic code execution.

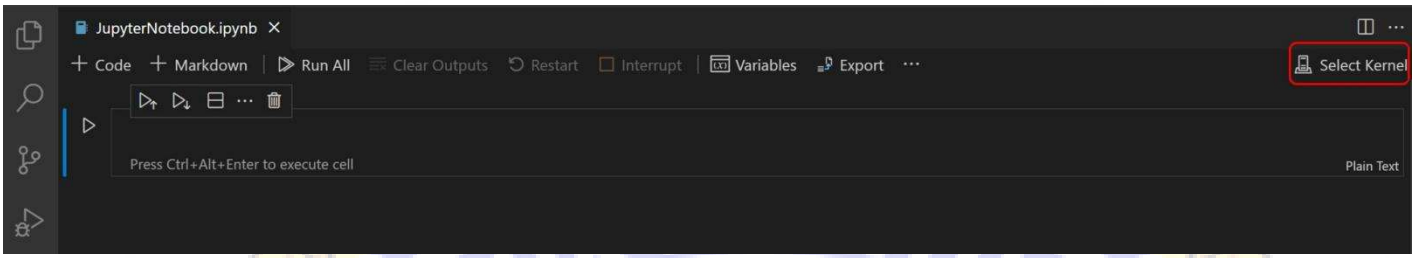
If you attempt to open a notebook when VS Code is in an untrusted workspace running Restricted Mode,you will not be able to execute cells and rich outputs will be hidden.

Create or open a Jupyter Notebook#

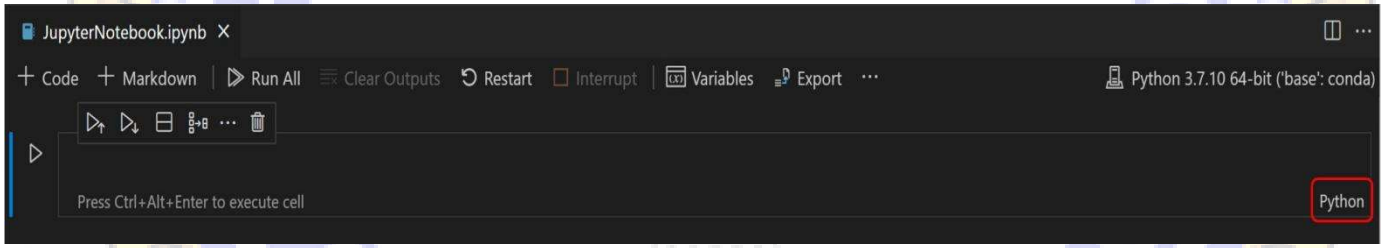
You can create a Jupyter Notebook by running the **Jupyter: Create New Jupyter Notebook** commandfrom the Command Palette (Ctrl+Shift+P) or by creating a new .ipynb file in your workspace.



Next, select a kernel using the kernel picker in the top right.



After selecting a kernel, the language picker located in the bottom right of each code cell will automatically update to the language supported by the kernel.

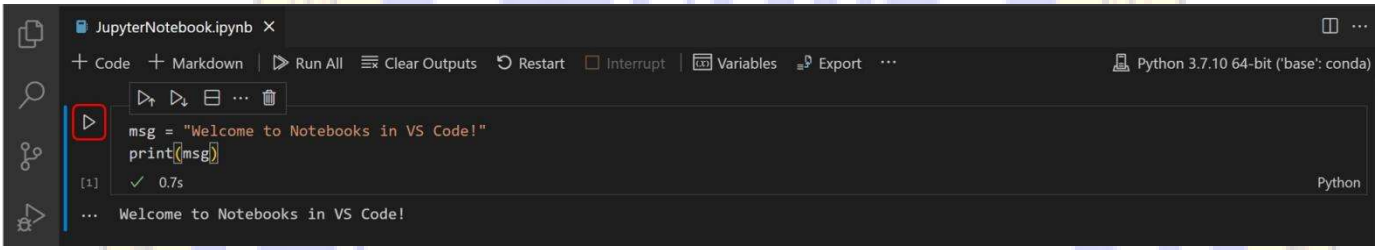


If you have an existing Jupyter Notebook, you can open it by right-clicking on the file and opening with VS Code, or through the VS Code File Explorer.

Running cells

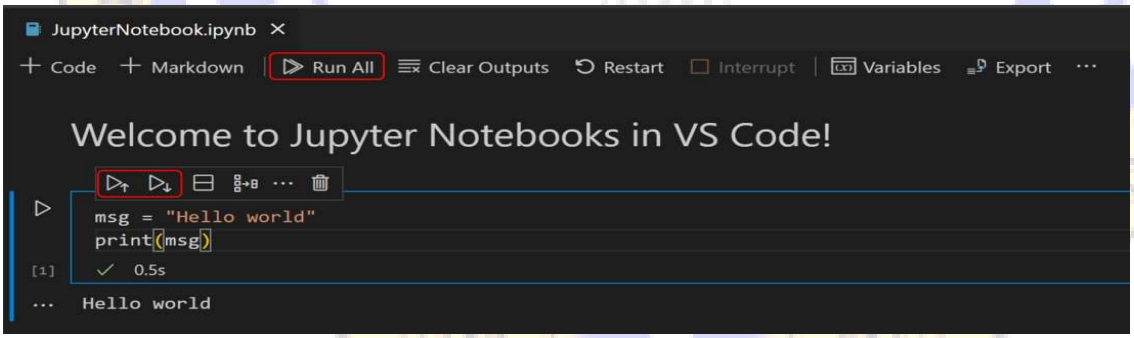
Once you have a Notebook, you can run a code cell using the **Run** icon to the left of the cell and the outputwill appear directly below the code cell.

You can also use keyboard shortcuts to run code. When in command or edit mode, use



Ctrl+Enter to runthe current cell or Shift+Enter to run the current cell and advance to the next.

You can run multiple cells by selecting **Run All**, **Run All Above**, or **Run All Below**.



CHAPTER 4

TESTING

Introduction

The Test Plan is designed to describe the scope, approach, resources, and schedule of all testing activities of the project MyHealth Care. The plan identifies the items to be tested, the features to be tested, the types of testing to be performed, the personnel responsible for testing, the schedule and resources required to complete testing, and the risks associated with the plan. The objective is to guarantee the operation of MyHealth Care is in alignment to Requirement.

4.1.1 Objective

The objective of testing is as follows:

1. Verify that the solution meets the requirements
2. Ensure solution is optimized for environment
3. Ensure overall quality

Meeting Requirement

The first testing objective is to prove that the MyHealth Care module addresses the problem and satisfies the requirement; making sure to serve all the basic and the important needs.

Optimized for Business Environment

The second testing objective is to ensure it works in a real-world environment. This means providing tests that simulate real life conditions and situations.

Ensure Quality

The third goal of our testing is to help ensure a high-level of quality of product. Since software changes become exponentially more expensive as a project advances through its lifecycle, the goal is to identify defects as early as possible.

4.2 Testing Scope

Smoke Testing

- Test the major functionalities for bugs.
- If 'must have' functionalities have defects, testing phase will not start.
- Product would be sent back to the developer.

Integration Testing

- Scope of integration testing is to ensure that specific functionalities work in sync with each other.
- Prepare test cases for all the functionality where there is a linkage between modules.
- Test the flow of data among different modules of Application under test.

System Testing

 The objectives of system tests are to test major business functionality, ensure functional and quality requirements are met.

 Ensure the system supports the use cases that have been defined

User Interface Testing

 Ensure the presence and alignment of elements as defined in requirements.

 Identify the elements for which User Interface testing has to be performed.

 Prepare test cases for presence and look of elements.

 Execute the test cases designed.

Progression Testing

 Objective should be to validate the functionality according to client requirement.

 Identify progression scenarios.

 Prepare test cases for progression.

 Execute newly created test cases for the added requirement

Regression Testing

 Test that no new defects are introduced after addition of requirements.

 Identify regression scenarios.

 Prepare test cases.

 Automate regression test cases for the previously present functionalities.

User Acceptance Testing

- Receive sign off from project manager, test lead and development lead.
- Set the pre-production environment.
- Train the user on how to use the application.
- Record the result and responses while user performs testing

4.3Testing Entry/Exit Criteria and environment

Smoke Testing

Entry Criteria: Major functionalities are added and working.

Exit Criteria: No Bugs found in testing

Environment: Test

Integration Testing

Entry Criteria: No bugs in smoke testing

Exit Criteria:

1. All the integration test cases have been executed.
2. No critical and Priority P1 & P2 defects are opened.

Environment: Test

System Testing

Entry Criteria: No critical or P1, P2 Priority bug is in open state.

Exit Criteria: No critical or Priority bugs should be in an open state

Environment: Test

User Interface Testing

Entry Criteria:

1. The system should have passed the exit criteria of system testing
2. No critical or Priority P1, P2 bug in an open state.

Exit Criteria: No critical or Priority bugs should be in an open state

Environment: Test

Regression Testing

Entry Criteria: After progression testing and no P1, P2 open bugs found

Exit Criteria:

1. All previous bugs are tested.
2. No critical or Priority P1, P2 bug in an open state

Environment: Test

Progression Testing

Entry Criteria:

1. After exit criteria for smoke test are met.
2. No open P1, P2 defects open.

Exit Criteria:

1. All test cases are executed.
2. No critical or Priority P1, P2 bug in an open

Environment: Test

User Acceptance Testing

Entry Criteria: Sign off from Team Member.

Exit Criteria:

1. No critical defects open

2. Business process works satisfactorily

Environment: Pre-Production

4.4 Defect management

Testing team recognizes that the bug reporting process is a critical communication tool within the testing process. Without effective communication of bug information and other issues, the development and release process will be negatively impacted. When logging a Bug, the tester should provide a priority to defect to assist developer in prioritizing the order in which they review and fix defects. Priority 1 and priority 2 defects must be addressed for acceptance (see definitions below).

Bug Priority: Critical

Priority = 1-Critical

Priority Definition: System down or a critical defect inhibiting the majority of users from performing key tasks *with no workarounds*. These incidents must be resolved prior to implementation.

Example: Form Tool defect preventing submission.

Bug Priority: Very Important

Priority = 2-High

38**Priority Definition:** Important defect that significantly impacts performance of a

large number of users, but a workaround exists; a critical defect inhibiting a small number of users from performing key tasks with no workarounds. Incident requires resolution.

Example: Round-robin assignment logic defect that causes manual assignment workaround.

Bug Priority: Important

Priority = 3-Medium

Priority Definition: Enhancement that improves usability for the majority of users or a non-critical defect, with workarounds.

Example: Form does not format properly across less common devices/browsers.

Bug Priority: Nice to Have

Priority = 4-Low

Priority Definition: Enhancement that improves usability for a small set of users or is cosmetic in nature; features that are not critical to the functionality of the solution.

Example: Incorrect capitalization, punctuation or font; tabbing order; size of text box does not correspond to max text length.

Bug Triage

The Test candidate and Development candidate should all be involved in these triage meetings. The Test Lead will provide required documentation and reports on bugs for all attendees. The purpose of the triage is to determine the type of resolution for each bug and to prioritize and determine a schedule for all "To Be Fixed Bugs'. Development will then assign the bugs to the appropriate person for fixing and report the resolution of each bug back into the Enrich. The Test Lead will be responsible for tracking and reporting on the status of all bug resolutions.

Bug Regression will be a central tenant throughout all testing phases.

All bugs that are resolved as “Fixed, Needs Re-Testing” will be regressed when testing team is notified of the new drop containing the fixes. When a bug passes regression it will be considered “Closed, Fixed”. If a bug fails regression, adopters testing team will notify development team by entering notes into notes. When a Priority 1 bug fails regression, testing team should also put out an immediate email to 3940 development. The Test Lead will be responsible for tracking and reporting.

4.5 Criteria

Entry Criteria

Testing would begin when Unit testing of developed modules/Components is complete. And no bugs are found in smoke test.

Suspension Criteria

 Testing will be suspended when Smoke Test or Critical test case bugs are discovered

 Testing will be suspended if there is critical scope change that impacts the requirement

 Suspend testing until the Development team fixes all the failed cases.

Exit Criteria

 When the app is stable, and Team agrees that the application meets functional requirements.

 Script execution of all the test cases in each area have passed.

 All priority 1 and 2 bugs have been resolved and closed.

Each test area has been signed off as completed by the Test Lead

CHAPTER 5

RESULTS AND OBSERVATION

Phase One

Pages Created for Course Coronavirus Disease Programme. The pages below were created/reviewed forthe first part of the course and are being constantly updated as new information emerges.

- Coronavirus Disease (COVID-19)
- Hand Hygiene
- Infection Prevention and Control
- Personal Protective Equipment (PPE)
- Respiratory Management of COVID 19
- Role of the Physiotherapist in COVID-19
- Social Distancing

Phase Two - Life After Coronavirus

This is being developed by the Physiopedia Team as part of the Topic of the Month for April. There is currently a lot of discussion on the aftermath of COVID 19, although it is not completely past us there area lot of people recovering with continued needs. As many of the current topics focus on rehabilitation andmental health not only of patients but health workers too we decided to review the following categories

- Respiratory
- Cardiopulmonary
- COVID 19
- Mental Health

Living with Long COVID

A year on from the first cases of Coronavirus there is still lots to learn. One of the current discoveries is the debilitating affects of COVID during the "recovery" stage, despite the severity of the acute stage. Thepages created/reviewed below form part of the ongoing learning associated with COVID and are being constantly updated as new information emerges.

CHAPTER 6

CONCLUSION AND FUTURE SCOPE

1. Stop the transmission by prioritizing tests and hence detecting the cases quickly.
2. Data can be collected on the symptoms of COVID-19.
3. A machine learning model is then trained on the data to find out the probability of a person having the infection.
4. The model is then used to find out whom to test for the infection first under a limited testing capacity.
5. The same model can be used to find potential candidate for conducting random tests
6. This model tells us that the person is corona + ve or not
7. This model also helps to control the coronavirus of that region
8. This project helps to establish a method to screen compounds against a viraldomain in order to identify inhibitors for treatment of COVID-19 and other coronavirus infections

In this paper, a new deterministic mathematical model of COVID-19 was formulated with quarantine, isolation, and public health education as interventions.The model was also used as a prototyped to extensively investigate the contributions of these control measures to ascertain their individual and combined contributions in curbing the transmission and spread of COVID-19. The model analysis includes the establishment of the Invariant region and positivity of the model, the existence of disease-free equilibrium, and computation of the basic reproduction number . It was found that the basic reproduction number, , is when none of the exposed individuals are quarantined compared to when all of the exposed individuals are quarantined, . This means that a single infected person cantransmit the infection to approximately two other persons when there is no quarantine, while there is a possibility of stopping further transmission of infectionwhen there is quarantine. It was also shown that when there is no isolation of the infected not hospitalized individuals in the population, the basic reproduction number, . This means that one infected not hospitalized person will infect approximately three persons in the population. The presence of isolation will help to reduce the number of infected not hospitalized individuals in the population.

The simultaneous implementation of the three interventions reduces the number of infected individuals compared to the implementation of two interventions in the infected population. Furthermore, it is observed that the time-dependent interventions reduce the number of exposed and infected individuals by 7,088 and 1,836, respectively. With the interventions such as quarantine, isolation, and publichealth education, the number of exposed and infected individuals will reduce drastically within a short time but not to zero, leaving a residue of infected individuals with the potential to cause a further

outbreak. This implies that COVID-19 may not be eradicated even with the timely implementation of theseinterventions. Therefore, further interventions are needed to stop the spread of COVID-19.

FUTURE SCOPE

This project is one of the best way to study the corona-virus attack and its impact in the community. Though this project collected fine data in District level and to some extent theirlocal level too. We recommend following points to achieve more fine data and visualizationof such aspects of community which are still not exposed among public and still getting severe effect.

- Since most of the official websites of the government offices were not updated daily, not only daily, even in a month. It would be easier for us to collect the data if the websites wereupdated time to time,
- If data providing procedure in government offices would be easier and undoubted, wecould have got data easily and comfortably.
- We think that if some more weeks were provided us for completing this project it would besufficient to collect the data and analyze the data so that it could be visualized in more efficient way
- This project hepls to control the Covid by detecting people.
- We can use this project to other disease such as fever , dengue etc
- This project also helps to person can go to the hospital or it can be cure in home isolation.

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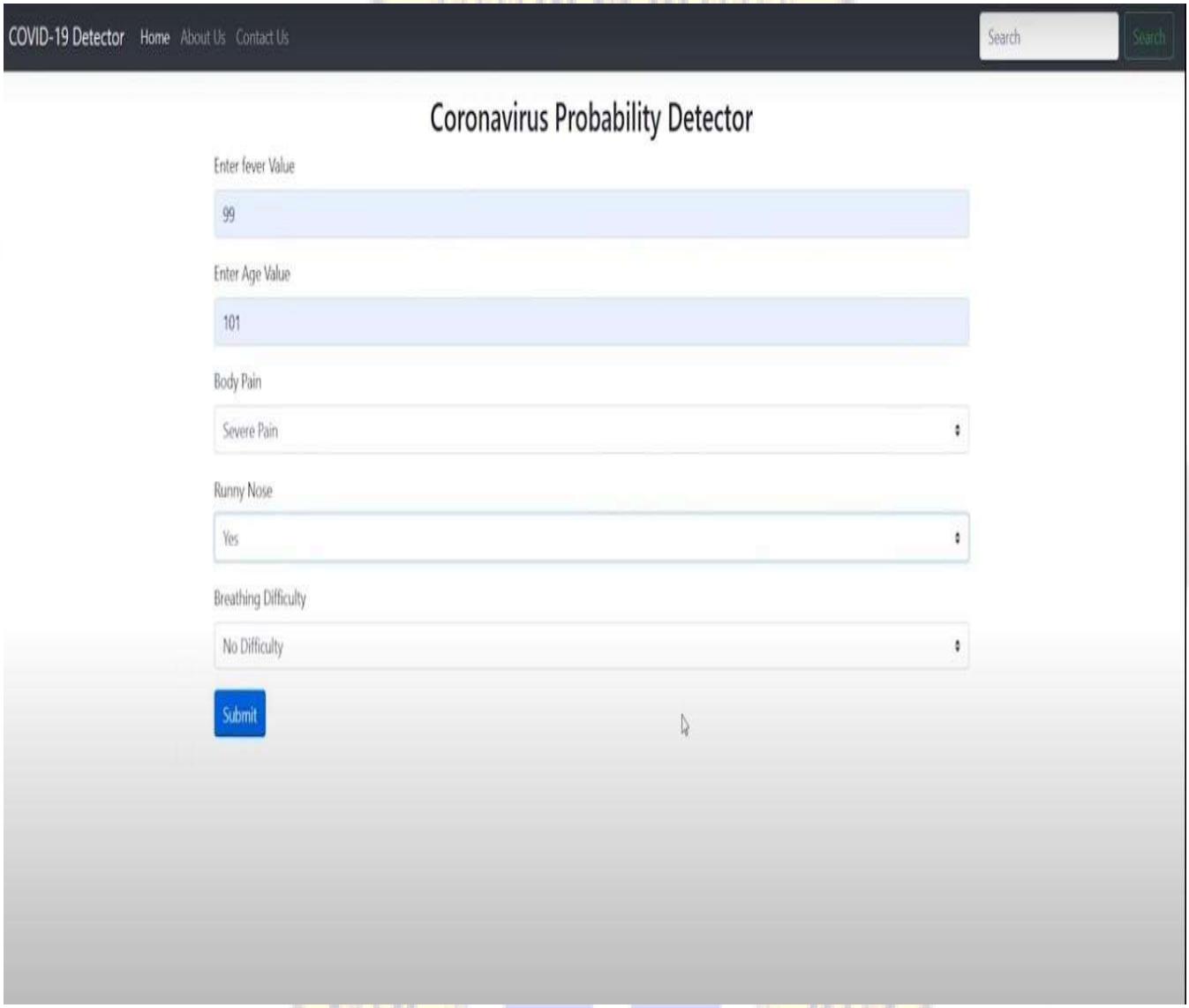
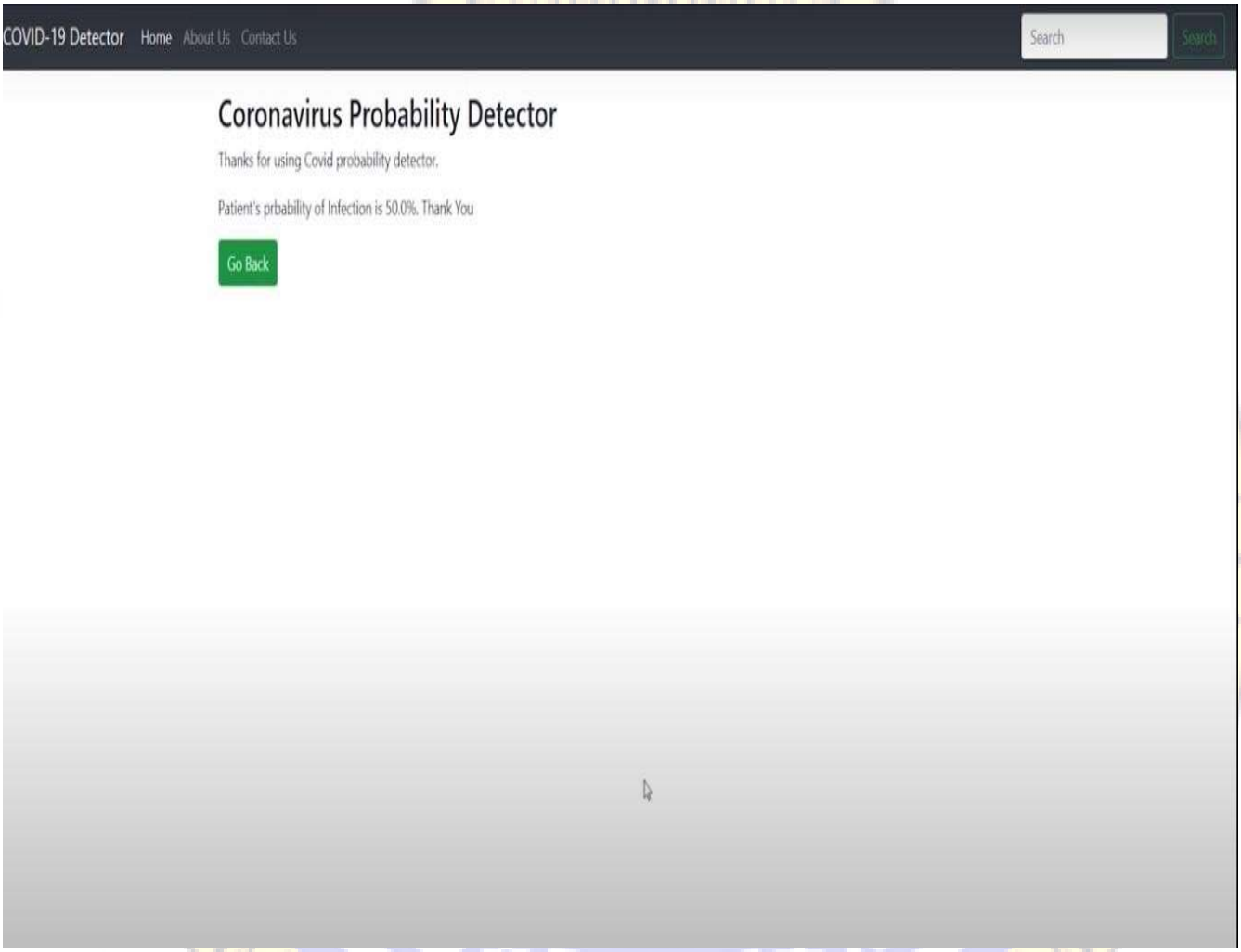
Appendix A

OUTPUT


COVID-19 Detector
Home
About Us
Contact Us
Search
Search
Coronavirus Probability Detector
Enter fever Value
99
Enter Age Value
101
Body Pain
Severe Pain
Runny Nose
Yes
Breathing Difficulty
No Difficulty
Submit


COVID-19 Detector
Home
About Us
Contact Us
Search
Search
Coronavirus Probability Detector
Thanks for using Covid probability detector.
Patient's prbability of Infection is 50.0%. Thank You
Go Back

Appendix B

CODE

MySolution.ipynb

import pandas as pd

Reading Data

```
df = pd.read_csv('data.csv')
df.tail()
df.info()
df['diffBreath'].value_counts()
df.describe()
```

Train Test Splitting

```
import numpy as np
def data_split(data, ratio):
np.random.seed(42)
shuffled = np.random.permutation(len(data))
test_set_size = int(len(data) * ratio)
test_indices = shuffled[:test_set_size]
train_indices = shuffled[test_set_size:]
return data.iloc[train_indices], data.iloc[test_indices]
np.random.permutation(7)
train, test = data_split(df, 0.2)
train
test
X_train = train[['fever', 'bodyPain', 'age', 'runnyNose', 'diffBreath']].to_numpy()
X_test = test[['fever', 'bodyPain', 'age', 'runnyNose', 'diffBreath']].to_numpy()
Y_train = train[['infectionProb']].to_numpy().reshape(2060 ,)
Y_test = test[['infectionProb']].to_numpy().reshape(515 ,)
Y_train
from sklearn.linear_model import LogisticRegression
clf = LogisticRegression()
clf.fit(X_train, Y_train)
inputFeatures = [102, 1, 22, -1, 1]
infProb =clf.predict_proba([inputFeatures])[0][1]
infProb
```

myTraining.py

```
import pandas as pd
import numpy ass np
from sklearn.linear_model import LogisticRegression
import pickle

def data_split(data, ratio):
    np.random.seed(42)
    shuffled = np.random.permutation(len(data))
    test_set_size = int(len(data) * ratio)
    test_indices = shuffled[:test_set_size]
    train_indices = shuffled[test_set_size:]
    return data.iloc[train_indices], data.iloc[test_indices]


if __name__ == "__main__":

    # Read the data
    df = pd.read_csv('data.csv')
    train, test = data_split(df, 0.2)
    X_train = train[['fever', 'bodyPain', 'age', 'runnyNose', 'diffBreath']].to_numpy()
    X_test = test[['fever', 'bodyPain', 'age', 'runnyNose', 'diffBreath']].to_numpy()

    Y_train = train[['infectionProb']].to_numpy().reshape(2060 ,)
    Y_test = test[['infectionProb']].to_numpy().reshape(515 ,)

    clf = LogisticRegression()
    clf.fit(X_train, Y_train)

    # open a file, where you ant to store the data
    file = open('model.pkl', 'wb')

    # dump information to that file
    pickle.dump(clf, file)
    file.close()
```

main.py

```
from flask import Flask, render_template, request
app = Flask(__name__)
import pickle


# open a file, where you stored the pickled data
file = open('model.pkl', 'rb')
clf = pickle.load(file)
file.close()

@app.route('/', methods=["GET", "POST"])
def hello_world():
    if request.method == "POST":
        myDict = request.form
        fever = int(myDict['fever'])
        age = int(myDict['age'])
        pain = int(myDict['pain'])
        runnyNose = int(myDict['runnyNose'])
        diffBreath = int(myDict['diffBreath'])
        # Code for inference
        inputFeatures = [fever, pain, age, runnyNose, diffBreath]
        infProb =clf.predict_proba([inputFeatures])[0][1]
        print(infProb)
        return render_template('show.html', inf=round(infProb*100))
    return render_template('index.html')
    # return 'Hello, World!' + str(infProb)


if __name__ == "__main__":
    app.run(debug=True)
```

Index.html

```
<!doctype html>
<html lang="en">
<head>
<!-- Required meta tags -->
<meta charset="utf-8">
<meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-fit=no">
<!-- Bootstrap CSS -->
<link rel="stylesheet" href="https://stackpath.bootstrapcdn.com/bootstrap/4.4.1/css/bootstrap.min.css" integrity="sha384-Vkoo8x4CGsO3+Hhxv8T/Q5PaXtkKtu6ug5TOeNV6gBiFeWPGFN9MuhOf23Q9Ifjh" crossorigin="anonymous">
<title>COVID-19 Probability Detector</title>
</head>
<body>
<nav class="navbar navbar-expand-lg navbar-dark bg-dark">
<a class="navbar-brand" href="#">COVID-19 Detector</a>
<button class="navbar-toggler" type="button" data-toggle="collapse" data-target="#navbarSupportedContent" aria-controls="navbarSupportedContent" aria-expanded="false" aria-label="Toggle navigation">
<span class="navbar-toggler-icon"></span>
</button>
<div class="collapse navbar-collapse" id="navbarSupportedContent">
<ul class="navbar-nav mr-auto">
<li class="nav-item active">
<a class="nav-link" href="#">Home <span class="sr-only">(current)</span></a>
</li>
<li class="nav-item">
<a class="nav-link" href="#">About Us</a>
</li>
<li class="nav-item">
<a class="nav-link" href="#" tabindex="-1" aria-disabled="true">Contact Us</a>
</li>
</ul>
<form class="form-inline my-2 my-lg-0">
<input class="form-control mr-sm-2" type="search" placeholder="Search" aria-label="Search">
<button class="btn btn-outline-success my-2 my-sm-0" type="submit">Search</button>
</form>
```

```
</div>
</nav>

<div class="container">
<h2 class="text-center mt-3">Coronavirus Probability Detector</h2>
<form action="/" method="POST">
<div class="form-group">
<label for="fever">Enter fever Value</label>
<input type="text" class="form-control" id="fever" name="fever" placeholder="Enter Fever Value">
</div>
<div class="form-group">
<label for="fever">Enter Age Value</label>
<input type="text" class="form-control" id="age" name="age" placeholder="Enter you Age">
</div>
<div class="form-group">
<label for="pain">Body Pain</label>
<select class="form-control custom-select" name="pain" id="pain">
<option value="0">No Pain</option>
<option value="1">Severe Pain</option>
</select>
</div>
<div class="form-group">
<label for="runnyNose">Runny Nose</label>
<select class="form-control custom-select" name="runnyNose" id="runnyNose">
<option value="0">Yes</option>
<option value="1">No</option>
</select>
</div>
<div class="form-group">
<label for="diffBreath">Breathing Difficulty</label>
<select class="form-control custom-select" name="diffBreath" id="diffBreath">
<option value="-1">No Difficulty</option>
<option value="0">Little Difficulty</option>
<option value="1">Severe Difficulty</option>
</select>
</div>

<button class="btn btn-success">Submit</button>
</form>
```

```
</div>
<!-- Optional JavaScript -->
<!-- jQuery first, then Popper.js, then Bootstrap JS -->
<script src="https://code.jquery.com/jquery-3.4.1.slim.min.js" integrity="sha384-J6qa4849blE2+poT4WnyKhv5vZF5SrPo0iEjwBvKU7imGFAV0wwj1yYfoRSJoZ+n" crossorigin="anonymous"></script>
<script src="https://cdn.jsdelivr.net/npm/popper.js@1.16.0/dist/umd/popper.min.js" integrity="sha384-Q6E9RHvbIyZFJoft+2mJbHaEWldlvI9IOYy5n3zV9zzTtmI3UksdQRVvoxMfooAo" crossorigin="anonymous"></script>
<script src="https://stackpath.bootstrapcdn.com/bootstrap/4.4.1/js/bootstrap.min.js" integrity="sha384-wfSDF2E50Y2D1uUdj0O3uMBJnjuUD4Ih7YwaYd1iqfktj0Uod8GCExl3Og8ifwB6" crossorigin="anonymous"></script>
</body>
</html>
```

Show.html

```
<!doctype html>
<html lang="en">
<head>
<!-- Required meta tags -->
<meta charset="utf-8">
<meta name="viewport" content="width=device-width, initial-scale=1, shrink-to-fit=no">
<!-- Bootstrap CSS -->
<link rel="stylesheet" href="https://stackpath.bootstrapcdn.com/bootstrap/4.4.1/css/bootstrap.min.css" integrity="sha384-Vkoo8x4CGsO3+Hhxv8T/Q5PaXtkKtu6ug5TOeNV6gBiFeWPGFN9MuhOf23Q9Ifjh" crossorigin="anonymous">
<title>COVID-19 Probability Detector</title>
</head>
<body>
<nav class="navbar navbar-expand-lg navbar-dark bg-dark">
<a class="navbar-brand" href="#">COVID-19 Detector</a>
<button class="navbar-toggler" type="button" data-toggle="collapse" data-target="#navbarSupportedConten aria-controls="navbarSupportedContent" aria-expanded="false" aria-label="Toggle navigation">
<span class="navbar-toggler-icon"></span>
</button>
<div class="collapse navbar-collapse" id="navbarSupportedContent">
<ul class="navbar-nav mr-auto">
```

```
<li class="nav-item active">
<a class="nav-link" href="#">Home <span class="sr-only">(current)</span></a>
</li>
<li class="nav-item">
<a class="nav-link" href="#">About Us</a>
</li>
<li class="nav-item">
<a class="nav-link" href="#" tabindex="-1" aria-disabled="true">Contact Us</a>
</li>
</ul>
<form class="form-inline my-2 my-lg-0">
<input class="form-control mr-sm-2" type="search" placeholder="Search" aria-label="Search">
<button class="btn btn-outline-success my-2 my-sm-0" type="submit">Search</button>
</form>
</div>
</nav>
<div class="container">
<h2 class=" mt-3">Coronavirus Probability Detector</h2>
<p>Thanks for using Covid probability detector.</p>
<p>Patient's prbability of Infection is {{inf}}. Thank You</p>
<a href="/">
<button class="btn btn-success my-2 my-sm-0" type="submit">Go Back</button>
</a>
</div>
<!-- Optional JavaScript -->
<!-- jQuery first, then Popper.js, then Bootstrap JS -->
<script src="https://code.jquery.com/jquery-3.4.1.slim.min.js" integrity="sha384-
J6qa4849blE2+poT4WnyKhv5vZF5SrPo0iEjwBvKU7imGFAV0wwj1yYfoRSJoZ+n"
crossorigin="anonymous"></script>
<script src="https://cdn.jsdelivr.net/npm/popper.js@1.16.0/dist/umd/popper.min.js" integrity="sha384-
Q6E9RHvbIyZFJoft+2mJbHaEWldlvI9IOYy5n3zV9zzTtmI3UksdQRVvoxMfooAo"
crossorigin="anonymous"></script>
<script src="https://stackpath.bootstrapcdn.com/bootstrap/4.4.1/js/bootstrap.min.js" integrity="sha384-
wfSDF2E50Y2D1uUdj0O3uMBJnjuUD4Ih7YwaYd1iqfktj0Uod8GCExl3Og8ifwB6"
crossorigin="anonymous"></script>
</body>
</html>
```