

DATA SCIENCE PROJECT ON COVID-19 CASES PREDICTION AND LIVE TRACKER BY DISPLAYING NOTIFICATIONS

A Project Record Submitted to the Bharathidasan University, Tiruchirapalli

In Partial fulfillment of the requirements for the Award of the degree of

MASTER OF COMPUTER SCIENCE

Project Submitted by

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SRI PUSHPAM COLLEGE (AUTONOMOUS)

(Re-accredited by NAAC with 'A' Grade)

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BONAFIDE CERTIFICATE

This is to certify that this project work was done under my guidance and the project record entitled **"DATA SCIENCE PROJECT ON COVID-19 CASES PREDICTION AND LIVE TRACKER BY DISPLAYING NOTIFICATIONS"** submitted by **E.NETHAJI (Register No: 20CSA306)**, in partial fulfillment of the requirement for the **M.Sc.**, degree course for the academic year 2021-2022 in the subject of Computer Science is the original project work of the candidate.

Submitted for viva-vice examination held on -----at
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ACKNOWLEDGEMENT

I thank the god almighty for his blessings on me for the successful completion of the project. My sincere gratitude to our beloved secretary and Correspondent **Thiru A. BALASUBRAMANIA VANDAYAR**, M.A., A.V.V.M. Sri Pushpam College, Poondi. For this sacrifice in offering facilities for the successful completion of the project work.

I convey my sincere thanks to our Principal **Dr. R. SIVAKUMAR**, M.Sc., M.Phil., Ph.D., A.V.V.M. Sri Pushpam College humbly dedicated himself for the betterment of educational and particularly giving sample guidance.

I greatly indebted to express my sincere thanks to **Dr. V. MANIRAJ**, M.Sc., M.Phil., Ph.D., Co-Ordinator, Department of Computer Science, in A.V.V.M Sri Pushpam College, Poondi, who provided all possible facilities for completion of this project work.

My sincere thanks to my guide **Prof. P. KALAIMAGAL**, M.Sc., M.Phil., of Computer Science in A.V.V.M.Sri Pushpam College,Poondi,for his constant encouragement to complete this work and teaching faculty members for their valuable guidance to complete my course.

My sincere thanks to **SRI PUSHPAM INSTITUTE OF VOCATIONAL EDUCATION & TRAINING**, Thanjavur.

My Endeavour stands incomplete without dedicating my gratitude to “**MY FAMILY MEMBERS, FRIENDS**” and well-wishers for their moral support throughout the project

E.NETHAJI

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CHAPTER 1

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is a contagious disease caused by a virus, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The first known case was identified in Wuhan, China, in December 2019. The disease has since spread worldwide, leading to the ongoing COVID-19 pandemic. Symptoms of COVID-19 are variable, but often include fever, cough, headache, fatigue, breathing difficulties, loss of smell, and loss of taste. Symptoms may begin one to fourteen days after exposure to the virus. At least a third of people who are infected do not develop noticeable symptoms. Of those people who develop symptoms noticeable enough to be classed as patients, most (81%) develop mild to moderate symptoms (up to mild pneumonia), while 14% develop severe symptoms (dyspnea, hypoxia, or more than 50% lung involvement on imaging), and 5% suffer critical symptoms (respiratory failure, shock, or multiorgan dysfunction). Older people are at a higher risk of developing severe symptoms. Some people continue to experience a range of effects (long COVID) for months after recovery, and damage to organs has been observed. Multi-year studies are underway to further investigate the long-term effects of the disease.

The current COVID-19 pandemic, caused by SARS CoV2, threatens human life, health, and productivity and is rapidly spreading worldwide. The COVID-19 virus, like other family members, is sensitive to ultraviolet rays and heat. AI and deep learning play an essential role in COVID-19 cases identification and classification using computer-aided applications, which achieves excellent results for identifying COVID-19 cases based on known symptoms including fever, chills, dry cough, and a positive x-rays. AI, and the deep learning model can be used to forecast the spread of the virus based on historical data which can help control its spread. So there is a need to build machine learning models to identify COVID-19 infected patient or to predict the spread of the virus in the future, but this is not easy to achieve because patient data is confidential, and without enough data, it is too difficult to build a robust model. A new approach is needed that makes it easy to build a model without accessing a patient's private data or requires transferring patient's raw data, and one which gives high prediction accuracy.

ABSTRACT

The current COVID-19 pandemic threatens human life, health, and productivity. AI plays an essential role in COVID-19 case classification as we can apply machine learning models on COVID-19 case data to predict infectious cases and recovery rates using chest x-ray. Accessing patient's private data violates patient privacy and traditional machine learning model requires accessing or transferring whole data to train the model. In recent years, there has been increasing interest in federated machine learning, as it provides an effective solution for data privacy, centralized computation, and high computation power.

This project introduces on COVID-19 cases prediction using machine learning algorithm and Track live COVID-19 in your country by displaying notifications using Python .These types of predictive models help in providing an accurate prediction of epidemics, which is essential for obtaining information on the likely spread and consequences of infectious diseases. Now the next step is data preparation, Simply prepare new data by combining the above datasets and then we will visualize a geographical plot of the data .Next find the accuracy and prediction of the COVID-19 data and also that data can be visualized.

To be updated about the spread of the COVID-19 in the area that you live in, To get the data and display Windows 10 notificatons using python and some libraries.

Keywords :

Python , Numpy, Pandas, Matplotlib, Sklearn, Time, Requests, bs4, Win10toast

1.1 PROJECT DESCRIPTION

This project is entitled as “**COVID-19 CASES PREDICTION AND LIVE TRACKER BY DISPLAYING NOTIFICATIONS** ” has done in **PYTHON** as Front end and **CSV** as Back end. In this project, the COVID-19 death cases data can be stored CSV format and it can be import it. That data can be analysed and apply machine learning algorithms , it will be predict the COVID-19 death cases upcoming days. Next track live COVID-19 details in your country by displaying notifications and it can be be visualized.

This project has the following modules. They are,

- Numpy
- Pandas
- Matplotlib
- Sklearn
- Time
- Requests
- BeautifulSoup
- Win10toast

MODULE DESCRIPTION

NUMPY

NumPy was created in 2005 by Travis Oliphant. NumPy stands for Numerical Python. NumPy is a general-purpose array-processing package. It provides a high-performance multidimensional array object, and tools for working with these arrays. It is the fundamental package for scientific computing with Python

It contains various features including these important ones:

- A powerful N-dimensional array object
- Sophisticated (broadcasting) functions
- Tools for integrating C/C++ and Fortran code
- Useful linear algebra, Fourier transform, and random number capabilities

Besides its obvious scientific uses, NumPy can also be used as an efficient multi-dimensional container of generic data. Arbitrary data-types can be defined using Numpy which allows NumPy to seamlessly and speedily integrate with a wide variety of databases .

PANDAS

Pandas is a Python library used for working with data sets. It has functions for analyzing, cleaning, exploring, and manipulating data. The name "Pandas" has a reference to both "Panel Data", and "Python Data Analysis" and was created by Wes McKinney in 2008. Pandas allows us to analyze big data and make conclusions based on statistical theories. Pandas can clean messy data sets, and make them readable and relevant. Relevant data is very important in data science.

MATPLOTLIB

Matplotlib is a low level graph plotting library in python that serves as a visualization utility. Matplotlib was created by John D. Hunter. Matplotlib is open source and we can use it freely. Matplotlib is mostly written in python, a few segments are written in C, Objective-C and Javascript for Platform compatibility.

SKLEARN

Scikit-learn (Sklarn) is the most useful and robust library for machine learning in Python. It provides a selection of efficient tools for machine learning and statistical modeling including classification, regression, clustering and dimensionality reduction via a consistent interface in Python. This library, which is largely written in Python.

TIME

A Python program can handle date and time in several ways. Converting between date formats is a common chore for computers. Python's time and calendar modules help track dates and times. There is a popular time module available in Python which provides functions for working with times, and for converting between representations. The function `time.time()` returns the current system time in ticks since 00:00:00 hrs. The `datetime()` class also takes parameters for time and timezone (hour, minute, second, microsecond, tzzone), but they are optional, and has a default value of 0, (None for timezone)

REQUESTS

Requests library is one of the integral part of Python for making HTTP requests to a specified URL. Whether it be REST APIs or Web Scrapping, requests is must to be learned for proceeding further with these technologies. When one makes a request to a URI, it returns a response. Python requests provides inbuilt functionalities for managing both the request and response.

BEAUTIFULSOUP

As BeautifulSoup is not a standard python library, we need to install it first. We are going to install the BeautifulSoup 4 library (also known as BS4), which is the latest one. To isolate our working environment so as not to disturb the existing setup, let us first create a virtual environment.

WIN10TOAST

Python is a general-purpose language, can be used to develop both desktop and web applications. By using a package available in Python named `win10toast`, we can create desktop notifications. It is an easy way to get notified when some event occurs.

CHAPTER 2

SOFTWARE PROJECT PLAN

This chapter discusses about the time schedule for the project, and it contains the various phases of the project.

TIME SCHEDULE FOR VARIOUS PHASES

S.NO	TASK	DURATION
1.	Problem definition	5 days
2.	Requirement Specification	4 days
3.	Requirement Document Specification	5days
4.	Design Analysis	12 days
5.	Screen design	17 days
6.	Design Review	12 days
7.	Coding	35 days
8.	Testing	5 days
	Total Days	95 days

CHAPTER 3

CUSTOMER REQUIREMENTS DETERMINATION

3.1 EXISTING SYSTEM

A massive global catastrophe will arise from the precarity of the COVID-19 pandemic. Any experts and government organisations around the world are worried about the pandemic involving a significant percentage of the world 's population. In this study the possibility of a COVID-19 outbreak was suggested as a global ML-based predictive method. The framework analyses data sets containing real data from the past day to day and uses machine learning algorithms to make forecasts about future days. The study findings show that in view of the existence and dimension of the dataset, ES performs better in the current forecast domain. LR and LASSO have both been effective in estimating and verifying the death rate to some degree. The mortality rate will rise in the next few days and the survival rate will decline according to the effects of both models. The effect of ups and downs of the data collection is badly achieved by SVM in all the cases. A precise hyperplane between the data sets values was very difficult to place. In general, we assume that the present situation of the model forecasts are right and will help us understand the future. Therefore, the study projections will also allow the governments to act and take decisions in good time to avert the Crisis COVID-19. This analysis will be continually developed and we will analysis the process of the forecast using a modified dataset and apply ML methods of forecast with the most accuracy and appropriate.

3.2 PROPOSED SYSTEM

Recently several deep learning methods have been proposed for the diagnosis of COVID-19. In order to improve the diagnostic performance, we have used transfer learning for diagnosis of corona virus through the transfer of already learnt knowledge. For this purpose, we used ImageNet as a source domain denoted by D_s where the source task T_s is to classify 1000 classes of natural images. The target domain denoted by D_t is the Covid2019 Chest.

3.3 PROBLEM STATEMENT

Quality in requirements engineering practices creates quality software projects, so there is a need to improve the quality of requirement engineering practices for COVID-19 software projects. Requirement engineering uses many algorithms and processes to gather well-negotiated requirements. However, the requirement negotiation is a complex and time-consuming task. Although many techniques and algorithms are used to make it easy and efficient, but still, there is a lacking in the quality of COVID-19 software projects. Python technology is being adopted in many fields and applications to improve the quality, security, reliability, and speed of projects. So, we can use python platforms in requirement engineering practices to gather more accurate requirements and to create improved COVID-19 software projects. Python requirement engineering will improve the quality and reliability of COVID-19 software projects. By using this technology in requirements engineering practices, the success rate of software projects related to COVID-19 is expected to improve.

OBJECTIVE

The objective of this research has been studied with the help of the following sub objectives:

1. To study the process of requirement elicitation, validation, and negotiation
2. Develop an application which will predict the COVID-19 death cases with decent accuracy and live tracker by displaying notifications.
3. Make use of machine learning algorithms to increase the accuracy of COVID-19 death cases prediction

CHAPTER 4

SOFTWARE REQUIREMENT SPECIFICATION

SYSTEM REQUIREMENT SPECIFICATION

A System Requirement Specification (SRS) is basically an organization's understanding of a customer or potential client's system requirements and dependencies at a particular point prior to any actual design or development work. The information gathered during the analysis is translated into a document that defines a set of requirements. It gives a brief description of the services that the system should provide and also the constraints under which the system should operate. Generally, SRS is a document that completely describes what the proposed software should do without describing how the software will do it. It's a two-way insurance policy that assures that both the client and the organization understand the other's requirements from that perspective at a given point in time.

SRS document itself states in precise and explicit language those functions and capabilities a software system (i.e., a software application, an ecommerce website and so on) must provide, as well as states any required constraints by which the system must abide. SRS also functions as a blueprint for completing a project with as little cost growth as possible. SRS is often referred to as the "parent" document because all subsequent project management documents, such as design specifications, statements of work, software architecture specifications, testing and validation plans, and documentation plans, are related to it.

Requirement is a condition or capability to which the system must conform. Requirement Management is a systematic approach towards eliciting, organizing and documenting the requirements of the system clearly along with the applicable attributes. The elusive difficulties of requirements are not always obvious and can come from any number of sources.

4.1 FUNCTIONAL REQUIREMENTS

Functional Requirement defines a function of a software system and how the system must behave when presented with specific inputs or conditions. These may include calculations, data manipulation and processing and other specific functionality. In this system following are the functional requirements:

Following are the functional requirements on the system:

1. The entire control model set must be translated to C output Code.
2. Inputs must be models designed using CLAW design components along with standard design components.
3. Multiple design models must be processed and the result must be combined to obtain a single output file.

NON-FUNCTIONAL REQUIREMENTS

Nonfunctional requirements are the requirements which are not directly concerned with the specific function delivered by the system. They specify the criteria that can be used to judge the operation of a system rather than specific behaviors. They may relate to emergent system properties such as reliability, response time and store occupancy. Nonfunctional requirements arise through the user needs, because of budget constraints, organizational policies, the need for interoperability with other software and hardware systems or because of external factors such as:

- Product Requirements
- Organizational Requirements
- User Requirements
- Basic Operational Requirements

PRODUCT REQUIREMENT

Platform Independency:

Standalone executables for embedded systems can be created so the algorithm developed using available products could be downloaded on the actual hardware and executed without any dependency to the development and modeling platform

CORRECTNESS

It followed a well-defined set of procedures and rules to compute and also rigorous testing is performed to confirm the correctness of the data.

EASE OF USE

Model Coder provides an interface which allows the user to interact in an easy manner.

MODULARITY

The complete product is broken up into many modules and well-defined interfaces are developed to explore the benefit of flexibility of the product.

ROBUSTNESS

This software is being developed in such a way that the overall performance is optimized and the user can expect the results within a limited time with utmost relevance and correctness

Nonfunctional requirements are also called the qualities of a system. These qualities can be divided into execution quality & evolution quality. Execution qualities are security & usability of the system which are observed during run time, whereas evolution quality involves testability, maintainability, extensibility or scalability.

4.2 ORGANIZATIONAL REQUIREMENTS

Process Standards: The standards defined by DRDO are used to develop the application which is the standard used by the developers inside the defense organization.

DESIGN METHODS

Design is one of the important stages in the software engineering process. This stage is the first step in moving from problem to the solution domain. In other words, starting with what is needed design takes us to work how to satisfy the needs.

4.3 USER REQUIREMENTS

- The coder must request the name of the model file to be processed
- In case of multiple files, the coder must ask the names of the files sequentially.
- The output file must be a C code translated from the model.
- Only a single output file must be created even if multiple input files are provided

4.4 BASIC OPERATIONAL REQUIREMENTS

The customers are those that perform the eight primary functions of systems engineering, with special emphasis on the operator as the key customer. Operational requirements will define the basic need and, at a minimum, will be related to these following points: -

Mission profile or scenario:

It describes the procedures used to accomplish mission objectives. It also finds out the effectiveness or efficiency of the system.

Performance and related parameters:

It points out the critical system parameters to accomplish the mission

Utilization environments:

It gives a brief outline of system usage. Finds out appropriate environments for effective system operation.

4.5 RESOURCE REQUIREMENTS

4.5.1 SOFTWARE REQUIREMENT

Operating System : Microsoft windows 10

Front End : Python

Back End : CSV

Documentation : Microsoft Word

4.5.2 HARDWARE REQUIREMENT

Processor : Intel Core i3 3.7 GHz

RAM : 4 GB

Speed : 3.40 GHz

Hard Disk : 500GB

Monitor : LED Monitor

Mouse : Wireless Mouse

Keyboard : Multi Type

Printer : Laser Printer

CHAPTER 5

SYSTEM ANALYSIS

Analysis is the process of finding the best solution to the problem. System analysis is the process by which we learn about the existing problems, define objects and requirements and evaluate the solutions. It is the way of thinking about the organization and the problem it involves, a set of technologies that helps in solving these problems. Feasibility study plays an important role in system analysis which gives the target for design and development.

FEASIBILITY STUDY

All systems are feasible when provided with unlimited resources and infinite time. But unfortunately, this condition does not prevail in the practical world. So it is both necessary and prudent to evaluate the feasibility of the system at the earliest possible time. Months or years of effort, thousands of rupees and untold professional embarrassment can be averted if an ill-conceived system is recognized early in the definition phase. Feasibility & risk analysis are related in many ways. If project risk is great, the feasibility of producing quality software is reduced. In this case three key considerations involved in the feasibility analysis are

- ECONOMICAL FEASIBILITY
- TECHNICAL FEASIBILITY
- SOCIAL FEASIBILITY

ECONOMICAL FEASIBILITY

This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus, the developed system as well within the budget and this was achieved because most of the technologies used are freely available. Only the customized products had to be purchased

TECHNICAL FEASIBILITY

This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. This will lead to high demands on the available technical resources. This will lead to high demands being placed on the client. The developed system must have a modest requirement, as only minimal or null changes are required for implementing this system.

SOCIAL FEASIBILITY

The aspect of study is to check the level of acceptance of the system by the user. This includes the process of training the user to use the system efficiently. The user must not feel threatened by the system, instead must accept it as a necessity. The level of acceptance by the users solely depends on the methods that are employed to educate the user about the system and to make him familiar with it. His level of confidence must be raised so that he is also able to make some constructive criticism, which is welcomed, as he is the final user of the system.

ANALYSIS

PERFORMANCE ANALYSIS

For the complete functionality of the project work, the project is run with the help of a healthy networking environment. Performance analysis is done to find out whether the proposed system. It is essential that the process of performance analysis and definition must be conducted in parallel.

TECHNICAL ANALYSIS

System is only beneficial only if it can be turned into information systems that will meet the organization's technical requirement. Simply stated this test of feasibility asks whether the system will work or not when developed & installed, whether there are any major barriers to implementation. Regarding all these issues in technical analysis there are several points to focus on

CHANGES TO BRING IN THE SYSTEM

All changes should be in a positive direction, there will be increased level of efficiency and better customer service.

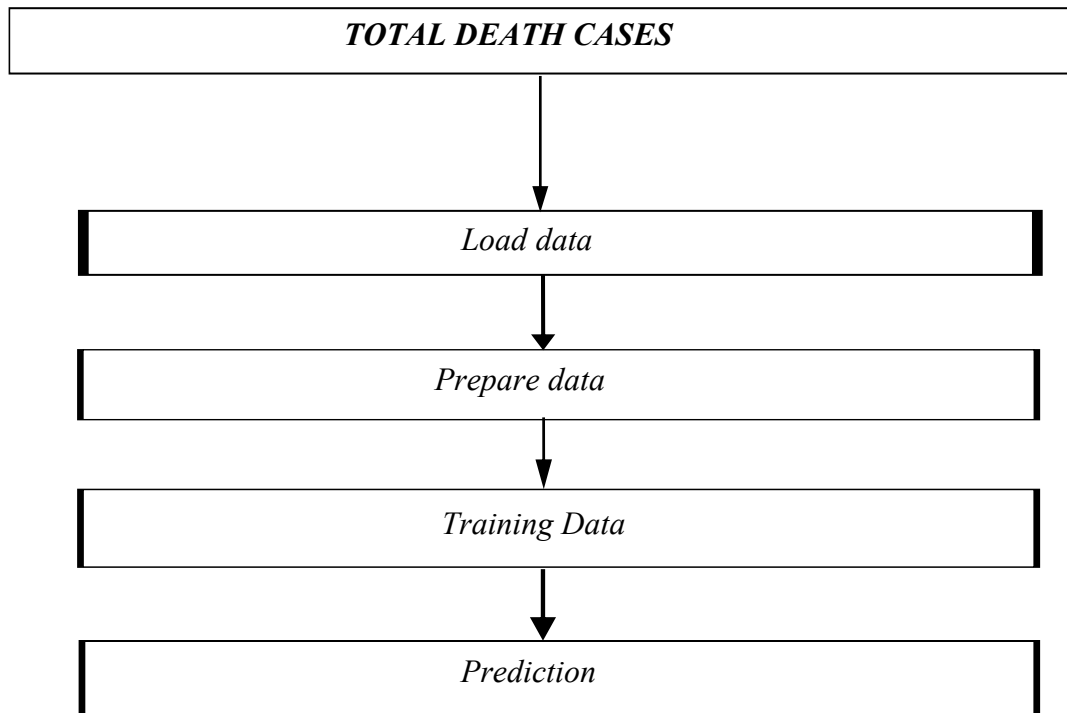
REQUIRED SKILLS

Platforms & tools used in this project are widely used. So the skilled manpower is readily available in the industry.

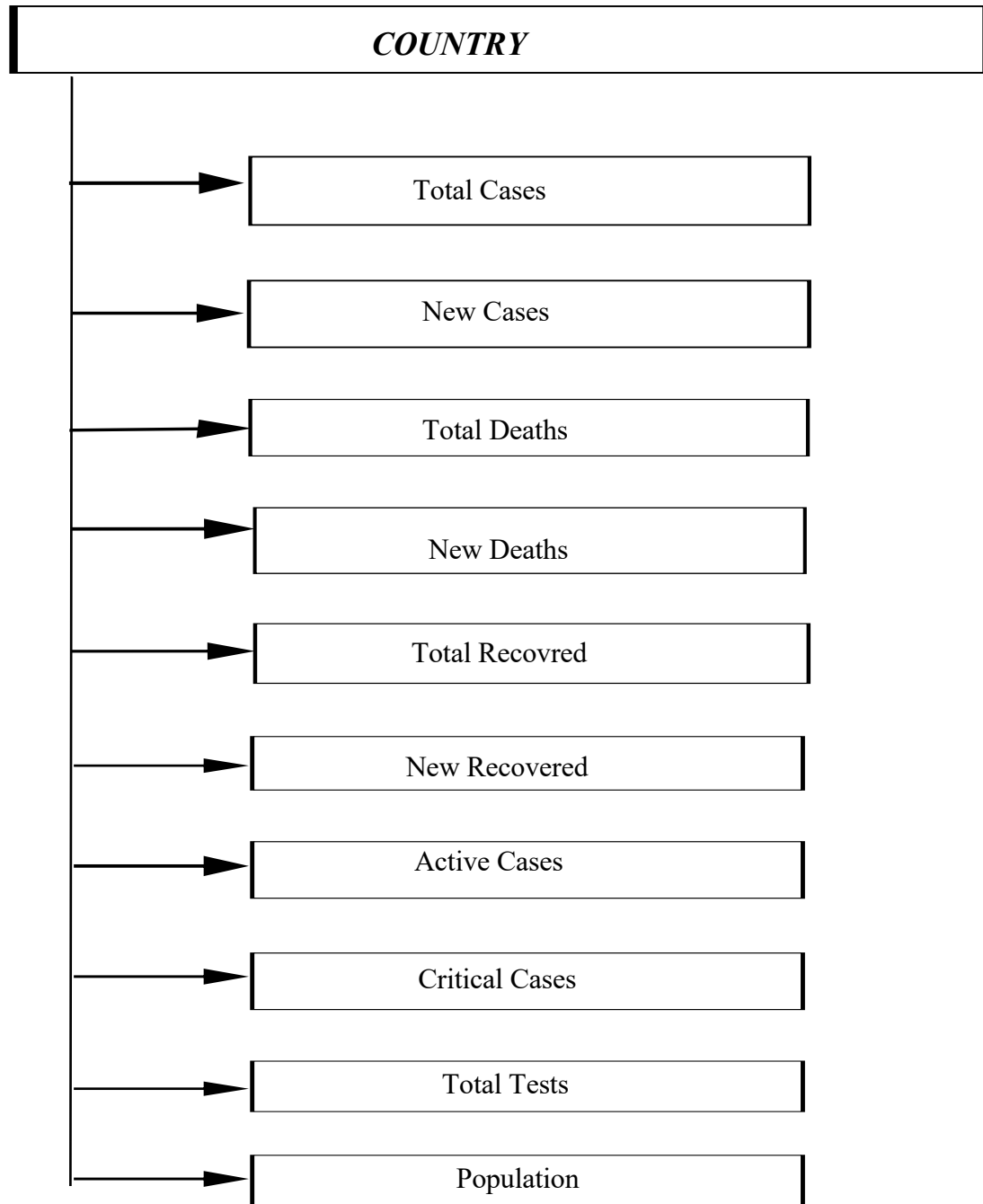
ACCEPTABILITY

The structure of the system is kept feasible enough so that there should not be any problem from the user's point of view.

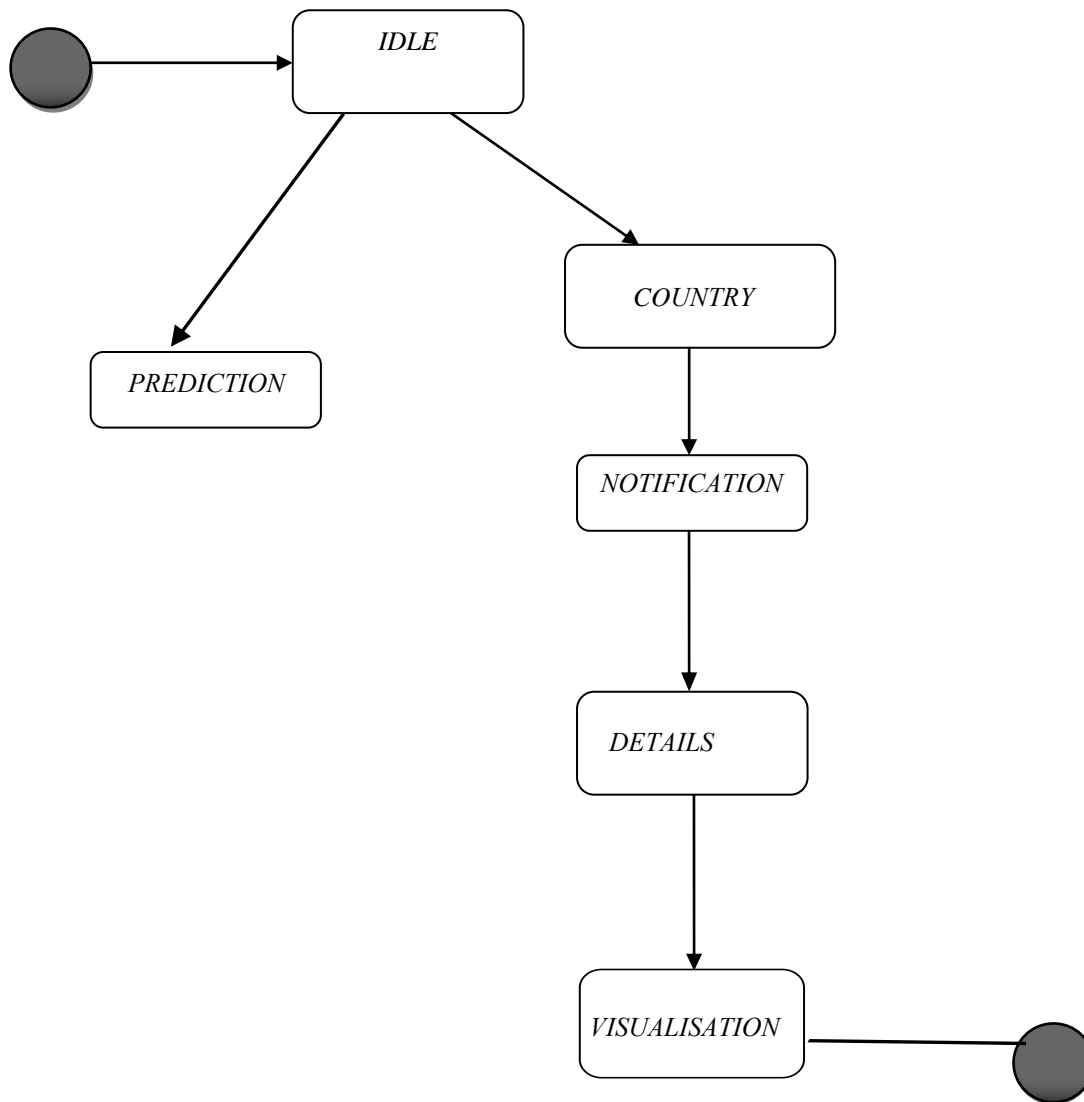
5.1 DATA FLOW DIAGRAM



5.2 USE CASE DIAGRAM



5.3 STATE CHART DIAGRAM



5.4 CASE TOOL FOR ANALYSIS

First, we have to find a reliable website that offers the data that we need. I decided to use Worldometers for this project. The website gives us a ready to use datasets with different data as columns and distinct countries as rows.

So we have to find and filter the web-elements to get the data, to then display it on notifications

Country, Other	Total Cases	New Cases	Total Deaths	New Deaths	Total Recovered	Active Cases	Serious, Critical	Tot Cases/ 1M pop
China	80,824	+11	3,189	+13	65,573	12,062	3,610	56.2
Italy	17,660		1,266		1,439	14,955	1,328	292.1
Iran	12,729	+1,365	611	+97	4,339	7,779		151.5
S. Korea	8,086	+107	72	+5	714	7,300	59	157.7
Spain	6,023	+791	191	+58	517	5,315	272	128.8
Germany	3,953	+278	8		46	3,899	9	47.2
France	3,661		79		12	3,570	154	56.1
USA	2,340	+93	50	+1	47	2,243	10	7.1
Switzerland	1,375	+236	13	+2	4	1,358		158.9
Norway	1,035	+39	1		1	1,033	27	190.9
Netherlands	959	+155	12	+2	2	945	45	56.0
Sweden	941	+127	2	+1	1	938	2	93.2

CHAPTER 6

DESIGN

6.1 FRONT END DESIGN

6.1.1 PYTHON

Python is a general purpose, dynamic, high-level, and interpreted programming language. It supports Object Oriented programming approach to develop applications. It is simple and easy to learn and provides lots of high-level data structures."

INTRODUCING TO PYTHON

Python is a high-level, general-purpose programming language with an elegant syntax that allows programmers to focus more on problem-solving than on syntax errors. One of the primary goals of Python Developers is to keep it fun to use. Python has become a big buzz in the field of modern software development, infrastructure management, and especially in Data Science and Artificial Intelligence.

PYTHON HISTORY

Python was initially founded in the late 1990s by Guido van Rossum. He decided to create a language in 1989. He wanted to build a programming language that could resolve the issues the programmers were facing at that time. Within 5 years, he released the first version of the Python programming language which not only solves many flaws but he made it with easily readable syntax. Guido van Rossum has named this programming language "Python" in honor of his favorite comedian "The Pythons" in the "Monty Python's Flying Circus" show.

Although it did not get popular at first after Google announced that it has used Python for its internal development programming, it started getting in-demand. This was a turning point for the Python programming language.

Thereafter, many programmers, developers started using Python as their primary programming language which eventually became the best programming language for any Machine Learning algorithms, Data Science projects, and many more. Today, It is one of the most widely used programming languages for any IT application.

FEATURES OF PYTHON

Some of the common features of the Python programming language are:

OBJECT-ORIENTED

Python was created with an Object-oriented programming approach which helps in writing clean and clear code. Object-oriented programming can be achieved through Python Class.

USE OF INTERPRETER

Python codes are interpreted line by line at a time using the Interpreter. This also helps in debugging.

FREE AND OPEN-SOURCE

This is a free and open-source programming language so everyone can use it.

SIMPLE

It is simple to use as it is just like an English sentence resulting in fast coding and execution

CAN BE INTEGRATED

It can be integrated with other programming languages like C, C+, Java, and many more. This will also teach you most of the programming concepts.

CROSS-PLATFORM

Python is a cross-platform programming language which means it allows you to use it on any platform like Windows, Linux, Mac, Unix, etc.

LARGE LIBRARY

Python's ecosystem is large and growing, with a wide range of open-source packages and libraries. There are over 137,000 Python libraries.

ELEGANT SYNTAX

Python has a simple syntax that improves readability and lowers code maintenance costs which makes code elegant and straightforward.

CHARACTERISTICS OF PYTHON

Some of the characteristics of Python programming which make it a popular language are:

- There's a rich collection of Python Data Types.
- Python is a platform-independent scripted language that comes with features to have complete access to operating system APIs.
- When compared with other programming languages, Python provides more run-time flexibility.
- The basic text manipulation facilities of Awk and Perl are also included in Python.
- There is a Python Module where you can have more than one class and free function.
- Libraries available in Python are cross-platform compatible and can run on platforms such as Windows, Linux, or macOS.
- Python can be easily compiled to byte-code; that's the reason it is most suitable for building large applications.
- Python also provides features to support functional and structured programming, as well as OOP concepts.
- Python supports an interactive mode that allows interactive testing and debugging for snippets of code.
- In Python, there is no editing, debugging, testing, and compilation steps, so it is very fast

APPLICATIONS OF PYTHON

Python can be used to develop a variety of applications like:

- **WEB APPLICATIONS**

Python offers various web development frameworks including Django, Pyramid, Flask, and many more. These frameworks and vast libraries help in making web application processes simple and easy.

- **SOFTWARE PROTOTYPES**

Python is an excellent language for developing prototypes, tests, and debugging tools.

- **SCIENTIFIC AND NUMERIC COMPUTING**

With Python packages such as Pandas and Numpy, scientific and numeric computing can be done efficiently.

- **NETWORK PROGRAMMING**

Python makes it easy to create scripts that automate the configuration of complex networks. For software-defined networking, it is the most widely used programming language.

- **GAMES AND 3D APPLICATIONS**

Games and 3D Applications: Python is a credible language for creating a simple 3D game using Pygame, making it an effective tool for prototyping.

ADVANTAGES OF PYTHON

Here are some advantages of this Python programming language

- Python is a high-level programming language with a syntax that is similar to English, making it an easy choice for beginners to understand and learn.
- Python is free and open so that anyone can download and use it right away.
- As the code is simple, the productivity is comparatively higher than other programming languages.
- Python is a system-independent programming language which means you do not need to change your code when using it on different platforms.
- Whenever there is an error, Python halts the coding until the error is resolved. This helps in creating error-free code.
- With numerous Python packages in its vast library helps the users to work on various applications with ease.

DISADVANTAGES OF PYTHON

The disadvantages of using Python are mentioned below

- Python's structures need additional memory.
- The execution process is relatively slower
- It can lead to run-time errors sometimes.
- It is not the best choice when interacting with databases.
- The processing power of Python is slow compared to other languages.

6.2 BACK END DESIGN

6.2.1 COMMA-SEPARATED VALUES(CSV)

A comma-separated values (CSV) file is a delimited text file that uses a comma to separate values. Each line of the file is a data record. Each record consists of one or more fields, separated by commas. The use of the comma as a field separator is the source of the name for this file format. A CSV file typically stores tabular data (numbers and text) in plain text, in which case each line will have the same number of fields.

The CSV file format is not fully standardized. Separating fields with commas is the foundation, but commas in the data or embedded line breaks have to be handled specially. Some implementations disallow such content while others surround the field with quotation marks, which yet again creates the need for escaping if quotation marks are present in the data.

The term "CSV" also denotes several closely-related delimiter-separated formats that use other field delimiters such as semicolons. These include tab-separated values and space-separated values. A delimiter guaranteed not to be part of the data greatly simplifies parsing.

Alternative delimiter-separated files are often given a ".csv" extension despite the use of a non-comma field separator. This loose terminology can cause problems in data exchange. Many applications that accept CSV files have options to select the delimiter character and the quotation character. Semicolons are often used instead of commas in many European locales in order to use the comma as the decimal separator and, possibly, the period as a decimal grouping character.

DATA EXCHANGE

CSV is a common data exchange format that is widely supported by consumer, business, and scientific applications. Among its most common uses is moving tabular data between programs that natively operate on incompatible (often proprietary or undocumented) formats. This works despite lack of adherence to RFC 4180 (or any other standard), because so many programs support variations on the CSV format for data import.

For example, a user may need to transfer information from a database program that stores data in a proprietary format, to a spreadsheet that uses a completely different format. Most database programs can export data as CSV and the exported CSV file can then be imported by the spreadsheet program

SPECIFICATION

RFC 4180 proposes a specification for the CSV format; however, actual practice often does not follow the RFC and the term "CSV" might refer to any file that is plain text using a character encoding such as ASCII, various Unicode character encodings (e.g. UTF-8), EBCDIC consists of records (typically one record per line), with the records divided into fields separated by delimiters (typically a single reserved character such as comma, semicolon, or tab; sometimes the delimiter may include optional spaces), where every record has the same sequence of fields. Within these general constraints, many variations are in use. Therefore, without additional information (such as whether RFC 4180 is honored), a file claimed simply to be in "CSV" format is not fully specified. As a result, some applications supporting CSV files allow users to preview the first few lines of the file and then specify the delimiter character(s), quoting rules, etc.; for example, Microsoft Excel's Text Import Wizard.

6.3 ALGORITHM USED

PREDICTION

- STEP 1 : Start the process.
- STEP 2 : Load death cases data .
- STEP 3 : Prepare and reshape the data.
- STEP 4 : Calculate accuracy of data .
- STEP 5 : Predict the death cases.
- STEP 6 : Stop the process.

NOTIFICATON AND VISUALIZATION

- STEP 1 : Start the process.
- STEP 2 : Search country name.
- STEP 3 : Get the notification.
- STEP 4 : Visualized covid-19 data .
- STEP 5 : Stop the process.

CHAPTER 7

IMPLEMENTATION AND TESTING

7.1 PROGRAMS

PREDICTION

```
from win10toast import ToastNotifier
from bs4 import BeautifulSoup
import requests
import time
import matplotlib.pyplot as plt
import numpy as np
import pandas as pd
from sklearn.preprocessing import PolynomialFeatures
from sklearn import linear_model

days = int(input("Enter The Number Days To Predict : "))

# LOAD DATA
data = pd.read_csv('C:/Users/s/Pictures/Camera Roll/predict.csv',sep="," ,encoding=
'unicode_escape')
data = data[['Id', 'Total_Deaths']]
print('-' * 30);print("HEAD");print("-" * 30)
print(data.head())
```


#PREPARE DATA

```
print('-' * 30);print("Prepare Data");print('-' * 30)
x = np.array(data['Id']).reshape(-1, 1)
y = np.array(data['Total_Deaths']).reshape(-1, 1)
plt.plot(y, '-m')
plt.show()
```

```
polyFeat = PolynomialFeatures(degree=4)
x = polyFeat.fit_transform(x)
print(x)
```

#TRAINING DATA

```
print('-' * 30);print("Prepare Data");print('-' * 30)
model = linear_model.LinearRegression()
model.fit(x, y)
accuracy = model.score(x, y)
print(f'Accuracy: {round(accuracy * 100, 3)}%')
y0 = model.predict(x)
plt.plot(y0, '--b')
plt.show()
```

#PREDICTION

```
print('-' * 30);print("Prediction");print('-' * 30)
print(f'Prediction-Cases after {days} days:', end=' ')
print(round(int(model.predict(polyFeat.fit_transform([[366+ days]]))) / 1000000, 2), 'Million')

x1 = np.array(list(range(1,30+ days))).reshape(-1, 1)
y1 = model.predict(polyFeat.fit_transform(x1))
plt.plot(y1, '--r')
plt.plot(y0, '--b')
plt.show()
```

NOTIFICATION

```
country =input("Enter The Country Name : ")#type which country Covid 19 details if you want
```

```
notification_duration = 60
```

```
refresh_time = 60 # minutes
```

```
data_check = []
```

```
worldmetersLink = "https://www.worldometers.info/coronavirus/"
```

```
def data_cleanup(array):
```

```
    L = []
```

```
    for i in array:
```

```
        i = i.replace("+", "")
```

```
        i = i.replace("-", "")
```

```
        i = i.replace(",", "")
```

```
        if i == "":
```

```
            i = "0"
```

```
        L.append(i.strip())
```

```
    return L
```

```
while True:
```

```
    try:
```

```
        html_page = requests.get(worldmetersLink)
```

```
    except requests.exceptions.RequestException as e:
```

```
        print(e)
```

```
        continue
```

```
    bs = BeautifulSoup(html_page.content, 'html.parser')
```

```

search = bs.select("div tbody tr td")
start = -1
for i in range(len(search)):
    if search[i].get_text().find(country) != -1:
        start = i
        break
data = []
for i in range(1, 15):
    try:
        data = data + [search[start + i].get_text()]
    except:
        data = data + ["0"]

data = data_cleanup(data)
message = "Total Cases = {}, New Case = {}, Total Deaths = {}, New Deaths = {}, Total
Recovred = {}, New Recovered={}, Active Case = {}, Critical Critical = {}, Tot Cases/1M
pop={}, Deaths 1M pop={}, Total Tests={}, Test 1m pop={}, Population={}".format(
    *data)

if data_check != data:
    data_check = data
    toaster = ToastNotifier()
    toaster.show_toast("Coronavirus {}".format(country), message,
duration=notification_duration,
        icon_path="C:/Users/s/Pictures/Saved Pictures/vv.ico")
else:
    time.sleep(refresh_time * 60)
    break

```

```
covid_case_details= "Total Cases = {}, New Case = {}, Total Deaths = {}, New Deaths =
{},Total Recovred = {},New Recovered={}, Active Case = {},Critical Cases = {},Tot cases/ 1m
pop = {},Tot Cases/1M pop={},Deaths 1M pop={},Total Tests={},Test 1m
pop={},Population={}".format(*data)
print(covid_case_details)
```

#VISUALIZATION

```
covid_case_details= "Total Cases = {}, New Case = {}, Total Deaths = {}, New Deaths =
{},Total Recovred = {},New Recovered={}, Active Case = {},Critical Cases = {},Tot cases/ 1m
pop = {},Tot Cases/1M pop={},Deaths 1M pop={},Total Tests={},Test 1m
pop={},Population={}".format(*data)
print(covid_case_details)
```

```
myexplode=[0.2,0.2,0.2,0.2,0.2]
mycolors=["r","g","b","y","hotpink","c"]
mylabels=["Total Cases","Total Deaths","Total Recovred","Active Cases","Total Tests"]
y=np.array([data[0],data[2],data[4],data[6],data[10]])
plt.pie(y,labels=mylabels,colors=mycolors,explode=myexplode)
plt.legend(title="COVID-19 Data Of "+country )
plt.show()
```

7.2 TESTING

System testing is actually a series of different tests whose primary purpose is to fully exercise the computer-based system. Although each test has a different purpose, all work to verify that all the system elements have been properly integrated and perform allocated functions. The testing process is actually carried out to make sure that the product exactly does the same thing what is supposed to do. In the testing stage following goals are tried to achieve: -

- To affirm the quality of the project.
- To find and eliminate and residual errors from previous stages
- To validate the software as solution to the original problem.
- To provide operational reliability of the system.

7.2.1 TESTING METHODOLOGIES

There are different types of testing methods or techniques used as part of the software testing methodology. Some of the important testing methodologies are:

7.2.2 WHITE BOX TESTING

White box testing (clear box testing, glass box testing, and transparent box testing or structural testing) uses an internal perspective of the system to design test cases based on internal structure. It requires programming skills to identify all paths through the software. The tester chooses test case inputs to exercise paths through the code and determines the appropriate outputs. While white box testing is applicable at the unit, integration and system levels of the software testing process, it is typically applied to the unit. While it normally tests paths within a unit, it can also test paths between units during integration, and between subsystems during a system level test.

Though this method of test design can uncover an overwhelming number of test cases, it might not detect unimplemented parts of the specification or missing requirements, but one can be sure that all paths through the test object are executed. Using white box testing we can derive test cases that:

- Guarantee that all independent paths within a module have been exercised at least once.
- Exercise all logical decisions on their true and false sides.
- Execute all loops at their boundaries and within their operational bounds.
- Execute internal data structure to assure their validity

7.2.3.1 ADVANTAGES OF WHITE BOX TESTING

To start the white box testing of the desired application there is no need to wait for user face (UI) to be completed. It covers all possible paths of code which will ensure a thorough testing.

- It helps in checking coding standards.
- Tester can ask about implementation of each section, so it might be possible to remove unused/deadlines of codes helps in reducing the number of test cases to be executed during the black box testing.
- As the tester is aware of internal coding structure, then it is helpful to derive which type of input data is needed to test the software application effectively.
- White box testing allows you to help in code optimization.

7.2.3.2 DISADVANTAGES OF WHITE BOXING

- To test the software application a highly skilled resource is required to carry out testing who has good knowledge of internal structure of the code which will increase the cost.
- Updating the test script is required if there is change in requirement too frequently.
- If the application to be tested is large in size, then exhaustive testing is impossible.
- It is not possible for testing each and every path/condition of software program, which might miss the defects in code.
- White box testing is a very expensive type of testing.
- To test each paths or conditions may require different input conditions, so in order to test full application, the tester need to create range of inputs which may be a time consuming.

7.2.3 BLACK BOX TESTING

Black box testing focuses on the functional requirements of the software. It is also known as functional testing. It is a software testing technique whereby the internal workings of the item being tested are not known by the tester. For example, in a black box test on software design the tester only knows the inputs and what the expected outcomes should be and not how the program arrives at those outputs. The tester does not ever examine the programming code and does not need any further knowledge of the program other than its specifications. It enables us to derive sets of inputs that will fully exercise all functional requirements for a program.

Black box testing is an alternative to white box technique. Rather it is a complementary approach that is likely to uncover a different class of errors in the following categories:

- Incorrect or missing function.
- Interface errors.
- Performance errors.
- Initialization and termination errors.
- Errors in objects.

7.2.3.1 ADVANTAGES OF BLACK BOX TESTING

- The test is unbiased as the designer and the tester are independent of each other.
- The tester does not need knowledge of any specific programming languages.
- The test is done from the point of view of the user, not the designer.
- Test cases can be designed as soon as the specifications are complete.

7.2.3.2 DISADVANTAGES OF BLACK BOX TESTING

- The test inputs need to be from large sample space. That is, from a huge set of data this will take time.
- Also, it is difficult to identify all possible inputs in limited testing time. So, writing test cases is slow and difficult.
- Chances are more that there will be unidentified paths during this testing.

7.3 UNIT TESTING

Unit testing involves the design of test cases that validate that the internal program logic is functioning properly, and that program inputs produce valid outputs. All decision branches and Bitcoin Price Prediction using Machine Learning internal code flow should be validated. It is the testing of individual software units of the application. This is a structural testing, that relies on knowledge of its construction and is invasive. Unit tests perform basic tests at component level and test a specific business process, application, and/or system configuration. Unit tests ensure that each unique path of a business process performs accurately to the documented specifications and contains clearly defined inputs and expected results.

7.3.1 SYSTEM TESTING

System testing checks complete end-end scenarios, as a user would exercise the system. The system has to be tested for correctness of the functionality by setting it up in a controlled environment. System testing includes testing of functional and nonfunctional requirements. It helps to verify and validate the system. All components system should have been successfully unit tested and then checked for any errors after integration.

7.3.2 QUALITY ASSURANCE

Quality assurance consists of the auditing and reporting functions of management. The goal of quality assurance is to provide management with the data necessary to be informed about product quality, thereby gaining insight and confident that the product quality is meeting its goals. This is an “umbrella activity” that is applied throughout the engineering process. Software quality assurance encompasses:

- Analysis, design, coding and testing methods and tools Formal technical reviews that are applied during each software engineering
- Multi-tiered testing strategy
- Control of software documentation and the change made to it.
- A procedure to ensure compliance with software development standards.
- Measurement and reporting mechanisms.

7.3.3 QUALITY FACTORS

An important objective of quality assurance is to track the software quality and assess the impact of methodological and procedural changes on improved software quality. The factors that affect the quality can be categorized into two broad groups:

- Factors that can be directly measured.
- Factors that can be indirectly measured

These factors focus on this important aspects of a software product

- Its operational characteristics
- Its ability to undergo changes Its adaptability to a new environment.
- Effectiveness or efficiency in performing its mission
- Duration of its use by its customer.

7.3.4 FUNCTIONAL TEST

Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation, and user manuals. Functional testing is centered on the following items:

VALID INPUT	:	identified classes of valid input must be accepted.
INVALID INPUT	:	identified classes of invalid input must be rejected.
FUNCTIONS	:	identified functions must be exercised.
OUTPUT	:	identified classes of application outputs must be exercised.
SYSTEMS/PROCEDURES:		interfacing systems or procedures must be invoked.

Organization and preparation of functional tests is focused on requirements, key functions, or special test cases. In addition, systematic coverage pertaining to identify Business process flows; data fields, predefined processes, and successive processes must be considered for testing. Before functional testing is complete, additional tests are identified and the effective value of current tests is determined.

CHAPTER 8

CONCLUSION

The COVID-19 pandemic outbreak has devastated the whole world and lead to a state of worldwide health emergency. Several efforts have been performed to combat this pandemic. In this study, we aimed to explore the impact of vital signs, chronic disease, preliminary clinical data, and demographic features to predict the mortality and survival of the COVID-19 patients using supervised machine learning algorithms. Due to the reduced mortality risk of the COVID-19 cases, the dataset suffers from data imbalance. SMOTE technique was used to alleviate the data imbalance. The results showed that random forest outperformed the other models using 10-fold cross-validation. Grid search technique was applied for parameter optimization. The study achieved the accuracy of 0.952 and AUC of 0.99. Despite the significant outcome achieved from this proposed model, there is still a need for improvement. The models need to be validated using multiple datasets. Furthermore, in the future, we will incorporate and explore the impact of other clinical features and laboratory results that were identified as significant in the previous studies

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ABBREVIATIONS USED

1. NUMPY - Numerical Python
2. PANDAS - Panel Data
3. BS4 - BeautifulSoup
4. CSV - Comma-Separated Values
5. COVID 19 - Coronavirus

APPENDIX OUTPUTS

LOAD DATA

```
Enter The Number Days To Predict : 6
```

```
-----
```

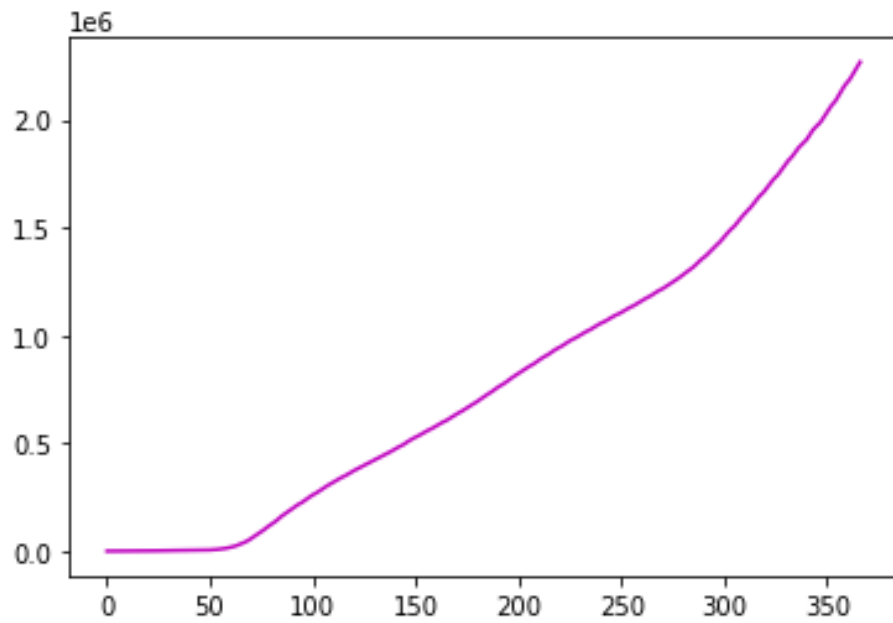
```
HEAD
```

```
-----
```

	Id	Total_Deaths
0	1	26
1	2	45
2	3	60
3	4	84
4	5	110

PREPARE DATA

Prepare Data



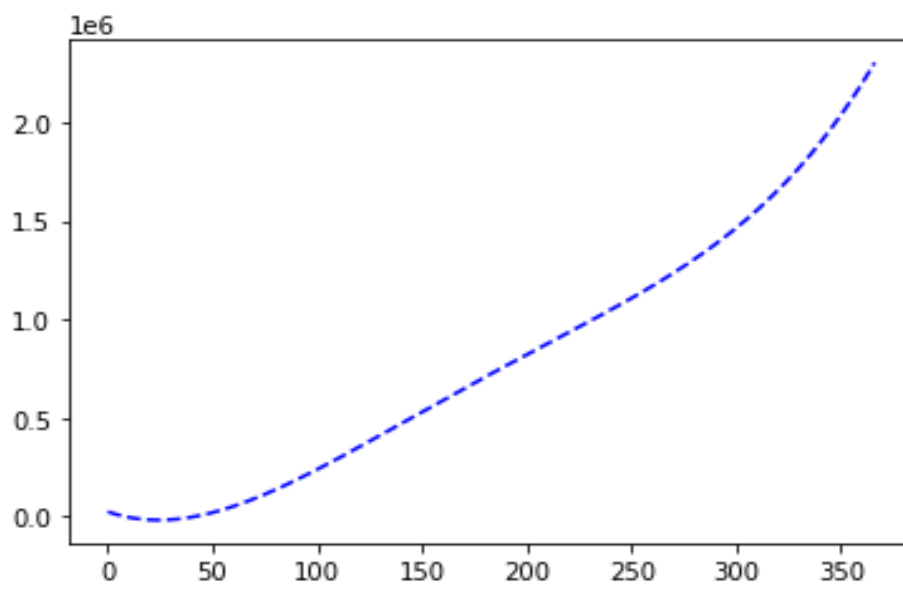
TRAINING DATA

```
[[1.00000000e+00 1.00000000e+00 1.00000000e+00 1.00000000e+00
  1.00000000e+00]
 [1.00000000e+00 2.00000000e+00 4.00000000e+00 8.00000000e+00
  1.60000000e+01]
 [1.00000000e+00 3.00000000e+00 9.00000000e+00 2.70000000e+01
  8.10000000e+01]
 ...
 [1.00000000e+00 3.65000000e+02 1.33225000e+05 4.86271250e+07
  1.77489006e+10]
 [1.00000000e+00 3.66000000e+02 1.33956000e+05 4.90278960e+07
  1.79442099e+10]
 [1.00000000e+00 3.67000000e+02 1.34689000e+05 4.94308630e+07
  1.81411267e+10]]
```

PREPARE DATA

Prepare Data

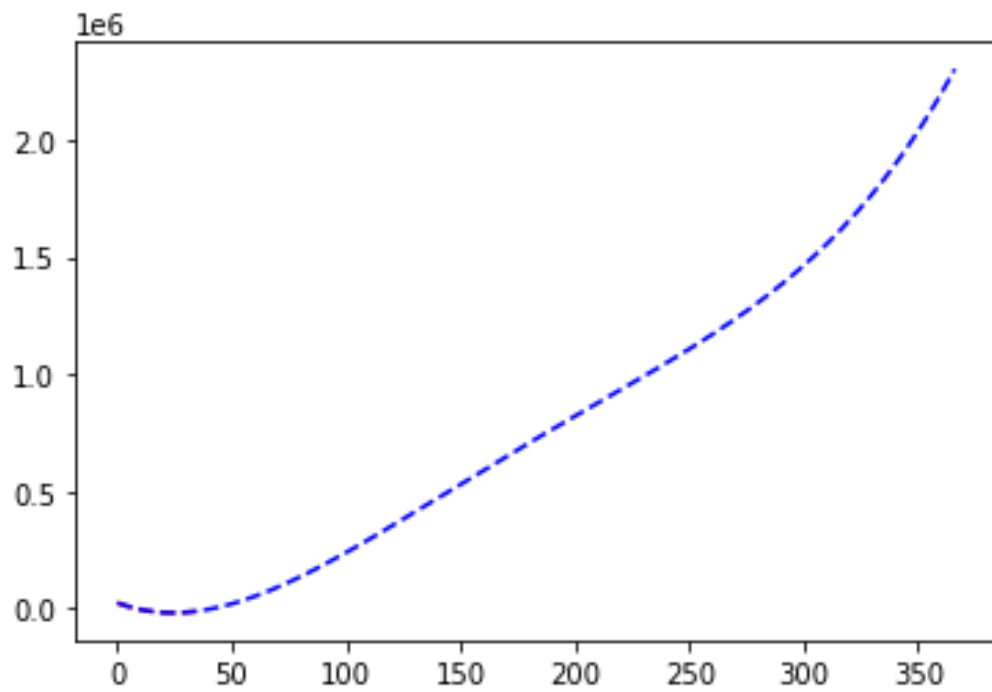
Accuracy:99.939%



PREDICTION

Prediction

Prediction-Cases after 6 days: 2.39 Million



NOTIFICATION



Coronavirus France



Total Cases = 28164406, New Case = 0,
Total Deaths = 144945, New Deaths =
0, Total Recovered = 25750641, New
Recovered = 0, Active Case = 2268820, Criti

COUNTRY COVID-19 DATA

Enter The Country Name : France

```
Total Cases = 28164406,  
New Case = 0,  
Total Deaths = 144945,  
New Deaths = 0,  
Total Recovred = 25750641,  
New Recovered=0,  
Active Case = 2268820,  
Critical Cases = 1677,  
Tot cases/ 1m pop = 429769,  
Tot Cases/1M pop=2212,  
Deaths 1M pop=266484045,  
Total Tests=4066358,  
Test 1m pop=65533845,  
Population=65533845.
```

COUNTRY COVID-19 DATA VISUALIZATION

