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A PROJECT REPORT

ON

"EPIDEMIC OUTBREAK DETECTION AND PREDICTION USING MACHINE LEARNING"

Submitted to

UNIVERSITY OF MUMBAI

In Partial Fulfilment of the Requirement for the Award of

BACHELOR'S DEGREE IN
COMPUTER ENGINEERING

BY

Poonawala Mohd Ayan Ishtiaque Ruksana	**16CO44**
Ansari Mohd Salman Abdul Salam Asiya Bano	**16CO20**
Sakharkar Sahil Salauddin Nazima	**16CO47**

UNDER THE GUIDANCE OF
Prof. Kalpana R.Bodke

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SCHOOL OF ENGINEERING & TECHNOLOGY
Plot No. 2 3, Sector - 16, Near Thana Naka,
Khandagaon, New Panvel - 410206

2019-2020

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A PROJECT II REPORT
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CERTIFICATE

This is certify that the project entitled

"Epidemic Outbreak Detection and Prediction using Machine Learning"

submitted by

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is a record of bonafide work carried out by them, in the partial fulfilment of the requirement for the award of Degree of Bachelor of Engineering (Computer Engineering) at ***Anjuman-I-Islam's Kalsekar Technical Campus, Navi Mumbai*** under the University of MUMBAI. This work is done during year 2019-2020, under our guidance.

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At last we must express our sincere heartfelt gratitude to all the staff members of Computer Engineering Department who helped me directly or indirectly during this course of work.

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Project I Approval for Bachelor of Engineering

This project entitled ***Epidemic Outbreak Detection and Prediction using Machine Learning*** by ***Poonawala Mohd Ayan Ishtiaque Ruksana , Ansari Mohd Salman Abdul Salam Asiya Bano , Sakharkar Sahil Salauddin Nazima*** is approved for the degree of ***Bachelor of Engineering in Department of Computer Engineering.***

Examiners

1. .....

2. .....

Supervisors

1. .....

2. .....

Chairman

.....

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Declaration

I declare that this written submission represents my ideas in my own words and where others ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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ABSTRACT

Epidemic diseases are the contagious diseases that are possible to be spread into the entire nation if the contagion measurement had reached the outbreak level and manage to wipe out the entire population. Epidemic Disease can have possible chances to spread into entire city if the contagion measurement reached to outbreak level.Epidemic disease outbreak had caused nowadays community to raise their great concern over the infectious disease controlling, preventing and handling methods to diminish the disease dissemination percentage and infected area.

The aim of the proposed system is to predict the spread of an epidemic by analyzing the conditions in the areas where people are affected.This project is focused on Various diseases,such as Influenza,Zika Virus,Malaria,Dengue which is an infectious disease, caused by exposure to the virus. The prediction will be done by analyzing the spread based on the movement of the disease through the population. It will be implemented using Machine Learning techniques to predict the spread in particular geographical regions.An approach model to predict the Disease area by using Text Analysis.Epidemic model use the power of Social Media data and this data help to provide the probability score of a Outbreak of Epidemic.The Data is extract on daily bases which make the output of the model more accurate.we use SVM Algorithm and various Machine Learning Technique.

Keywords: Epidemic Diseases,Disease Forecast,Prediction algorithm, Epidemic spread,sentiment analysis,Machine Learning ,social media, Epidemic Breakout Detection,public health,NLTK.

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Chapter 1

Introduction

Epidemic Disease is communicable Disease which has certain possible to spread into the entire area if the contagion measurement ratio reaches to outbreak level situation. Epidemic Disease such as bird flu, Dengue, Influenza and many more. This contagious diseases had caused major world health issues and was believed to be one of the major factors that had caused 43 percent of life lost globally.

People are not only using twitter while dealing with diseases but also many use search engines to query about symptoms, treatment, the spread of diseases which is time-consuming. This project overcomes the time-consuming problem by collecting all data from twitter and epitomize the required data. Social media such as twitter is useful for collecting real-time news and information. Beginning with data analysis, we first extract data from twitter. Data pre-processing method is used to remove the extra columns, dummy data is also removed by this technique. The Cardinal columns on which the system works is the date, tweet, hashtag, location, and polarity. By accumulating these columns the final CSV is prepared. The population-level pattern based on the nature of epidemiological research makes it well suited for machine learning. Machine learning and data mining techniques are used to make predictions based on patterns learned from data. NLP (Natural Language Processing) is used to understand the human language as it is spoken. NLP will read the tweets and classifies the polarity accordingly. Based on the polarity of tweets the polarity column of CSV is filled. From this CSV by using logic. python the ratio of state polarity is defined. The state which is epidemic will be shown as red colour in the map and in non-epidemic states, if diseases occur at a certain value it will extricate the affected area

.

1.1 Purpose

India has more diversity in the term of the population which mean that an Infectious Disease can divert into Most Dangerous Epidemic Disease. In 2018 there was an epidemic outbreak of Nipah Virus in the state of Kerela, India traced to the fruit

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bat in the area[10].The the outbreak was localized in Kozhikode and Malappuram districts of Kerala[10]and claimed 17 lives[11]. The Purpose of the system is detection and prediction of Epidemic Disease based on sentiment analysis of the Data. This can help the health sector and people to take precautions and care. The prediction will be done by analyzing the spread based on the movement of the disease through the population. It will be implemented using Machine Learning techniques to predict the spread in particular geographical regions.

1.2 Project Scope

In order to predict the spread of this disease, which is responsible for causing about half a million deaths per year, we are developing this model. Predicting the spread of Epidemic can enable the residents of at risk areas to take precautions against contracting the disease and be a step towards reducing the number of cases per year.

1.3 Project Goals and Objectives

1.3.1 Goals

a. To provide better user interface.

b. To provide flexible system to user.

c. To provide more functionalities to user.

d. To provide a solution that would assist users to Predict and Detect Epidemic and take Precautions.

e. Target Large Audience and provide Benefits to them.

f. User can use it from anywhere through mobile or computer.

1.3.2 Objectives

The epidemic disease had become the most dangerous disease for the 21 st Century. The infectious disease had still gone through the outbreaks despite of the modern medical treatment.Model of modern medical treatment has had turned far side due to the epidemic disease dissemination factors such as the increase of population density and the speedy outbreaks of new infectious diseases. health

In this model, we propose a predictive model to predict the status of the epidemic in the specific region. For the experimental purpose, we collect the data from twitter.

1.4 Organization of Report

The report is organized as follows : The introduction is given in Chapter 1. It describes the fundamental terms used in this project. It describes the Goal, Objectives and scope of this project. The Chapter 2 describes the review of the relevant various techniques in the literature systems. It describes the pros and cons of each technique with how to overcome those cons using new technology.

The project planning includes members and capabilities of this project ,roles and responsibilities of each member,Budget of Project and Project timeline is describe in Chapter 3. The Chapter 4 describes Functional and Nonfunctional Requirements of project.Along with this it also explain features of system and constraints of system.

The Chapter 5 includes Design Information with Class Diagram, Sequence Diagram , Component Diagram and System Architecture. Implementation of each module is explained in Chapter 6. Chapter 7 shows final Test Cases and Test Results. Chapter 8 includes Screenshot of outputs and Conclusion and Future Scope of Project is described in Chapter 9.

Chapter 2

Literature Survey

2.1 Epidemic Outbreak Prediction Using Artificial Intelligence

The paper [1] proposed that Epidemic diseases are Infectious and communicable disease that can be possibly escalate into entire area or city if contagious measurement had reached the outburst level. There are well known epidemic diseases like Cholera, in- fluenza, Bird Flu ans many more.In this paper the approach is to predict the disease prone area using the power of Text Analysis and Machine learning. Epidemic Model use the analysis and provide us a probability score of the spread and analyse the epidemic spread-out. It has used Twitter API for extracting various tweets and then sentiment analysis is applied. For storing the tweets which are extracted from Twitter API , HDFS(mongoDB) has been used. For implementation, they have used words-n grams, words embedding with various deep learning algorithms.

2.1.1 Advantages of Paper

a. It uses a map to show where the diseases can spread.

b. It consists of N-numbers of diseases.

c. Cloud Storage for large amount of Data.

2.1.2 Disadvantages of Paper

a. No Updation of Databases.

b. No prevention of diseases.

2.1.3 How to overcome the problems mentioned in Paper

a. Model update the Database daily for Analysis.

b. It also provide prevention,list of medicines and helpline numbers.

2.2 Deep Learning for Epidemiological Predictions

The paper [2] proposed a present monthly analysis of epidemic diseases using the map of the US with ILI Activity level. It has proposed a deep learning framework for predicting epidemiological profiles from the perspective of time series. Various time series models such as autoregressive model(AR), Gaussian Process Regression(GPR) has been used. This approach tries to improve the performance consistently compare to mostly used linear and non-linear methods on various datasets. They have prepared 3 real-world datasets [2]. Ablation tests are performed on datasets and the results are shown in RMSE. It has a CNN module to take information across different sources. CNN module to catch the dependencies that are time related in the data and Residual module to overcome overfitting issues. This Model is applied on Data sets which consist of country i.e Japan-prefectures, US-region

2.2.1 Advantages of Paper

a. It consist of ILI Activity level which help user to analyzed the level of diseases.

b. User can download the image of map or data

c. It consist of map which show mostly update of epidemic diseases.

2.2.2 Disadvantages of Paper

a. This Application doesn't show analysis of specific diseases

b. No prevention of diseases shown.

c. Updation of Database is done weekly.

2.2.3 How to overcome the problems mentioned in Paper

a. It will show the Graphical mapping View of Disease.

b. It also provide prevention,list of medicines and helpline numbers.

c. Updation of Database is done on daily bases.

2.3 Epidemic Prediction

This paper presents a proposed system which will predict the spread of influenza an infectious disease. The prediction will be done by analyzing the spread based on the movement of disease through population. It will also consider environmental factors. It will be implemented using Support Vector Machine, Artificial neural network and other Machine Learning Algorithms. They will use past outbreak data from FluNet to train the model.

2.3.1 Advantages of Paper

a. Predictions are more accurate as this system are specific to a particular disease.

b. It uses data from FlueNet(WHO based influenza surveillance).So the accuracy of data is more.

c. It also considesr climate changes and other environmental factors.

2.3.2 Disadvantages of Paper

a. It doesn't show spread of epidemic diseases.

b. It is just a warning system, No prevention is given.

2.3.3 How to overcome the problems mentioned in Paper

a. It will show the Graphical mapping View of Disease.

b. It also provide prevention,list of medicines and helpline numbers.

c. Updation of Database is done on daily basis.

2.4 Technical Review

Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed. Machine learning focuses on the development of computer programs that can access data and use it learn for themselves.Sentiment analysis is basically concerned with analysis of emotions and opinions from text. We can refer sentiment analysis as opinion mining. Social media contain huge amount of the sentiment data in the form of tweets, blogs, and updates on the status, posts, etc. Sentiment analysis of this largely generated data is very useful to express the opinion of the mass.

There are a few ways to collect tweets from Twitter. You can use the Twitter API but the Twitter API limits the number of tweets you can collect. You can manually scrape the tweets you want but this can be time consuming. Another option is to use Twint. Twint is a tool that allows you to scrape Tweets off of Twitter that fit inputted requirements. Twint allows you to search and scrape tweets that contain certain words or phrases, tweets published by specific accounts, tweets within a certain time frame and much more.

2.4.1 Advantages of Technology

a. Sentiment analysis finds and justifies the sentiment of the person with respect to a given source of content

b. Machine Learning can review large volumes of data and discover specific trends and patterns that would not be apparent to humans. For instance, for an e-commerce website like Amazon, it serves to understand the browsing behaviors and purchase histories of its users to help cater to the right products, deals, and reminders relevant to them. It uses the results to reveal relevant advertisements to them.

c. ML algorithms have the ability to improve over time.

2.4.2 Reasons to use this Technology

a. Sentiment analysis is extremely useful in social media monitoring as it allows us to gain an overview of the wider public opinion behind certain topics.So it can analyze the sentiments of tweets.

b. Twint allows you to search and scrape tweets that contain certain words or phrases, tweets published by specific accounts, tweets within a certain time frame and much more.

c. Machine learning can predict the epidemic diseases by using past data and predict future outbreaks.

Chapter 3

Project Planning

3.1 Members and Capabilities

Table 3.1: Table of Capabilities

SR. No	Name of Member	Capabilities
1	Ayan Poonawala	Django, UI Design
2	Salman Ansari	Machine learning, Backend, Data Collection
3	Sahil Sakharkar	Frontend, UI

Work Breakdown Structure

a. All of the members are equally important in developing the project.

b. We work on a different part of the project based on one's capability.

c. Firstly we came up with documentation, And based on the documentation we set our goal and created a blueprint.

d. We then started going hands-on with the project to develop it according to the flow as decided earlier.

3.2 Roles and Responsibilities

Table 3.2: Table of Responsibilities

SR. No	Name of Member	Role	Responsibilities
1	Ayan Poonawala	Team Leader	UI Design, Django Model
2	Salman Ansari	Backend	Text Mining , Ml Model
3	Sahil Sakharkar	Embedding System	Frontend Developing, Integrating System

3.3 Assumptions and Constraints

a. User of the app Should know how to use browser and Internet

b. User of the app should know how to read stats of various Diseases.

3.4 Project Management Approach

a. Planning of project.

b. Defining the scope of the project.

c. Estimation of time and It's management.

d. Creating Gantt Charts and properly assigning tasks to members.

e. Reporting the progress of project with the guide.

3.5 Ground Rules for the Project

a. Properly planning and gathering relevant information is very important.

b. Developing a Blueprint of the project and work accordingly.

c. All the members should report to the guide whenever required

d. Setting up small goals every week.

e. Achieving the small goal within that span of time.

f. Keeping tracks of the progress towards project.

g. Participate in meeting.

h. Inform the leader about unavailability.

3.6 Project Budget

a. It is a light project.

b. Cost of the project is very low and efficient.

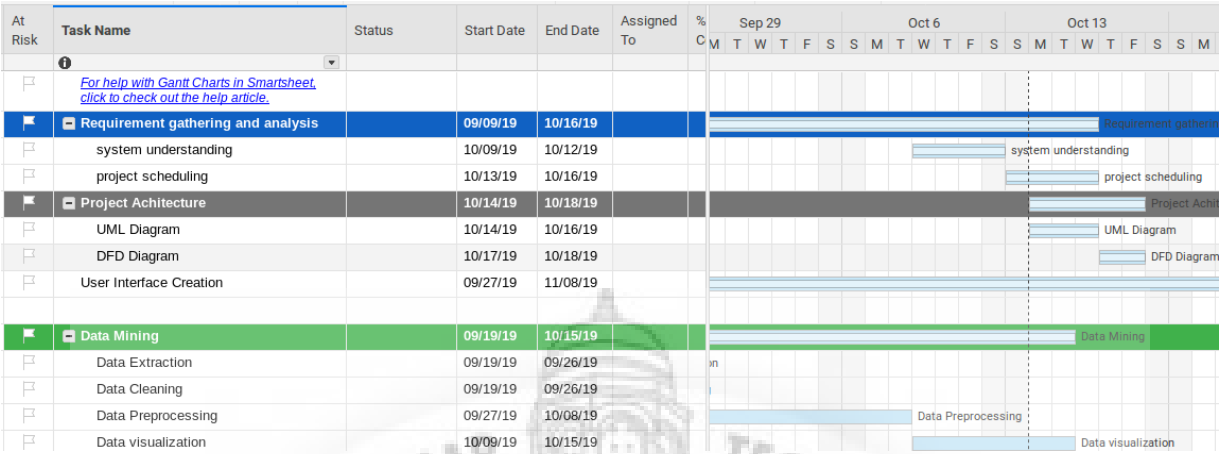
c. The cost of Cloud Would add in future scope of project

d. Python Programming Language(Open Source)

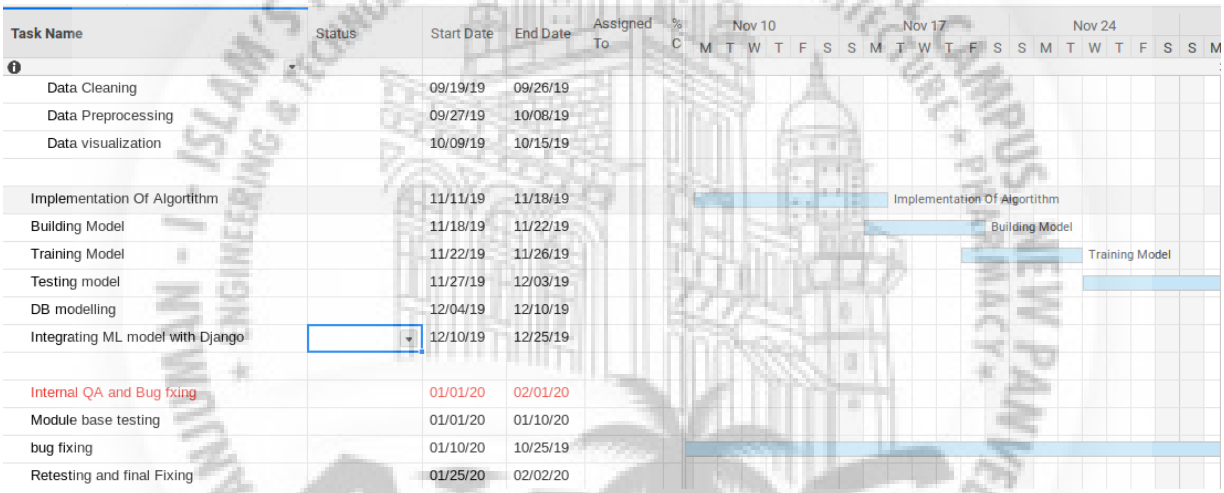
e. MySQL : Open Source

f. Frame Work : Django(Open Source)

3.7 Project Timeline



At Risk	Task Name	Status	Start Date	End Date	Assigned To	% C
	For help with Gantt Charts in Smartsheet, click to check out the help article.					
	Requirement gathering and analysis		09/09/19	10/16/19		
	system understanding		10/09/19	10/12/19		
	project scheduling		10/13/19	10/16/19		
	Project Achitecture		10/14/19	10/18/19		
	UML Diagram		10/14/19	10/16/19		
	DFD Diagram		10/17/19	10/18/19		
	User Interface Creation		09/27/19	11/08/19		
	Data Mining		09/19/19	10/15/19		
	Data Extraction		09/19/19	09/26/19		
	Data Cleaning		09/19/19	09/26/19		
	Data Preprocessing		09/27/19	10/08/19		
	Data visualization		10/09/19	10/15/19		



Task Name	Status	Start Date	End Date	Assigned To	% C
Data Cleaning		09/19/19	09/26/19		
Data Preprocessing		09/27/19	10/08/19		
Data visualization		10/09/19	10/15/19		
Implementation Of Algortithm		11/11/19	11/18/19		
Building Model		11/18/19	11/22/19		
Training Model		11/22/19	11/26/19		
Testing model		11/27/19	12/03/19		
DB modelling		12/04/19	12/10/19		
Integrating ML model with Django		12/10/19	12/25/19		
Internal QA and Bug fixing		01/01/20	02/01/20		
Module base testing		01/01/20	01/10/20		
bug fixing		01/10/20	10/25/19		
Retesting and final Fixing		01/25/20	02/02/20		

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Chapter 4

Software Requirements Specification

4.1 Overall Description

4.1.1 Product Perspective

The product is an open source. It is a web-app based system. This web based app provide service to local user to detect the local emerging epidemic diseases in the particular region with the use of Machine Learning. This System is independent from other third party application. The main outcome of the app is to proposed to create awareness of epidemic in a country by fetching information from social media. we create a model to detect the disease areas. This Information would further given to the government and NGOs to help affected people. The text analysis and sentiment analysis will help to find the required data from social media and this data helps to provide the probability score of an Outbreak of Epidemic of particular areas

4.1.2 Product Features

There are three major features in this system.
Basic Homepage which consist of basic details of diseases information and their precautions and symptoms along with helpline search option which shows various helplines across the country.
Map View Feature acts as a main feature of the Project. Which shows various epidemic spread in map of our country.
Covid-19 tracker is also a Feature Added which shows live tracking of confirmed cases of COVID-19 through out the country

4.1.3 User Classes and Characteristics

The Project is web based project and a social project which help user to detect the upcoming epidemic and enable the resident of risk area to take precautions against the contracting diseases. This Project is proposed to create awareness of epidemic in a country by fetching information from social media.

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4.1.4 Operating Environment

Software Requirements

- OPERATING SYSTEM:Windows,Linux.
- python3,Django,html5,css3,JavaScript.
- Jupyter Notebook.
- visual studio,sublime editor.
- Databases : MYSQL Server
- WebServer : XAMP,LAMP
- Browser : Mozilla,Chrome etc

Hardware Requirements

- Specification Processor :Intel core i3 and above and other processor
- RAM :3GB

4.1.5 Design and Implementation Constraints

The Application is Pure Web-based application. GUI is simple and easy which make user to access the application easily and efficiently. This system focuses one of the features at time.

4.2 System Features

Map View is one of the main feature of the system. There is an urge of apprehending the inter play between the epidemic unwinding and awareness dispersal in time varying networks. The output will be presented state wise on a country map. The state which has an epidemic will be highlighted. In the case of non-epidemic if some areas have diseases the map will also show the affected area. All in one it reduces time and information is modified on a daily basis which makes data more accurate.

4.2.1 Map View

Map View Feature acts as a main feature of the Project. Which shows various epidemic spread in map of our country Covid-19 tracker is also a Feature Added. Which shows live tracking of confirmed cases of COVID-19 through out the country

Description and Priority

Map View is one of the main feature of the system. The output will be presented state wise on a country map. The state which has an epidemic will be highlighted. In the case of non-epidemic if some areas have diseases the map will also show the affected area.

Stimulus/Response Sequences

Stimulus:User clicks the map of the country
Response:Details expansion of various state in table form open.
Stimulus:User clicks on various state by hovering through state color.
Response:Respective state table open with cities in it.
Stimulus:User can Click on new Menu Covid-19 tracker.
Response:New window open which shows Live COVID-19 Tracker in various state through Live data. .

Functional Requirements

REQ-1: Access to the Databases
REQ-2: Access to Internet and Browser.

4.3 External Interface Requirements

4.3.1 User Interfaces

The application is pure web based Application. GUI is very simple. Home page consist of basic info of various diseases and their prevention and symptoms. Header Menu Consists of various working tasks. i.e View Helplines, Contact, Map View. In View Helplines we can search various health helplines in India. Map view is the window where the main functionality of the project held in which they show various spread of the disease in India's Map. and also show Online COVID-19 Tracker.

4.3.2 Hardware Interfaces

Since this application is Pure Web based it doesn't required any special Hardware Interfaces.

4.3.3 Software Interfaces

This software uses different libraries. NLTK library is used to sentiment analysis of the text and data available which gives the Polarity of the data. Django Python

web framework is used to design web with interconnection with Python. Twint API and Official Twitter API is used to extract the Data. Database(SQL) is maintained to store the polarity data after Machine learning process and also use it to match while performing the task. OS support also needed.

4.3.4 Communications Interfaces

The Product is a light web-app, there is no such large communication in the system. Only Databases access, that also done locally. Also https standard is used in-order to gain the access to the browser.

4.4 Nonfunctional Requirements

4.4.1 Performance Requirements

Performance of overall system is very efficient and well optimize. The time taken to Show various diseases in map would take 3-5 sec as it has Machine Learning in it. Process and everything is well organized. The COVID-19 online tracker also take approx 3-4 sec to show in map.

4.4.2 Safety Requirements

This system does not contain any critical data. Still it provided basic security aspects. The databases that are accessed are locally executed.In case of any updates in libraries used can lead to the failure in systems.

4.4.3 Security Requirements

All the Libraries used are certified and standard as well as all the framework provide basic security to the system. There is no Critical data in System. Although data stored in Databases with encryption.

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Chapter 5

System Design

5.1 System Requirements Definition

System requirement definitions specify what the system should do, its functionality and its essential and desirable system properties. The techniques applied to elicit and collect information in order to create system specifications and requirement definitions involve consultations, interviews, requirements workshop with customers and end users. The objective of the requirements definition phase is to derive the two types of requirement:

5.1.1 Functional requirements

They define the basic functions that the system must provide and focus on the needs and goals of the end users.

Use-case Diagram

A use case diagram at its simplest is a representation of a user's interaction with the system that shows the relationship between the user and the different use cases in which the user is involved.

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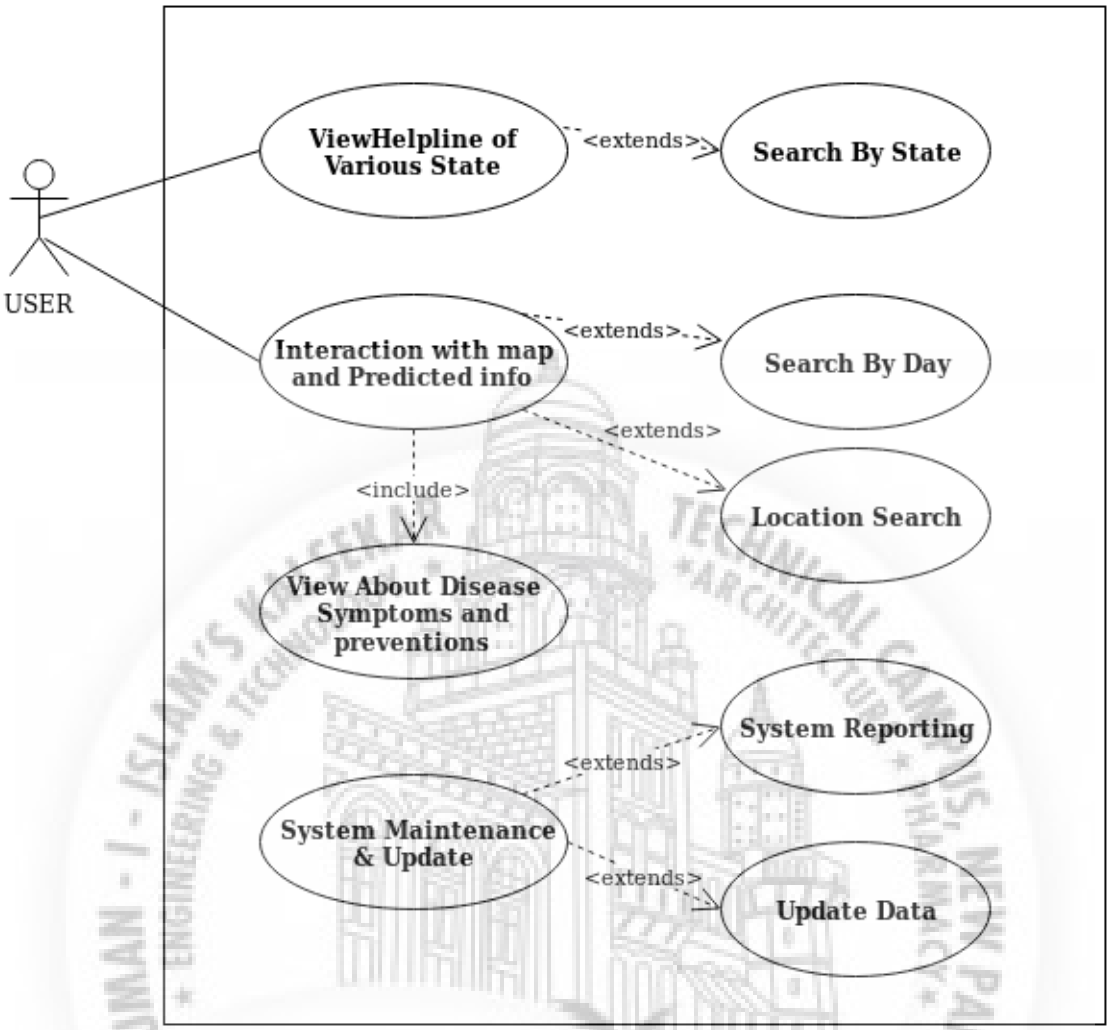

Figure 5.1: Usecase

Data-flow Diagram

A data-flow diagram is a way of representing a flow of a data of a process or a system. The DFD also provides information about the outputs and inputs of each entity and the process itself. Given below is Level 0 Level 1 and Level 2 DFD of system.

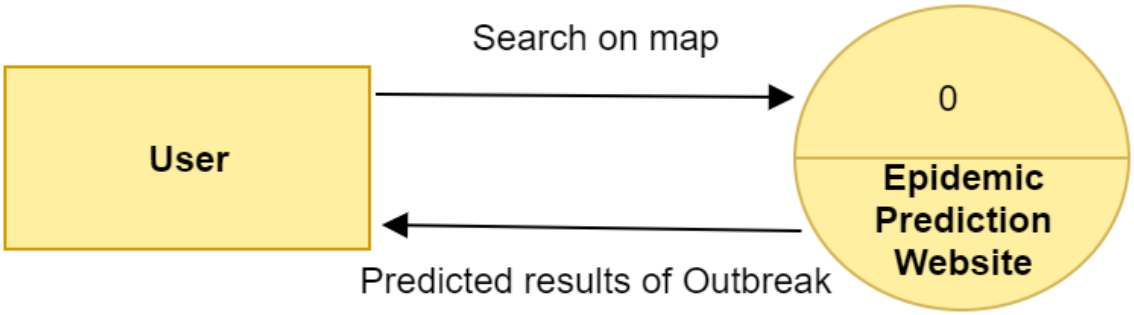

Figure 5.2: DFD level 0

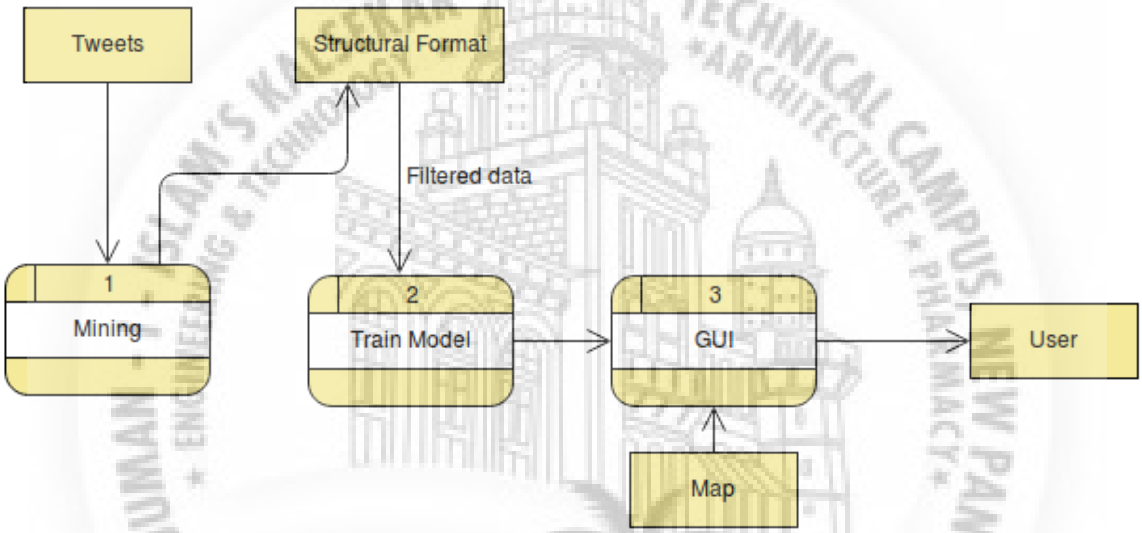

Figure 5.3: DFD level 1

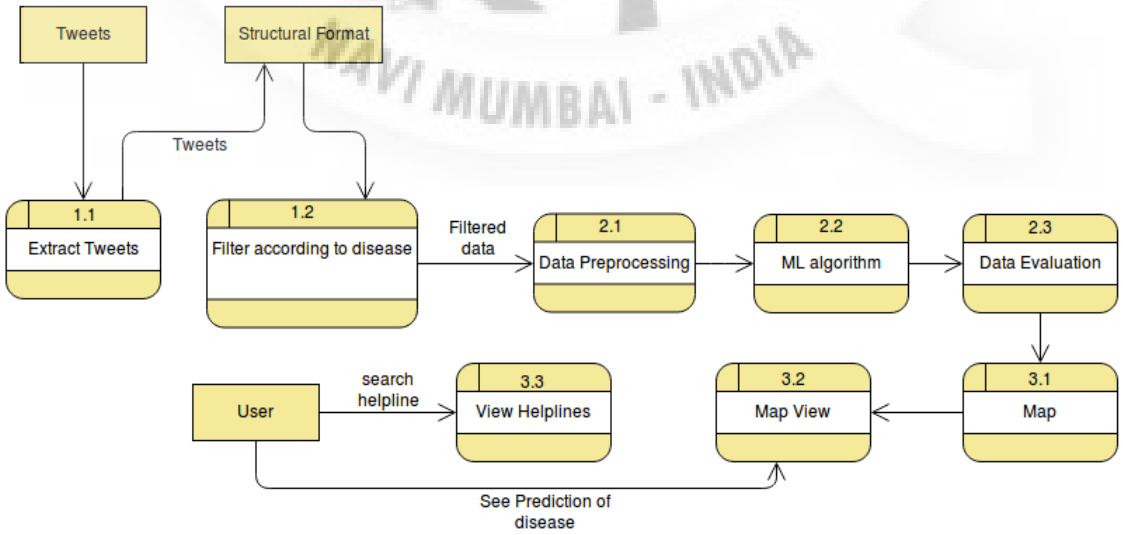

Figure 5.4: DFD level 2

5.1.2 System requirements (non-functional requirements)

These are non-functional system properties such as availability, performance and safety etc. They define functions of a system, services and operational constraints in detail.

a. Usability - Application implementation is feasible using technologies that are accessible to the end-users.

b. Portability - The interfaces are compatible with Web View and Mobile view.

c. Performance Efficiency -Application is able to perform well in a proper time constraint.

d. Multi User System -Application is able to consider the presence of more than one user in the same environment. All the features of the system operates properly for all users and provides proper transparency.

e. Time Efficiency - Time taken for the executing of system is less.

5.2 System Architecture Design

A system architecture is the conceptual model that defines the structure, behavior, and more views of a system. An architecture description is a formal description and representation of a system, organized in a way that supports reasoning about the structures and behaviors of the system.

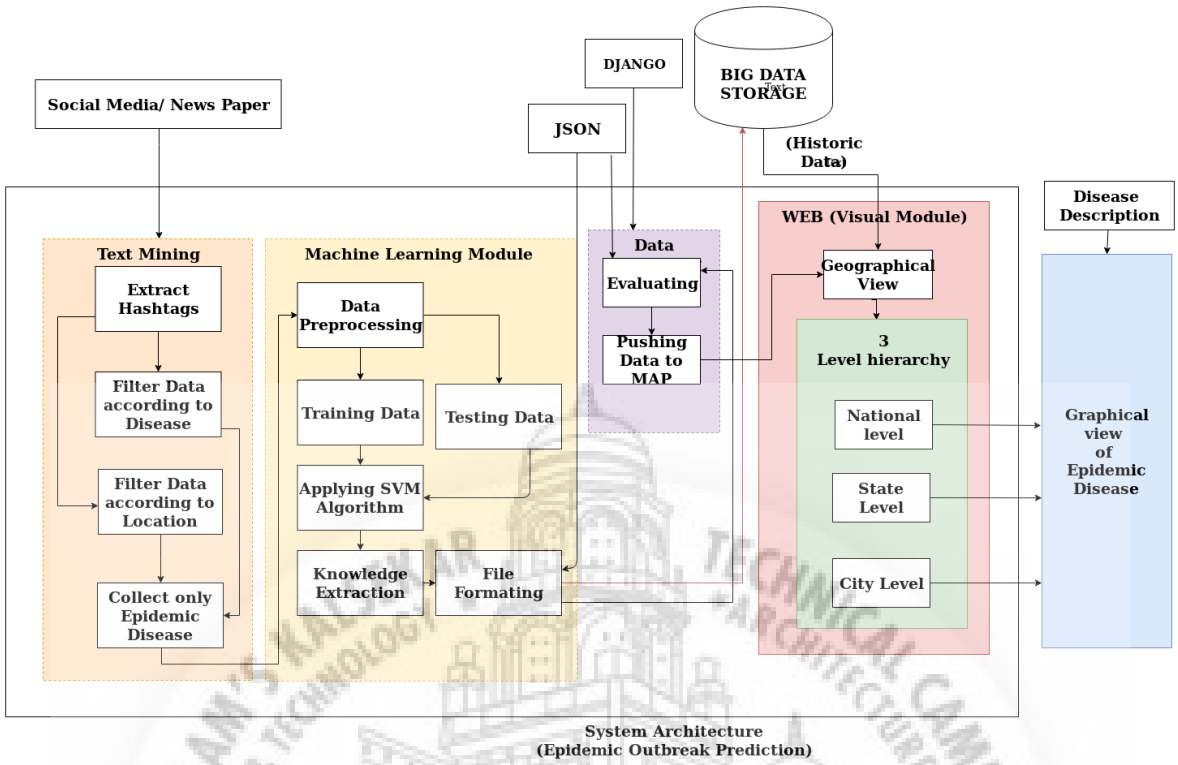

Figure 5.5: System Architecture

5.3 Sub-system Development

This System consist of overall three Modules Text Mining, Machine Learning Module, Web Module. The input to the Text Mining module is extracted data and tweets of various diseases extracted from twitter via Twint and Twitter API. In which this further get filter accordingly. The next module i.e Machine Learning Module takes that data done pre-processing of that data and try to extract some knowledge from that data by applying NLTK algorithm and Sentiment Analysis. After Gaining Knowledge our Third Web Module is used to represent that data into Web format by using Python web framework Django.

5.3.1 Text Mining

This the core module of project in which we are extracting various hashtags and disease name from twitter and newspaper websites. Also we will collect location tag from there region.

Text Mining Flow Diagram or Modular Diagram

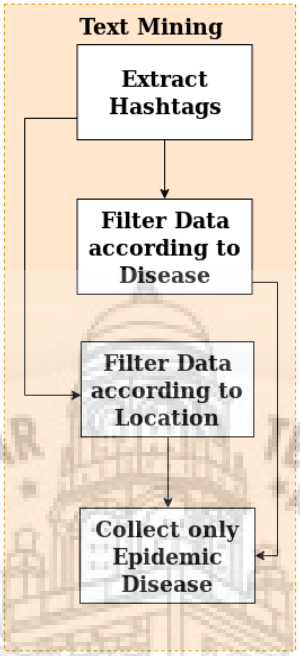

Figure 5.6: Text Mining And Data Pre-processing

5.3.2 Machine Learning Module

This is where we will try to gain some knowledge from our extracted data. We are going to use SVM (Support Vector Machine) and NLTK to classify the epidemic disease which are currently viral in particular region.

Machine Learning Module Flow Diagram or Modular Diagram

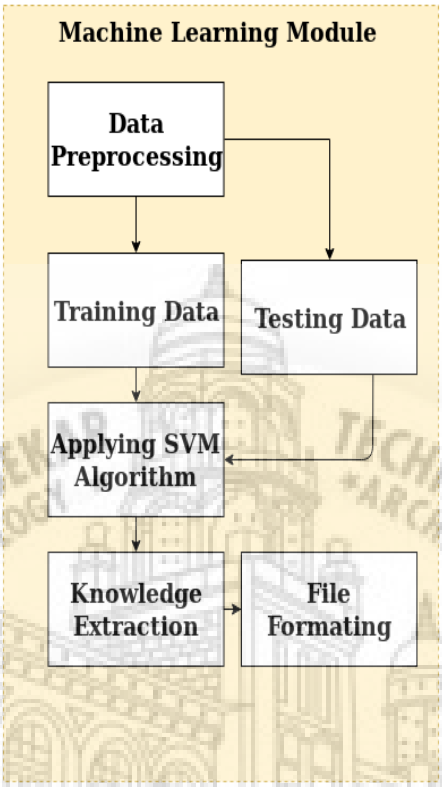

Figure 5.7: ML Model

5.3.3 Django

Django is a high-level Python web framework that enables rapid development of secure and maintainable websites. Built by experienced developers, Django takes care of much of the hassle of web development, so you can focus on writing your app without needing to reinvent the wheel. It is free and open source, has a thriving and active community, great documentation, and many options for free and paid-for support.Django is the one of framework of python which is use to connect machine learnig model from web application.

5.3.4 Web Module

After gaining epidemic disease from mining and knowledge gain from it we can represent that data into map by means of 3 level of hierarchy i.e National wise, State wise, city wise.

Web Module Flow Diagram or Modular Diagram

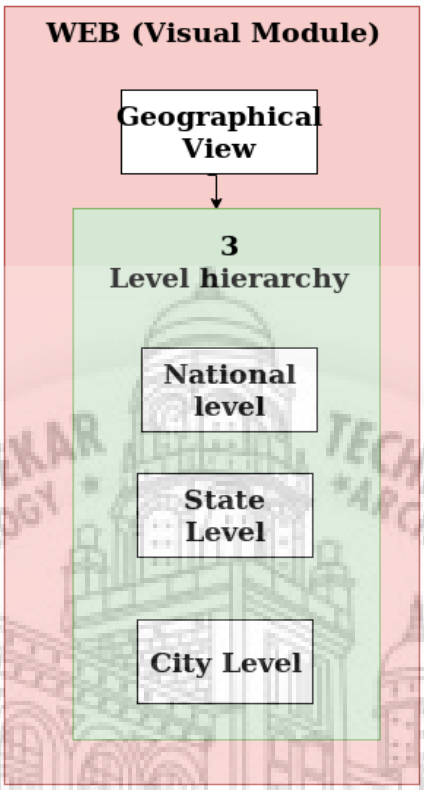

Figure 5.8: Web Module

5.4 Systems Integration

System integration (SI) is an engineering process or phase concerned with joining different subsystems or components as one large system. It ensures that each integrated subsystem functions as required. Different Sub-Modules Integrated in one full System. SI is also used to add value to a system through new functionalities provided by connecting functions of different systems.

5.4.1 Class Diagram

A class diagram in the Unified Modeling Language is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations, and the relationships among objects.

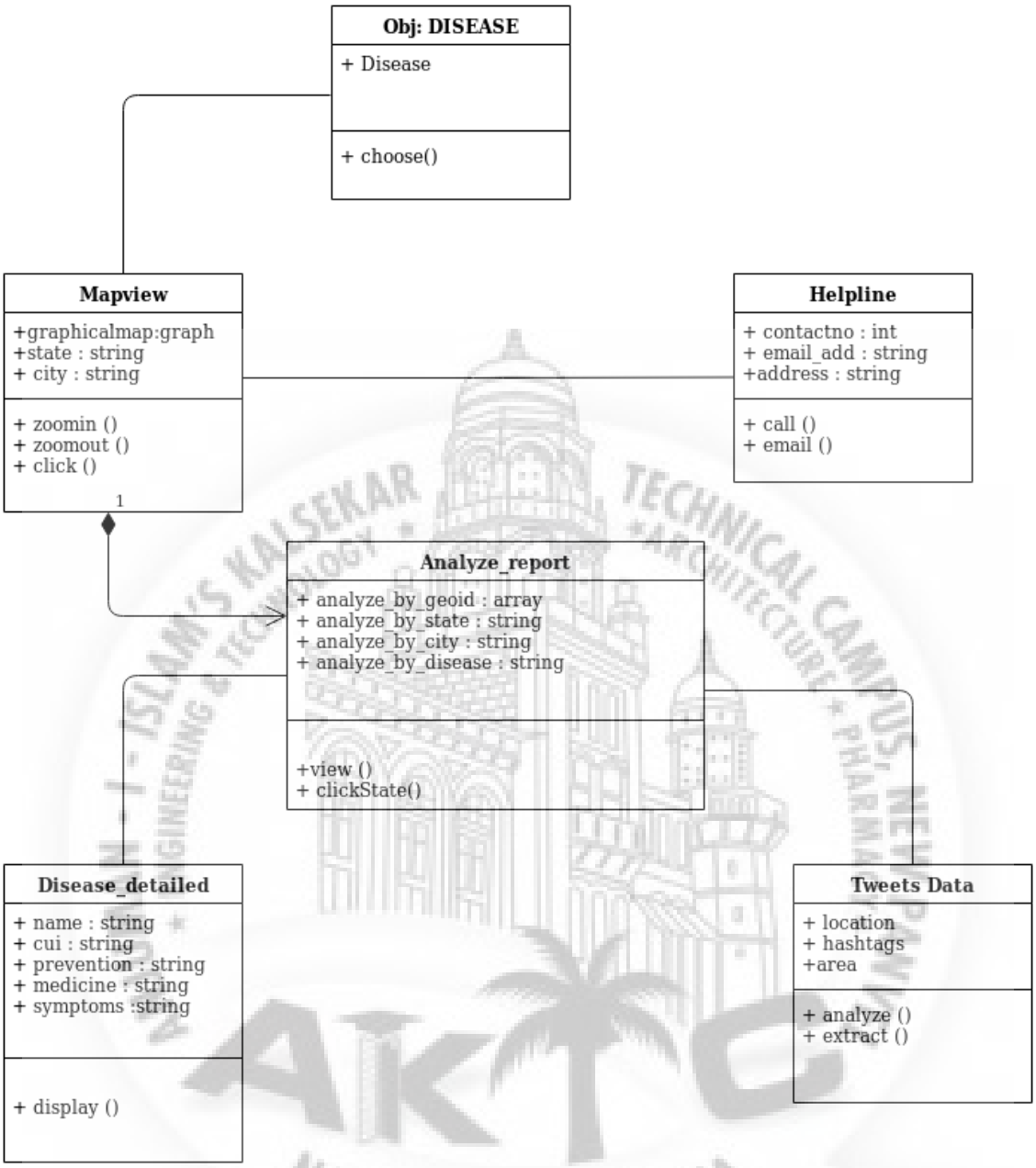

Figure 5.9: Class Diagram

5.4.2 Sequence Diagram

A sequence diagram shows object interactions arranged in time sequence. It depicts the objects and classes involved in the scenario and the sequence of messages exchanged between the objects needed to carry out the functionality of the scenario.

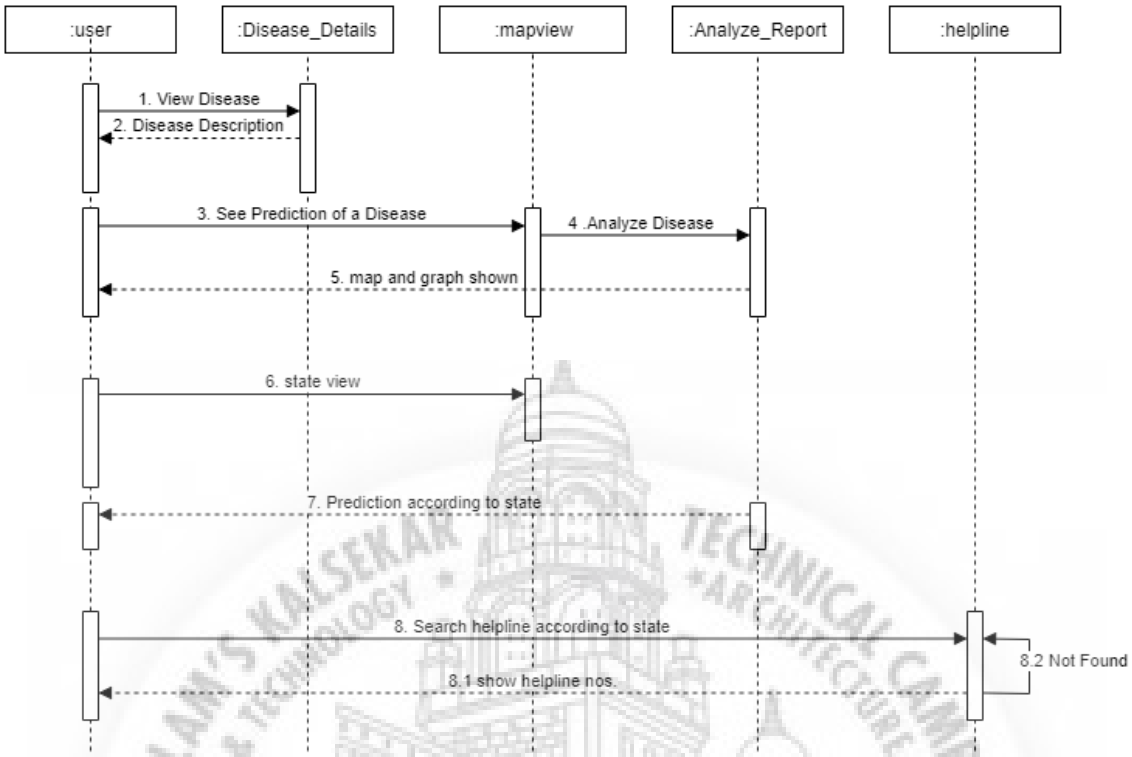

Figure 5.10: Class Diagram

Chapter 6

Implementation

6.1 Text Mining and Machine Learning

This module of project in which we are extracting various hashtags and disease name from twitter using twitter API and Twint Commands.

In this module we will try to gain some knowledge from our extracted data. We are going to use SVM (Support Vector Machine) and NLTK to classify the epidemic disease which are currently viral in particular region.

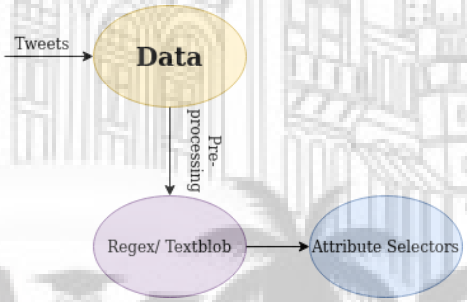

Figure 6.1: Text Mining and Attribute Selecion

Twint data extraction query example

```
twint -s getwellsoonmodia --near 'Mumbai' --since 2019-10-07 -o file1.csv --csv

 twint -s '#dengue' --until 2019-04-15 --since 2019-01-01 -o dengue3.csv --csv

twint -s '#influenza' --until 2019-10-01 --since 2018-01-01 -o influenza.csv --
    csv

twint -s '#dengue' --until 2019-10-01 --since 2018-01-01 -o denguee.csv --csv



twint -s '#malaria' --until 2019-10-01 --since 2018-01-01 -o malaria.csv --csv

twint -s '#malaria #dengue' --until 2019--12-01 --since 2018-01-01 --lang 'en'
    --near 'india' --location -o tryyxy.csv --csv
```

Data Pre-Processing

```

@author: salman
"""
import pandas as pd
data =pd.read_csv("dengue.csv")
salman=data.loc[:,['date','tweet','hashtags']]
salman.to_csv("dengue2018.csv")

######################
#hashtag

@author: salman
"""

import re
import pandas as pd
data = pd.read_csv('data.csv', encoding = 'unicode_escape')
s = "I love #stackoverflow because #people are very #helpful!"
re.findall(r"#(\w+)", s)

for i in range(data.shape[0]):
    s = data['tweet'][i]
    hashtag = re.findall(r"#(\w+)", s)
    data['hashtag'][i] = hashtag

###################################
#concate_csvfile.py

@author: salman
"""
import pandas as pd
names = ["dengue.csv", "dengue2018.csv", "denguuuu.csv", "indluenza2018.csv", "
    malaa.csv", "malaria.csv"]
final_data_csv = pd.DataFrame(columns = ["",'date','tweet','hashtags','place'])

for name in names:

    data = pd.read_csv(name)
    sample = data.loc[:,['date','tweet','hashtags','place']]
    #sample.to_csv(name.split('.')[0] + "Final.csv", index = False)
    final_data_csv = pd.concat([final_data_csv, sample], axis = 0)
final_data_csv.to_csv("Final_data.csv", index = False)
```

Machine Learning NLTK- Polarity

```
@author: salman
"""
import pandas as pd
from textblob import TextBlob
from textblob.sentiments import NaiveBayesAnalyzer
import re

def clean_tweet(tweet):
    return ' '.join(re.sub("(@[A-Za-z0-9]+)|([^0-9A-Za-z \t])|(\w+:\/\/\S+)", "
        ", tweet).split())

data = pd.read_csv('Final_data_with_location.csv')
data['polarity'] = 'NaN'
data = data.values

for i in range(data.shape[0]):
    text = data[i][1]
    analysis = TextBlob(clean_tweet(data[i][1]), analyzer=NaiveBayesAnalyzer())
    pol = analysis.sentiment.classification
    print(pol)
    data[i][5] = pol

data = pd.DataFrame(data)
data.rename(columns = {
        '0': "date",
        '1': "tweet",
        '2': "hashtags",
        '3': "city",
        '4': "state",
        '5': "polarity"
        }, inplace = True)
data.to_csv("Final_data_with_location_and_polarity.csv")
```

Mapping Polarity with various states

```
# -*- coding: utf-8 -*-

import pandas as pd
import numpy as np
import ast

data = pd.read_csv('data.csv', encoding = 'unicode_escape')
data['hashtag'] = data.hashtag.apply(lambda s: list(ast.literal_eval(s)))
cities = list(data['city'].unique())
for i in range(2):
    cities.pop()

polar = []
epi_check = {}
for city in cities:
    dengue_count = 0
    malaria_count = 0
    influenza_count = 0
    zika_count = 0
    chiken_count = 0
    other = 0
    check =  data.loc[data['city'] == city]
    pos = check.loc[check['polar'] == 'pos'].shape[0]
    neg = check.loc[check['polar'] == 'neg'].shape[0]
```

```
    lst = list(check['Unnamed: 0'])
    for i in lst:
        if ('malaria' in check['hashtag'][i] or 'Malaria' in check['hashtag'][i
            ]):
            malaria_count += 1
        if ('zika' in check['hashtag'][i] or 'Zika' in check['hashtag'][i] or '
            ZikaVirus' in check['hashtag'][i] or 'zikavirus' in check['hashtag'
            ][i]):
            zika_count += 1
        if ('dengue' in check['hashtag'][i] or 'Dengue' in check['hashtag'][i]):
            dengue_count += 1
        if ('chicungunya' in check['hashtag'][i] or 'Chicungunya' in check['
            hashtag'][i]):
            chiken_count += 1
        if ('influenza' in check['hashtag'][i] or 'Influenza' in check['hashtag'
            ][i]):
            influenza_count += 1
        else:
            other += 1
    total = pos + neg
    pos = int(((pos + neg) * 30)/100)

    if(pos < neg):
        polar.append('Epedimic')
        x = 'Epedimic'
    else:
        polar.append('Non Epedimic')
        x = 'Non Epedimic'

    print(city + "------>" + x, pos, neg, malaria_count, dengue_count ,
        influenza_count , zika_count)
```

6.2 Web and Django Module

This module is implemented using Python programming language and Django framework for web Development.Following are the python packages used :

Django is a high-level python web framework that enables to use python and machine learning in web development. In this module after gaining knowledge from the extracted data and machine learning we represent that data into map my means of 3 level hierarchy . i.e National wise, State Wise, City Wise.

Figure 6.2: Web Module

View.py

```
  from django.http import HttpResponse
from django.shortcuts import render
from django.views.generic import ListView
from .models import City
from django.db.models import Q
import os
from .twitter import *
from django.http import JsonResponse
from operator import itemgetter
from .models import City
from .models import Epi
from .models import All
from django.views.decorators.csrf import csrf_exempt
from rest_framework.decorators import api_view
import csv


import pandas as pd
import numpy as np
import ast
```

```
import requests
from bs4 import BeautifulSoup
from tabulate import tabulate
import os
import numpy as np
import matplotlib.pyplot as plt
import time,datetime
import os
import schedule
import pandas as pd
from textblob import TextBlob
from textblob.sentiments import NaiveBayesAnalyzer
import re
from django.core.exceptions import MiddlewareNotUsed
from django.conf import settings

# Create your views here.
def home(request,*args, **kwargs):
    return render(request,"index.html",{})


def about(request,*args, **kwargs):
    return render(request,"about.html",{})

def contact(request,*args, **kwargs):
    return render(request,"contact.html",{})

def helpline(request,*args, **kwargs):
    return render(request,"helpline.html",{})

def covid2():
    state=[]
    total_confirmed_case=[]
    cured=[]
    death=[]
    replacer = lambda row: [x.text.replace('\n', '') for x in row]
    URL = 'https://www.mohfw.gov.in/'
    response = requests.get(URL).content
    soup = BeautifulSoup(response, 'html.parser')
    header = replacer(soup.tr.find_all('th'))
    datas = []
    all_rows = soup.find_all('tr')

    for row in all_rows:
        stat = replacer(row.find_all('td'))
        if stat:
            datas.append(stat)
    datas.remove(datas[-1])
    datas[0][1] = 'A&N Islands'
    header[2] ='Total Confirmed cases'
    header[0] = 'SR.NO'
    datas.remove(datas[-1])

    datas[-1].insert(1,'')
    print(datas)
    for act in datas:
        state.append(act[1])
        total_confirmed_case.append(act[2])
        cured.append(act[3])
        death.append(act[4])
    total_num = datas[-1]
```

```
    datas.remove(datas[-1])
    state_data = pd.DataFrame(data = datas, columns = header)
    state_data['Total Confirmed cases'] = state_data['Total Confirmed cases'].
        map(int)
    state_data['Cured/Discharged/Migrated'] = state_data['Cured/Discharged/
        Migrated'].map(int)
    state_data['Death'] = state_data['Death'].map(int)
    b=sorted(state_data['Total Confirmed cases'],reverse=True)
    maxx=b[0]
    group_size = [sum(state_data['Total Confirmed cases']),sum(state_data['Cured
        /Discharged/Migrated']),sum(state_data['Death'])]
    group_labels = ['Total Confirmed cases\n' + str(sum(state_data['Total
        Confirmed cases'])),'Cured/Discharged/Migrated\n' + str(sum(state_data['
        Cured/Discharged/Migrated'])),'Death\n' + str(sum(state_data['Death']))]
    custom_colors = ['blue','green','red']
    plt.figure(figsize = (10,3))
    plt.pie(group_size, labels = group_labels, colors = custom_colors)
    central_circle = plt.Circle((0,0), 0.5, color = 'white')
    fig = plt.gcf()
    fig.gca().add_artist(central_circle)
    plt.rc('font', size = 8)
    fig.savefig('static/diagram.png')
    return datas,header,total_num,state_data,maxx

def total_case():

    replacer = lambda row: [x.text.replace('\n', '') for x in row]
    URL = 'https://www.mohfw.gov.in/'
    response = requests.get(URL).content
    soup = BeautifulSoup(response, 'html.parser')
    header = replacer(soup.tr.find_all('th'))
    case=['ACTIVE CASE','CURED','DEATHS','MIGRATED']
    detail = soup.find_all('div',{"class":'site-stats-count'})
    for de in detail:
        strong = replacer(de.find_all('strong'))
    total_case = strong[0]
    total_cured = strong[1]
    total_death = strong[2]
    cur_time = datetime.date.today()
    return strong,case


def data_R():
    data = pd.read_csv('data/dataR.csv' , encoding = 'unicode_escape')
    data['hashtag'] = data.hashtag.apply(lambda s: list(ast.literal_eval(s)))
    states = list(data['state'].unique())
    print(states)
    for i in range(2):
        states.pop()

    polar = []
    epi_check = {}

    for state in states:
        dengue_count = 0
        malaria_count = 0
        influenza_count = 0
        zika_count = 0
        chiken_count = 0
        other = 0
        dict1=[]
```

```
        check =  data.loc[data['state'] == state]
        pos = check.loc[check['polar'] == 'pos'].shape[0]
        neg = check.loc[check['polar'] == 'neg'].shape[0]
        lst = list(check['Unnamed: 0'])
        for i in lst:
            if ('malaria' in check['hashtag'][i] or 'Malaria' in check['hashtag'][i]):
                malaria_count += 1
            if ('zika' in check['hashtag'][i] or 'Zika' in check['hashtag'][i] or 'ZikaVirus' in check['hashtag'][i] or 'zikavirus' in check['hashtag'][i]):
                zika_count += 1
            if ('dengue' in check['hashtag'][i] or 'Dengue' in check['hashtag'][i]):
                dengue_count += 1
            if ('chicungunya' in check['hashtag'][i] or 'Chicungunya' in check['hashtag'][i]):
                chiken_count += 1
            if ('influenza' in check['hashtag'][i] or 'Influenza' in check['hashtag'][i]):
                influenza_count += 1
            else:
                other += 1
        total = pos + neg
        pos = int(((pos + neg) * 30)/100)

        if(pos < neg):
            polar.append('Epedimic')
            x = 'Epedimic'
            epi_check.setdefault(state,[]).append(0)
            epi_check.setdefault(state,[]).append(x)
            epi_check.setdefault(state,[]).append(malaria_count)
        else:
            polar.append('Non Epedimic')
            x = 'Non Epedimic'
            epi_check.setdefault(state,[]).append(10000)
            epi_check.setdefault(state,[]).append(x)
            epi_check.setdefault(state,[]).append(malaria_count)


    return epi_check,states,polar


def data_City(ct):
    # -*- coding: utf-8 -*-



    data = pd.read_csv('data/dataR.csv' , encoding = 'unicode_escape')
    data['hashtag'] = data.hashtag.apply(lambda s: list(ast.literal_eval(s)))
    cities = list(data['city'].unique())
    for i in range(2):
        cities.pop()

    polar = []
    li2=[]
    search=ct
    aa=list(data['city'].where(data['state'] == search))
    cityx=list(set(aa))
    cityx.pop(0)
    for city in cityx:
```

```
193         dengue_count = 0
194         malaria_count = 0
195         influenza_count = 0
196         zika_count = 0
197         chiken_count = 0
198         other = 0
199         check =  data.loc[data['city'] == city]
200         pos = check.loc[check['polar'] == 'pos'].shape[0]
201         neg = check.loc[check['polar'] == 'neg'].shape[0]
202         lst = list(check['Unnamed: 0'])
203         for i in lst:
204             if ('malaria' in check['hashtag'][i] or 'Malaria' in check['hashtag'
                ][i]):
205                 malaria_count += 1
206             if ('zika' in check['hashtag'][i] or 'Zika' in check['hashtag'][i]
                or 'ZikaVirus' in check['hashtag'][i] or 'zikavirus' in check['
                hashtag'][i]):
207                 zika_count += 1
208             if ('dengue' in check['hashtag'][i] or 'Dengue' in check['hashtag'][
                i]):
209                 dengue_count += 1
210             if ('chicungunya' in check['hashtag'][i] or 'Chicungunya' in check['
                hashtag'][i]):
211                 chiken_count += 1
212             if ('influenza' in check['hashtag'][i] or 'Influenza' in check['
                hashtag'][i]):
213                 influenza_count += 1
214             else:
215                 other += 1
216         total = pos + neg
217         pos = int(((pos + neg) * 30)/100)
218
219         if(pos < neg):
220             polar.append('Epedimic')
221
222             x = 'Epedimic'
223             if(neg-pos)>15:
224                 threat=100
225             else:
226                 threat=int((((neg-pos)*100)/15))
227             li1=[city,threat]
228             li2.append(li1)
229
230         else:
231             polar.append('Non Epedimic')
232             x = 'Non Epedimic'
233
234     return li2
235
236         #print(state + "------>" + x, pos, neg, malaria_count, dengue_count ,
                influenza_count , zika_count)
237 def sentiment(request,*args, **kwargs):
238     return render(request,"index2.html",{})
239
240 def mapview(request,*args, **kwargs):
241     csvfile = csv.reader(open("../src/test.csv"))
242     res = dict(csvfile)
243     #res = data_R()
244     contex = {"output": res}
245     return render(request,"tempp.html",contex)
246
```

```
247
248
249 def pred(request,*args, **kwargs):
250     return render(request,"pred.html",{})
251 def tempp(request,*args, **kwargs):
252     return render(request,"tempp.html",{})
253
254 def new(request):
255     if request.method == 'POST':
256         city=request.POST.get("id",None)
257
258         op=data_City(city)
259         df =  pd.DataFrame(op)
260
261         df.to_csv('out.csv', sep=',', header=None, index=None)
262         Epi.objects.all().delete()
263         with open("../src/out.csv") as f:
264             reader = csv.reader(f)
265             for row in reader:
266                 _, created = Epi.objects.get_or_create(
267                     city=row[0],
268                     threat=row[1],
269                     )
270         #context={"citydata": op}
271 #context = { "data" : [1, 2, 3, 4, 5, 6, 7, 8, 9, 10],}
272         print(op)
273     return HttpResponse("hello")
274
275 class TableView(ListView):
276     model = Epi
277     template_name = 'tempp3.html'
278
279     def get_queryset(self): # new
280         object_list = Epi.objects.all()
281
282
283
284         return object_list
285
286 class StateResultsView(ListView):
287     model = All
288     template_name = 'tempp.html'
289
290     def get_queryset(self): # new
291         quer = self.request.GET.get('st')
292         object_list = All.objects.filter(
293          Q(state__icontains=quer) | Q(city__icontains=quer)
294     )
295         return object_list
296
297
298 def covid(request,*args, **kwargs):
299     ranges={}
300     full_data={}
301     datas,header,active_case,state_data,maxx=covid2()
302     active,case= total_case()
303     datas.append(active_case)
304     a  = active_case[2]
305     a=a[:-1]
306     total_cas = int(a)
307     total_cured = int(active_case[3])
```

```
    total_death = int(active_case[4])
    positive = (total_cured * 100)//total_cas
    negative = (total_death * 100)//total_cas
    states = list(state_data['Name of State / UT'].unique())
    for i in range(len(states)):
        ranges.setdefault(states[i],[int(datas[i][2]),int(datas[i][3]),int(datas
            [i][4])])
        full_data.setdefault(states[i],datas[i])
    contex ={"output" :ranges}
    print(contex)
    return render(request,"map.html",{'max':maxx,'datas': datas, 'header':
        header ,'active':zip(active,case),'actives':active,'active_case':
        active_case,'total':total_cas,'positive':positive,'negative':negative,'
        ranges':contex})

class SearchResultsView(ListView):
    model = City
    template_name = 'helpline.html'

    def get_queryset(self): # new
        query = self.request.GET.get('q')
        object_list = City.objects.filter(
        Q(name__icontains=query) | Q(state__icontains=query)
    )
        return object_list

class TweetView(ListView):
    template_name="index2.html"
    def strtobool(v):
        return v.lower() in ["yes", "true", "t", "1"]
    api = TwitterClient('@Sirajology')
    def tweets():
        retweets_only = request.args.get('retweets_only')
        api.set_retweet_checking(strtobool(retweets_only.lower()))
        with_sentiment = request.args.get('with_sentiment')
        api.set_with_sentiment(strtobool(with_sentiment.lower()))
        query = request.args.get('query')
        api.set_query(query)

        tweets = api.get_tweets()
        return JsonResponse({'data': tweets, 'count': len(tweets)})

def clean_tweet(tweet):
        return ' '.join(re.sub("(@[A-Za-z0-9]+)|([^0-9A-Za-z \t])|(\w+:\/\/\S+)"
            , " ", tweet).split())


def  polarity():
    data = pd.read_csv('data/Final_data_with_location.csv')
    data['polarity'] = 'NaN'
    data = data.values

    for i in range(data.shape[0]):
        text = data[i][1]
        analysis = TextBlob(clean_tweet(data[i][1]), analyzer=NaiveBayesAnalyzer
            ())
        pol = analysis.sentiment.classification
        print(pol)
        data[i][5] = pol

    data = pd.DataFrame(data)
```

```
    data.rename(columns = {
            '0': "date",
            '1': "tweet",
            '2': "hashtags",
            '3': "city",
            '4': "state",
            '5': "polarity"
            }, inplace = True)
    data.to_csv("data/data.csv")


def append():
    name = pd.read_csv("name.csv")
    name = name.dropna(how = 'all')
    lst_city = [x.split('[')[0] for x in name[' City ']]
    lst_state = [x for x in name[' State']]
    data = pd.read_csv("data/Final_data.csv").values
    for i in range(data.shape[0]):
        data[i][3] = np.random.choice(lst_city)
    pd.DataFrame(data).to_csv("data/Final_data_with_location.csv", index = False
        )
    data = pd.read_csv("data/Final_data_with_location.csv")
    data['state'] = 'NaN'
    data = data.values
    for i in range(data.shape[0]):
        index = lst_city.index(data[i][3])
        data[i][4] = lst_state[index]
    pd.DataFrame(data).to_csv("data/Final_data_with_location.csv", index = False
        )
    polarity()


def concate_csv():
    names = ["data/dengue.csv","data/indluenza2018.csv", "data/malaria.csv","
        data/covid.csv"]

    final_data_csv = pd.DataFrame(columns = ["",'date','tweet','hashtags','place
        '])

    for name in names:
        if(len(names) > 5):
            data = pd.read_csv(name)
            sample = data.loc[:,['date','tweet','hashtags','place']]
            #sample.to_csv(name.split('.')[0] + "Final.csv", index = False)
            final_data_csv = pd.concat([final_data_csv, sample], axis = 0,sort=
                False)
    final_data_csv.to_csv("data/Final_data.csv", index = False)
    append()



def job():
    today = datetime.datetime.now().date()
    x = str(today)
    y = str(today - datetime.timedelta(days=1))
    dengue ='twint -s "#dengue" --until '+x+' --since '+y+' --location --near
        INDIA --translate -l english --verified -o data/dengue.csv --csv'
    influ = 'twint -s "#influenza" --until '+x+' --since '+y+' --location --near
        INDIA --translate -l english --verified -o data/indluenza2018.csv --csv
        '
    malaria ='twint -s "#malaria" --until '+x+' --since '+y+' --location --near
```

```
        INDIA --translate -l english --verified -o data/malaria.csv --csv'
    covid = 'twint -s "#corona #covid-19" --until '+x+' --since '+y+' --location
        --near INDIA --translate -l english --verified -o data/covid.csv --csv
        '
    names = [dengue,influ,malaria,covid]
    for  name in names:
        print(name+' over /n/n/n/n/n/n')
        os.system(name)
    concate_csv()
```

Webpages /index.html

```
  {%load static%}
<!DOCTYPE html>
<html lang="en">

<head>
  <meta charset="utf-8">
  <meta http-equiv="X-UA-Compatible" content="IE=edge">
  <meta name="viewport" content="width=device-width, initial-scale=1">
  <!-- The above 3 meta tags *must* come first in the head; any other head
      content must come *after* these tags -->
  <title>Epidemic Prediction</title>

  <!-- Bootstrap -->
  <link href="{%static 'css/bootstrap.min.css'%}" rel="stylesheet">
  <link href="{%static 'css/bootstrap.min.css'%}" rel="stylesheet">
  <link rel="stylesheet" href="{%static 'css/font-awesome.min.css'%}">
  <link href="{%static 'css/animate.min.css'%}" rel="stylesheet">
  <link href="{%static 'css/animate.css'%}" rel="stylesheet" />
  <link href="{%static 'css/prettyPhoto.css'%}" rel="stylesheet">
  <link href="{%static 'css/style.css'%}" rel="stylesheet">

</head>

<body>
  <nav class="navbar navbar-default navbar-fixed-top">
    <div class="container">
      <div class="row">
        <div class="site-logo">
          <a href="{% url 'home'%}" class="brand">Epidemic Prediction</a>
        </div>

        <!-- Brand and toggle get grouped for better mobile display -->
        <div class="navbar-header">
          <button type="button" class="navbar-toggle" data-toggle="collapse"
              data-target="#menu">
            <i class="fa fa-bars"></i>
          </button>
        </div>
        <!-- Collect the nav links, forms, and other content for toggling -->
        <div class="collapse navbar-collapse" id="menu">
          <ul class="nav navbar-nav navbar-right">
            <li><a href="{% url 'home'%}">Home</a></li>
            <li><a href="{% url 'about'%}">About Us</a></li>
            <li><a href="{% url 'helpline'%}">View Helpines</a></li>
            <li><a href="{% url 'contact'%}">Contact</a></li>
            <li><a href="{% url 'map'%}">Map View</a></li>
            <li><a href="{% url 'covid'%}">Covid19</a></li>

```

```
47
48            </ul>
49          </div>
50          <!-- /.Navbar-collapse -->
51        </div>
52      </div>
53    </nav>
54
55    <div id="home">
56      <div class="slider">
57        <div id="about-slider">
58          <div id="carousel-slider" class="carousel slide" data-ride="carousel">
59            <!-- Indicators -->
60            <ol class="carousel-indicators visible-xs">
61              <li data-target="#carousel-slider" data-slide-to="0" class="active"
                    ></li>
62              <li data-target="#carousel-slider" data-slide-to="1"></li>
63              <li data-target="#carousel-slider" data-slide-to="2"></li>
64            </ol>
65
66            <div class="carousel-inner">
67              <div class="item active">
68                <img src="{% static 'images/download1.jpg' %}" class="img-
                      responsive" alt="">
69              </div>
70              <div class="item">
71                <img src="{% static 'images/download2.jpg' %}" class="img-
                      responsive" alt="">
72              </div>
73              <div class="item">
74                <img src="{% static 'images/download3.jpg' %}" class="img-
                      responsive" alt="">
75              </div>
76            </div>
77
78            <a class="left carousel-control hidden-xs" href="#carousel-slider"
                  data-slide="prev">
79              <i class="fa fa-angle-left"></i>
80            </a>
81
82            <a class=" right carousel-control hidden-xs" href="#carousel-slider"
                  data-slide="next">
83              <i class="fa fa-angle-right"></i>
84            </a>
85          </div>
86          <!--/#carousel-slider-->
87        </div>
88        <!--/#about-slider-->
89      </div>
90    </div>
91
92    <section id="about">
93      <div class="container">
94        <div class="center">
95          <div class="col-md-6 col-md-offset-3">
96            <h2>Epidemic Diseases</h2>
97            <hr>
98            <p class="lead">Below are some Epidemic Diseases description and their
                  prevention techniques</p>
99          </div>
100       </div>
```

```
    </div>

    <div class="container">
      <div class="row">

        <!--/.col-sm-6-->

        <div class="col-sm-6 wow fadeInDown">
          <div class="accordion">
            <div class="panel-group" id="accordion1">
              <div class="panel panel-default">
                <div class="panel-heading active">
                  <h3 class="panel-title">
                    <a class="accordion-toggle" data-toggle="collapse" data-
                        parent="#accordion1" href="#collapseOne1">
                      Influenza
                      <i class="fa fa-angle-right pull-right"></i>
                    </a>
                  </h3>
                </div>

                <div id="collapseOne1" class="panel-collapse collapse ">
                  <div class="panel-body">
                    <div class="media accordion-inner">

                      <div class="media-body">

                        <p><b>Influenza, commonly known as the flu, is an
                            infectious disease caused by an influenza virus.
                            Symptoms can be mild to severe.The most common
                            symptoms include: high fever, runny nose, sore
                            throat, muscle pains, headache, coughing, and
                            feeling tired. These symptoms typically begin two
                            days after exposure to the virus and most last less
                            than a week. <br><br>The cough, however, may last
                            for more than two weeks. In children, there may be
                            diarrhea and vomiting, but these are not common in
                            adults.Diarrhea and vomiting occur more commonly in
                            gastroenteritis, which is an unrelated disease and
                            sometimes inaccurately referred to as "stomach flu"
                            or the "24-hour flu". Complications of influenza may
                             include viral pneumonia, secondary bacterial
                            pneumonia, sinus infections, and worsening of
                            previous health problems such as asthma or heart
                            failure.<br><br>
Three of the four types of influenza viruses affect humans: Type A, Type B, and
    Type C. Type D has not been known to infect humans, but is believed to have
    the potential to do so.Usually, the virus is spread through the air from
    coughs or sneezes. This is believed to occur mostly over relatively short
    distances. It can also be spread by touching surfaces contaminated by the
    virus and then touching the mouth or eyes. A person may be infectious to
    others both before and during the time they are showing symptoms. The
    infection may be confirmed by testing the throat, sputum, or nose for the
    virus </b><br></p>

<div class="panel panel-default">
  <div id="p1" class="panel-heading active">
    <h3 class="panel-title">
      <a  class="accordion-toggle" data-toggle="collapse"  href="#collapseP1">
        Prevention & Precautions
        <i class="fa fa-angle-right pull-right"></i>
```

```
136         </a>
137       </h3>
138     </div>
139
140     <div id="collapseP1" class="panel-collapse collapse ">
141       <div class="panel-body">
142         <div class="media accordion-inner">
143
144           <div class="media-body">
145
146             <p><b>Vaccination: Unvaccinated staff should get the flu vaccine <br>
                  <br>Place patients with influenza or influenza-like illness into
                  Droplet Precautions. This will prevent exposures to patients and
                  staff. <br><br>DO NOT come to work if you have a fever (
                  temperature of 100  F [37.8  C] or greater) or an influenza-like
                   illness <br> <br>Persons with influenza-like symptoms should not
                  visit patients (exception: ill parents visiting children must wear
                   a mask) <br> <br>Wear gloves, masks, and eyewear during
                  respiratory specimen collection (nasal washings, tracheal
                  aspirates, throat, or nasopharyngeal swabs). </b><br></p>
147
148           </div>
149         </div>
150       </div>
151     </div>
152   </div>
153
154                       </div>
155                     </div>
156                   </div>
157                 </div>
158               </div>
159
160               <div class="panel panel-default">
161                 <div class="panel-heading active">
162                   <h3 class="panel-title">
163                     <a class="accordion-toggle" data-toggle="collapse" data-
                          parent="#accordion1" href="#collapseTwo1">
164                       Dengue
165                       <i class="fa fa-angle-right pull-right"></i>
166                     </a>
167                   </h3>
168                 </div>
169                 <div id="collapseTwo1" class="panel-collapse collapse">
170                   <div class="panel-body">
171                     <p>Dengue is fast emerging pandemic-prone viral disease in
                          many parts of the world. Dengue flourishes in urban poor
                           areas, suburbs and the countryside but also affects
                          more affluent neighbourhoods in tropical and subtropical
                           countries.<br><br>
172
173 Dengue is a mosquito-borne viral infection causing a severe flu-like illness and
    , sometimes causing a potentially lethal complication called severe dengue.
    The incidence of dengue has increased 30-fold over the last 50 years. Up to
    50-100 million infections are now estimated to occur annually in over 100
    endemic countries, putting almost half of the worlds population at risk.<
    br><br>
174
175 Severe dengue (previously known as dengue haemorrhagic fever) was first
    recognized in the 1950s during dengue epidemics in the Philippines and
    Thailand. Today it affects Asian and Latin American countries and has become
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```
    a leading cause of hospitalization and death among children and adults in
    these regions.<br><br>
176
177 The full life cycle of dengue fever virus involves the role of mosquito as a
    transmitter (or vector) and humans as the main victim and source of
    infection.<br></p>
178 <div class="panel panel-default">
179   <div id="p1" class="panel-heading active">
180     <h3 class="panel-title">
181       <a  class="accordion-toggle" data-toggle="collapse"  href="#collapseP2">
182         Prevention & Precautions
183         <i class="fa fa-angle-right pull-right"></i>
184       </a>
185     </h3>
186   </div>
187
188   <div id="collapseP2" class="panel-collapse collapse ">
189     <div class="panel-body">
190       <div class="media accordion-inner">
191
192         <div class="media-body">
193
194           <p><b>Protect yourself against mosquito bites <br><br>Avoid visiting
                areas prone to mosquitoes <br><br>Apply mosquito repellent,
                ideally one containing DEET <br> <br>Use mosquito nets while
                sleeping. <br> <br>  If  you or your child gets a rash or any
                other negative reaction from an insect repellent, wash it off with
                 mild soap and water and stop using the product. Consult a doctor
                if the condition persists,    says Dr Chua Ying Ying. </b><br></p>
195
196         </div>
197       </div>
198     </div>
199   </div>
200 </div>
201                 </div>
202               </div>
203             </div>
204
205             <div class="panel panel-default">
206               <div class="panel-heading active">
207                 <h3 class="panel-title">
208                   <a class="accordion-toggle" data-toggle="collapse" data-
                        parent="#accordion1" href="#collapseThree1">
209                     Malaria
210                     <i class="fa fa-angle-right pull-right"></i>
211                   </a>
212                 </h3>
213               </div>
214               <div id="collapseThree1" class="panel-collapse collapse">
215                 <div class="panel-body">
216                   <p>Malaria: An infectious disease caused by protozoan
                        parasites from the Plasmodium family that can be
                        transmitted by the bite of the Anopheles mosquito or by
                        a contaminated needle or transfusion. Falciparum malaria
                         is the most deadly type.<br><br>
217
218 The symptoms of malaria include cycles of chills, fever, sweats, muscle aches
    and headache that recur every few days. There can also be vomiting, diarrhea
    , coughing, and yellowing (jaundice) of the skin and eyes. Persons with
    severe falciparum malaria can develop bleeding problems, shock, kidney and
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    liver failure, central nervous system problems, coma, and die. Travelers to
    areas with malaria are advised to take medications to prevent infection if
    exposed. The treatment of malaria is with oral or intravenous medications,
    including chloroquine, mefloquine (Larium), or atovaquone/proguanil (
    Malarone).<br><br>
219
220 Malaria transmission occurs primarily between dusk and dawn because of the
    nocturnal feeding habits of Anopheles mosquitoes. One should therefore take
    protective measures to reduce contact with mosquitoes, especially during
    these hours. These measures include remaining in well-screened areas, using
    mosquito nets, and wearing clothes that cover most of the body.<br></p>
221 <div class="panel panel-default">
222   <div id="p1" class="panel-heading active">
223     <h3 class="panel-title">
224       <a  class="accordion-toggle" data-toggle="collapse"  href="#collapseP3">
225         Prevention & Precautions
226         <i class="fa fa-angle-right pull-right"></i>
227       </a>
228     </h3>
229   </div>
230
231   <div id="collapseP3" class="panel-collapse collapse ">
232     <div class="panel-body">
233       <div class="media accordion-inner">
234
235         <div class="media-body">
236
237           <p><b>There's a significant risk of getting malaria if you travel to
                an affected area. It's very important you take precautions to
                prevent the disease. <br><br>There's currently no vaccine
                available that offers protection against malaria, so it's very
                important to take antimalarial medication to reduce your chances
                of getting the disease.
238
239 However, antimalarials only reduce your risk of infection by about 90%, so
    taking steps to avoid bites is also important. <br> <br>Use insect repellent
     on your skin and in sleeping environments. Remember to reapply it
    frequently. The most effective repellents contain diethyltoluamide (DEET)
    and are available in sprays, roll-ons, sticks and creams <br> <br> <br>
    Malaria can often be avoided using the ABCD approach to prevention, which
    stands for: <br>Awareness of risk     find out whether you're at risk of
    getting malaria. <br><br>Bite prevention     avoid mosquito bites by using
    insect repellent, covering your arms and legs, and using a mosquito net. <br
    > <br>Check whether you need to take malaria prevention tablets     if you
    do, make sure you take the right antimalarial tablets at the right dose, and
     finish the course. <br> <br>Diagnosis     seek immediate medical advice if
    you have malaria symptoms, including up to a year after you return from
    travelling. </b><br></p>
240
241         </div>
242       </div>
243     </div>
244   </div>
245 </div>
246                   </div>
247                 </div>
248               </div>
249
250               <div class="panel panel-default">
251                 <div class="panel-heading active">
252                   <h3 class="panel-title">
```

```
                    <a class="accordion-toggle" data-toggle="collapse" data-
                        parent="#accordion1" href="#collapseFour1">
                      Zika
                      <i class="fa fa-angle-right pull-right"></i>
                    </a>
                  </h3>
                </div>
                <div id="collapseFour1" class="panel-collapse collapse">
                  <div class="panel-body">
                    <p>Zika virus is a mosquito-borne flavivirus that was first
                        identified in Uganda in 1947 in monkeys. It was later
                        identified in humans in 1952 in Uganda and the United
                        Republic of Tanzania.<br><br>
Outbreaks of Zika virus disease have been recorded in Africa, the Americas, Asia
    and the Pacific. From the 1960s to 1980s, rare sporadic cases of human
    infections were found across Africa and Asia, typically accompanied by mild
    illness.<br><br>
The incubation period (the time from exposure to symptoms) of Zika virus disease
    is estimated to be 3 14 days. The majority of people infected with Zika
    virus do not develop symptoms. Symptoms are generally mild including fever,
    rash, conjunctivitis, muscle and joint pain, malaise, and headache, and
    usually last for 2 7 days<br></p>


<div class="panel panel-default">
  <div id="p1" class="panel-heading active">
    <h3 class="panel-title">
      <a class="accordion-toggle" data-toggle="collapse" href="#collapseP4">
        Prevention & Precautions
        <i class="fa fa-angle-right pull-right"></i>
      </a>
    </h3>
  </div>

  <div id="collapseP4" class="panel-collapse collapse ">
    <div class="panel-body">
      <div class="media accordion-inner">

        <div class="media-body">

          <p><b>
Protection against mosquito bites during the day and early evening is a key
    measure to prevent Zika virus infection. Special attention should be given
    to prevention of mosquito bites among pregnant women, women of reproductive
    age, and young children.<br><br>

Personal protection measures include wearing clothing (preferably light-coloured
    ) that covers as much of the body as possible; using physical barriers such
    as window screens and closed doors and windows; and applying insect
    repellent to skin or clothing that contains DEET, IR3535 or icaridin
    according to the product label instructions.<br><br>

Young children and pregnant women should sleep under mosquito nets if sleeping
    during the day or early evening. Travellers and those living in affected
    areas should take the same basic precautions described above to protect
    themselves from mosquito bites. <br><br>

Aedes mosquitoes breed in small collections of water around homes, schools, and
    work sites. It is important to eliminate these mosquito breeding sites,
    including: covering water storage containers, removing standing water in
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    flower pots, and cleaning up trash and used tires. Community initiatives are
     essential to support local government and public health programs to reduce
    mosquito breeding sites.  Health authorities may also advise use of
    larvicides and insecticides to reduce mosquito populations and disease
    spread. </b><br></p>
291
292         </div>
293       </div>
294     </div>
295   </div>
296 </div>
297                   </div>
298                 </div>
299               </div>
300
301               <div class="panel panel-default">
302                 <div class="panel-heading active">
303                   <h3 class="panel-title">
304                     <a class="accordion-toggle" data-toggle="collapse" data-
                          parent="#accordion1" href="#collapseFive1">
305                       COVID-19
306                       <i class="fa fa-angle-right pull-right"></i>
307                     </a>
308                   </h3>
309                 </div>
310                 <div id="collapseFive1" class="panel-collapse collapse">
311                   <div class="panel-body">
312                     <p>Coronavirus disease 2019 (COVID-19) is an infectious
                          disease caused by severe acute respiratory syndrome.<br>
                          The disease was first identified in 2019 in Wuhan, the
                          capital of Hubei, China, and has since spread globally,
                          resulting in the 2019 20  coronavirus pandemic.<br>
                          Common symptoms include fever, cough, and shortness of
                          breath. Muscle pain, sputum production, diarrhea, and
                          sore throat are less common.<br>While the majority of
                          cases result in mild symptoms some progress to pneumonia
                          and multi-organ failure</p>
313                     <a href="http://www.covid19india.org">Click to track Covid19
                          in India</a>
314
315 <div class="panel panel-default">
316   <div id="p1" class="panel-heading active">
317     <h3 class="panel-title">
318       <a  class="accordion-toggle" data-toggle="collapse"  href="#collapseP5">
319         Measures & Precautions
320         <i class="fa fa-angle-right pull-right"></i>
321       </a>
322     </h3>
323   </div>
324
325   <div id="collapseP5" class="panel-collapse collapse ">
326     <div class="panel-body">
327       <div class="media accordion-inner">
328
329         <div class="media-body">
330
331           <p><b>Preventive measures to reduce the chances of infection.<br></b><
                br></p>
332           <ul>
333             <li>Staying at home
334             <li>Avoiding crowded places
```

```
335             <li>Washing hands with soap and warm water often and for at least 20
                    seconds
336             <li>Practicing good respiratory hygiene and avoiding touching the
                    eyes, nose, or mouth with unwashed hands
337             <ul/>
338             <a href="http://www.covid19india.org">Click to track Covid19 in
                    India</a>
339         </div>
340       </div>
341     </div>
342   </div>
343 </div>
344                     </div>
345                   </div>
346                 </div>
347
348               </div>
349               <!--/#accordion1-->
350             </div>
351           </div>
352
353       </div>
354       <!--/.row-->
355     </div>
356     <!--/.container-->
357   </section>
358   <!--/#about-->
359
360   <footer id="footer" class="midnight-blue">
361     <div class="container">
362       <div class="row">
363         <div class="col-md-6 col-md-offset-3">
364           <div class="text-center">
365             <a href="#home" class="scrollup"><i class="fa fa-angle-up fa-3x"></i
                    ></a>
366           </div>
367           &copy; EPIDEMIC PREDICTION.
368            All Rights Reserved.
369
370         </div>
371
372           <div class="col-lg-12">
373             <div class="social">
374               <ul class="social-share">
375                 <li><a href="#"><i class="fa fa-facebook"></i></a></li>
376                 <li><a href="#"><i class="fa fa-twitter"></i></a></li>
377                 <li><a href="#"><i class="fa fa-linkedin"></i></a></li>
378                 <li><a href="#"><i class="fa fa-dribbble"></i></a></li>
379                 <li><a href="#"><i class="fa fa-skype"></i></a></li>
380               </ul>
381             </div>
382           </div>
383       </div>
384     </div>
385   </footer>
386   <!--/#footer-->
387
388   <!-- jQuery (necessary for Bootstrap's JavaScript plugins) -->
389   <script src="{% static 'js/jquery.js'%}"></script>
390   <!-- Include all compiled plugins (below), or include individual files as
        needed -->
```

```
391   <script src="{% static 'js/bootstrap.min.js'%}"></script>
392   <script src="{% static 'js/jquery.prettyPhoto.js'%}"></script>
393   <script src="{% static 'js/jquery.isotope.min.js' %}"></script>
394   <script src="{% static 'js/wow.min.js'%}"></script>
395   <script src="{% static 'js/jquery.easing.min.js'%}"></script>
396   <script src="{% static 'js/main.js'%}"></script>
397   <script src="{% static 'contactform/contactform.js'%}"></script>
398
399 </body>
400
401 </html>
```

Chapter 7

System Testing

System testing is a level of software testing where a complete and integrated software is tested. The purpose of this test is to evaluate the system's compliance with the specified requirements.

7.1 Test Cases and Test Results

Test ID	Test Case Title	Test Condition	System Behavior	Expected Result
T01	Clicking and Viewing the Diseases info	A Browser	On clicking disease info is shown	Disease info on clicking on any disease
T02	Contact us Page	a registered email address	Feedback given successfully	Successful feedback
T03	View Helpline	input city name	List of helpline numbers shown successfully	A view list of helpline numbers
T04	View map of epidemic Outbreak	NaN	Map View of Epidemic diseases shown successfully	Map View of Epidemic Diseases
T05	View Epidemic cities of state	A click on any state of map	A table of epidemic cities of that state shown successfully	A table of epidemic cities of that state.
T06	Search State or City	input city or state name	A table view of status of that city is shown successfully	A table view of status of that city.

7.2 Test Cases:

Title: Clicking and Viewing the Diseases info
Description: A user should be able to successfully view epidemic

disease info on clicking on it

Assumption: a supported browser is being used.

Test Steps:

1. Navigate to epidemic prediction webapp
2. On the Home page ,there are 5 diseases shown.
3. Click on any disease.

Expected Result: Disease info on clicking on any disease.
Actual Result: On clicking disease info is shown sucessfully.

Title: Contact us Page
Description:A user must be able to send feedback or response to devs.

*Pre-condition:*a registered email address

Test Steps:

1. Navigate to epidemic prediction webapp.
2. Go to Contact Us page
3. Enter the details.
4. Click on submit.

Expected Result: User message sent .
Actual Result: User message has been sent successfully.

Title: View Helpline numbers
Description:A user must be able to view the helpline numbers of any city on search.

*condition:*a input city name

Test Steps:

1. Navigate to epidemic prediction webapp and click on View Helpline

2. Enter city name.
3. Click on search.

Expected Result: A view list of helpline numbers.
Actual Result: List of helpline numbers shown successfully.

Title: View map of epidemic diseases
Description:A user must be able to view the map of epidemic diseases with colour on each state viz. red or green.Red indicates Epidemic, Green indicates Non-epidemic .

Test Steps:

1. Navigate to epidemic prediction webapp.
2. Click on Map View.

Expected Result: Map View of Epidemic Diseases

Actual Result: Map View of Epidemic diseases shown successfully.

Title: Search status of a city or state.
Description:A user must be able to view the status of any city or state on search.
*condition:*a input city name

Test Steps:

1. Navigate to epidemic prediction webapp and click on Map View.
2. Enter city name or state name in search box.
3. Click on search.

Expected Result: A table view of status of that city
Actual Result: A table view of status of that city is shown successfully.

7.2.1 Software Quality Attributes

Availability-1 : The system shall be available to users all the time.
Availability-2 : The system shall always have something to function and always pop up error messages in case of component failure.
Efficiency-1 : The system shall generate the correct epidemic prediction with an accuracy of 80% above.
Efficiency-2 : The system shall provide the right tools to support all its features.

Chapter 8

Screenshots of Project

8.1 Home Page and Map View

Figure 8.1: Landing Page

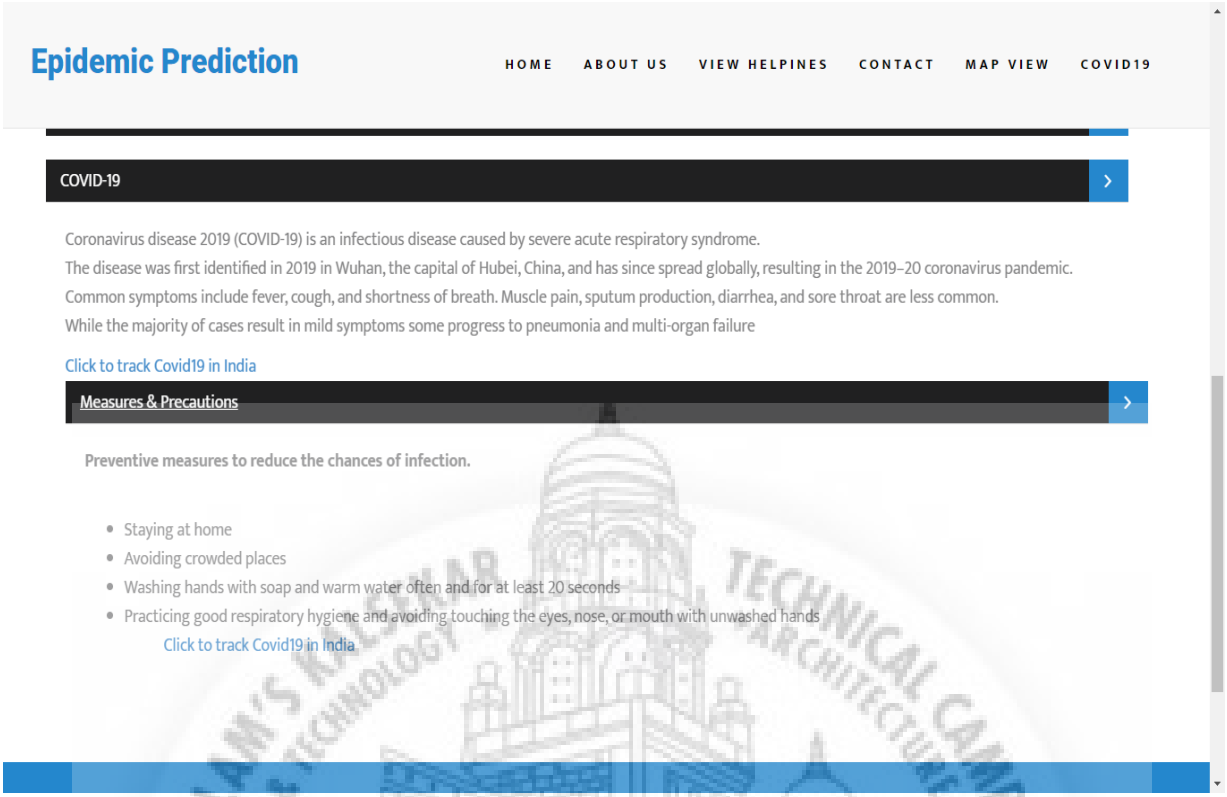

Figure 8.2: Landing Page

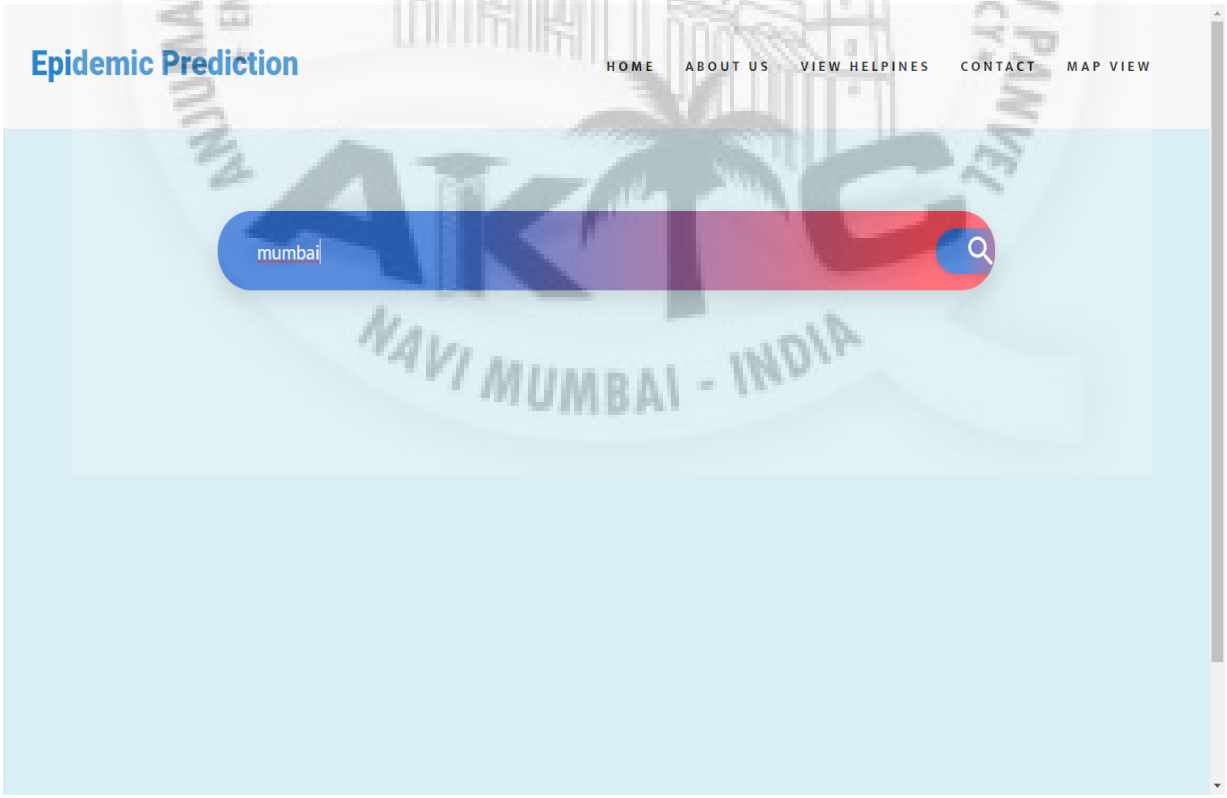

Figure 8.3: View Helplines

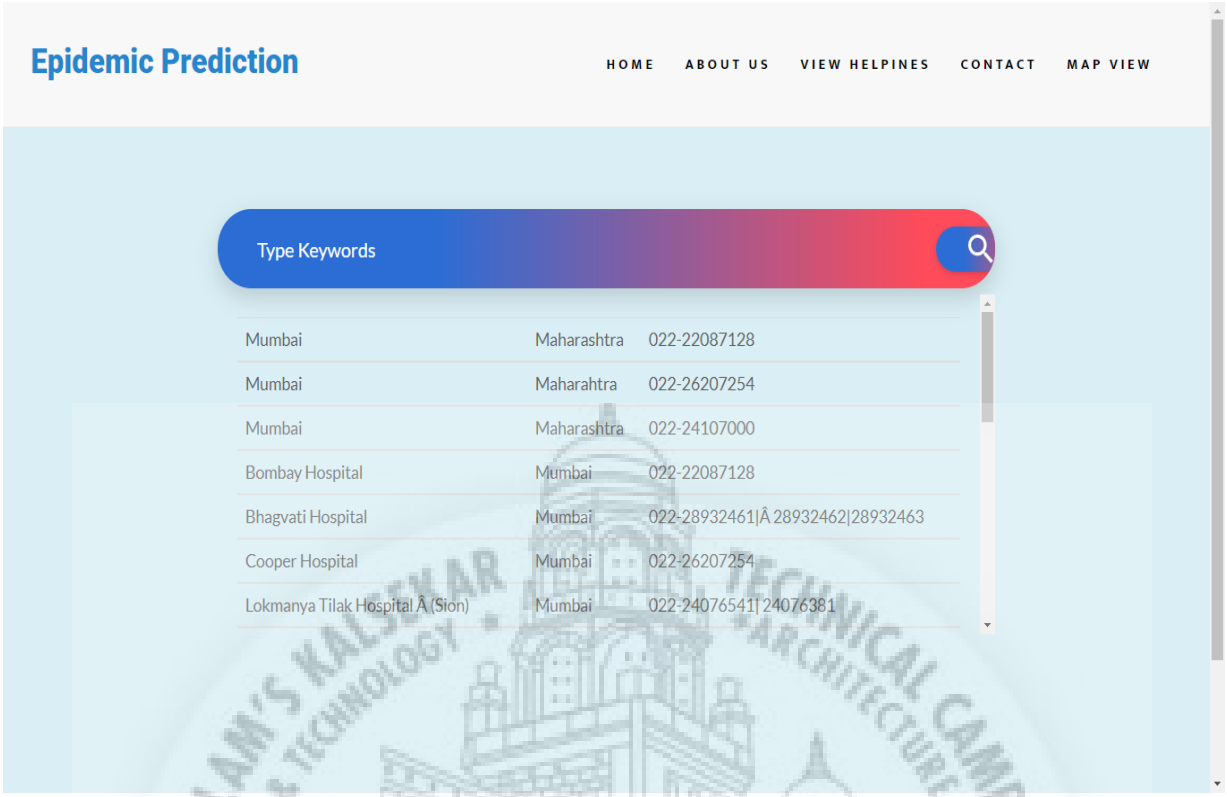

Figure 8.4: View Helplines

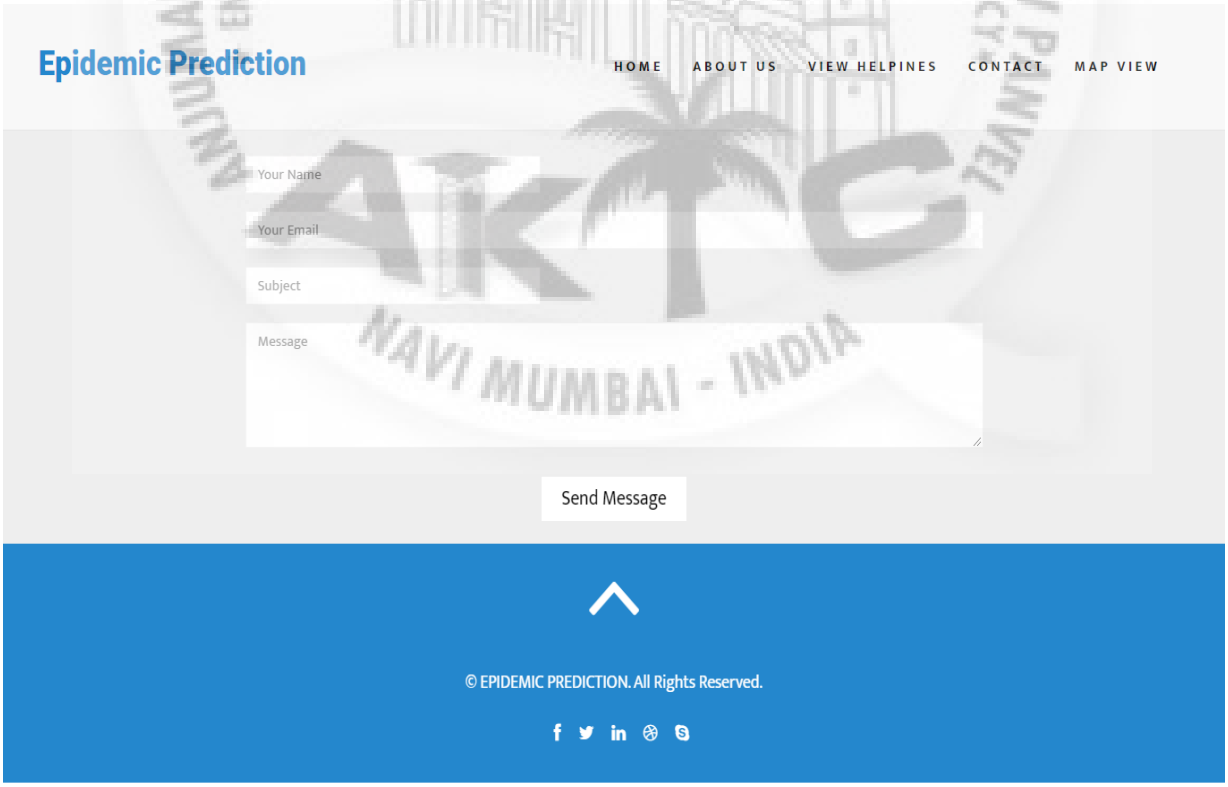

Figure 8.5: Contact Us

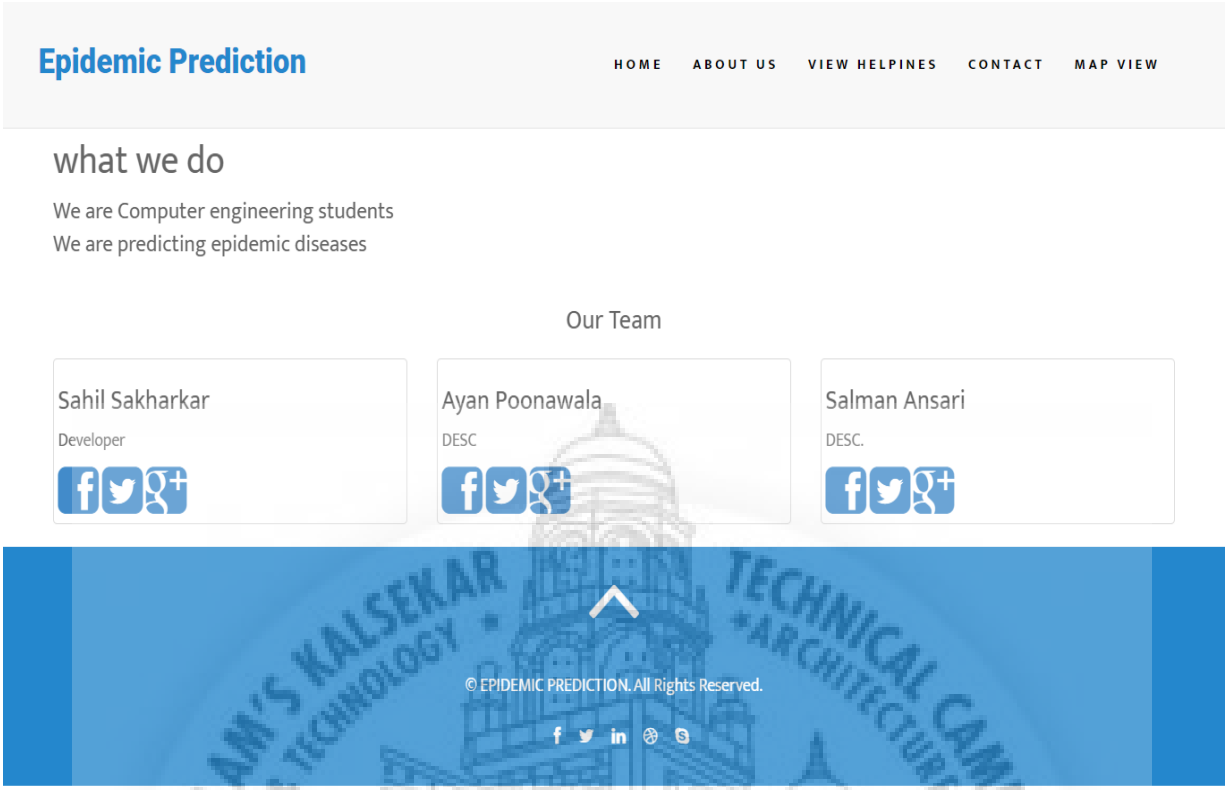

Figure 8.6: About Us

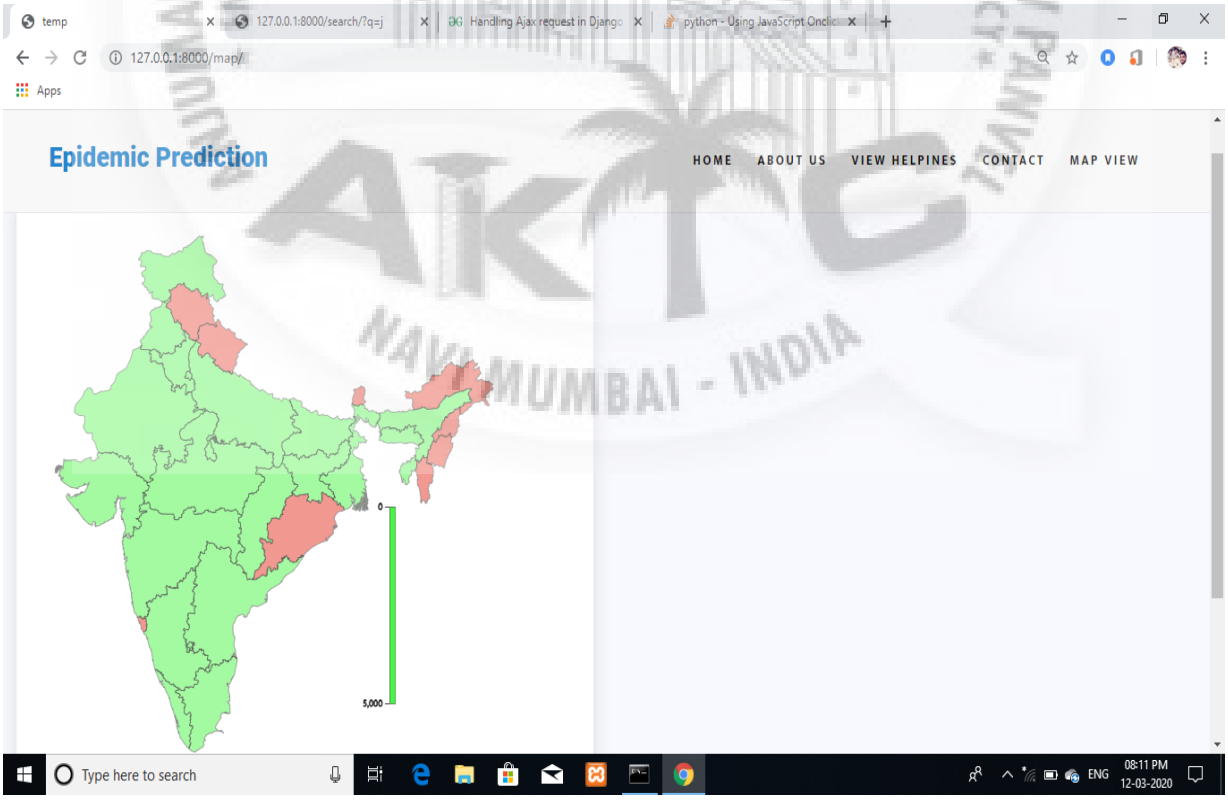

Figure 8.7: Map View

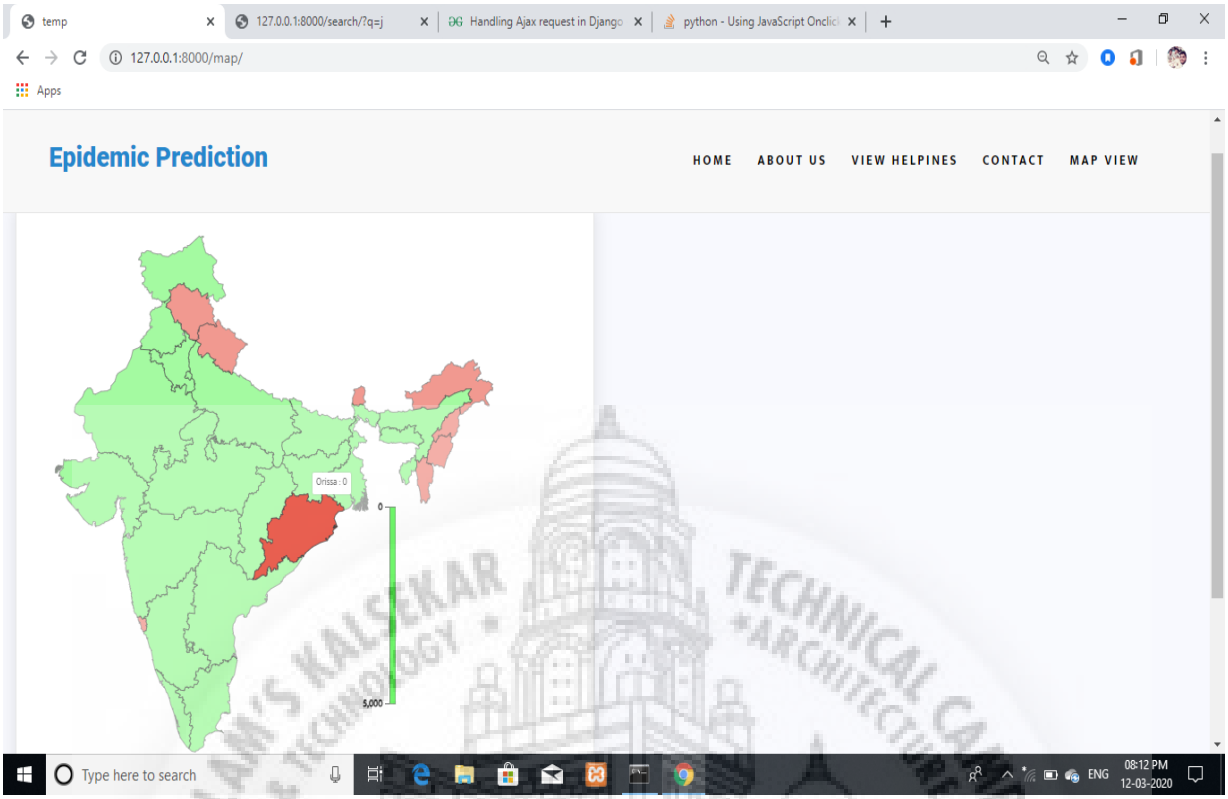

Figure 8.8: Map View Hovering

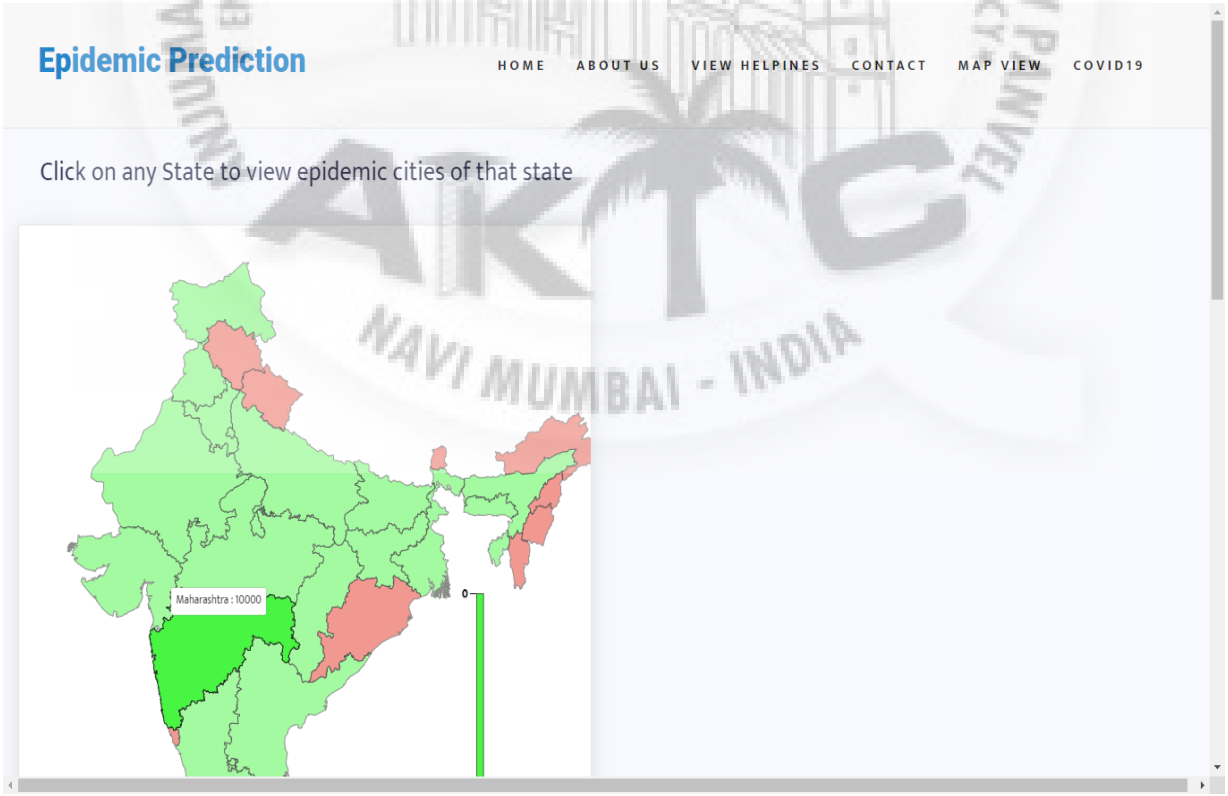

Figure 8.9: Map View Hovering

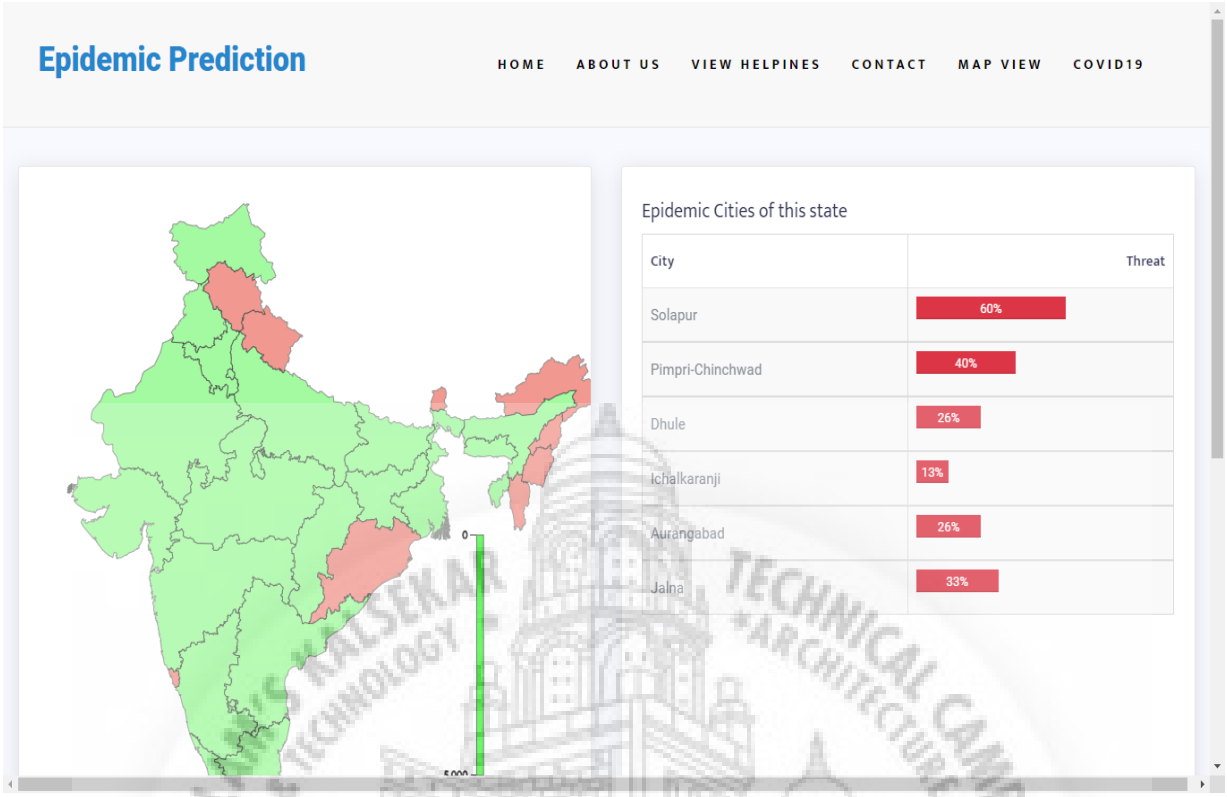

Figure 8.10: Map view

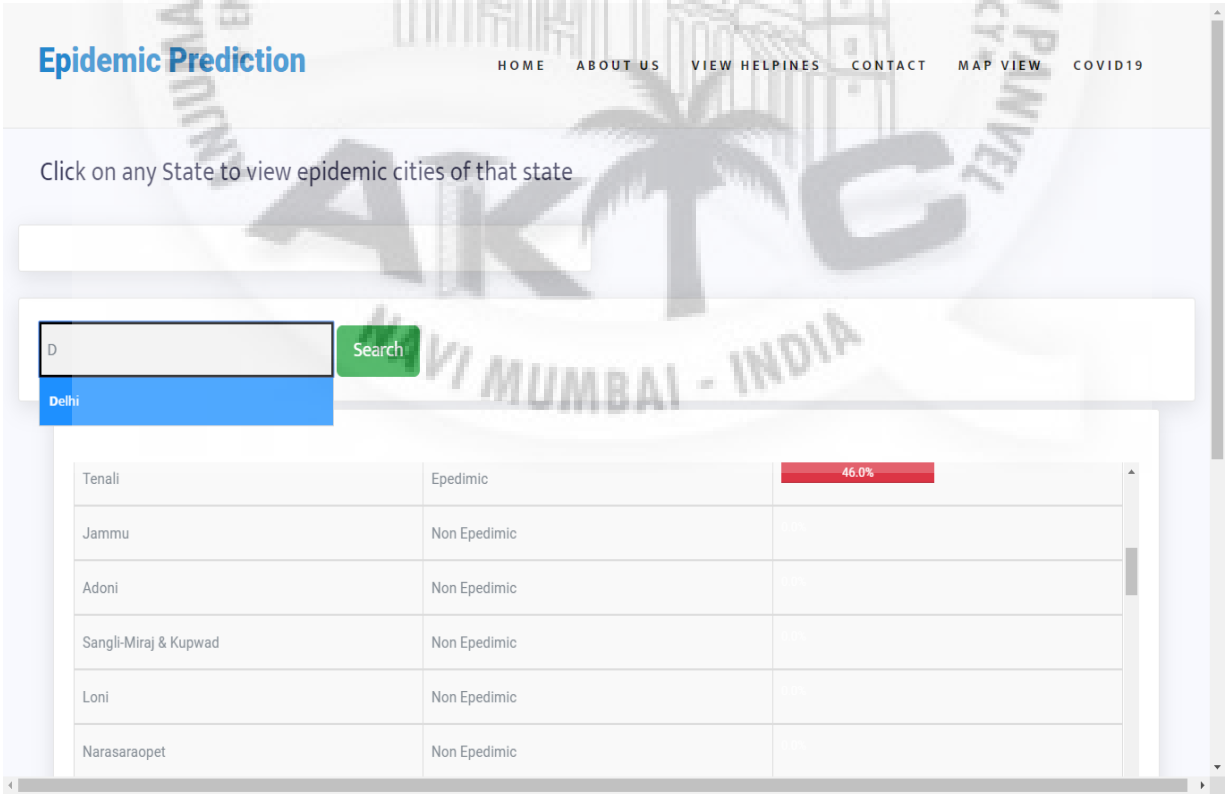

Figure 8.11: Search Bar Result of State

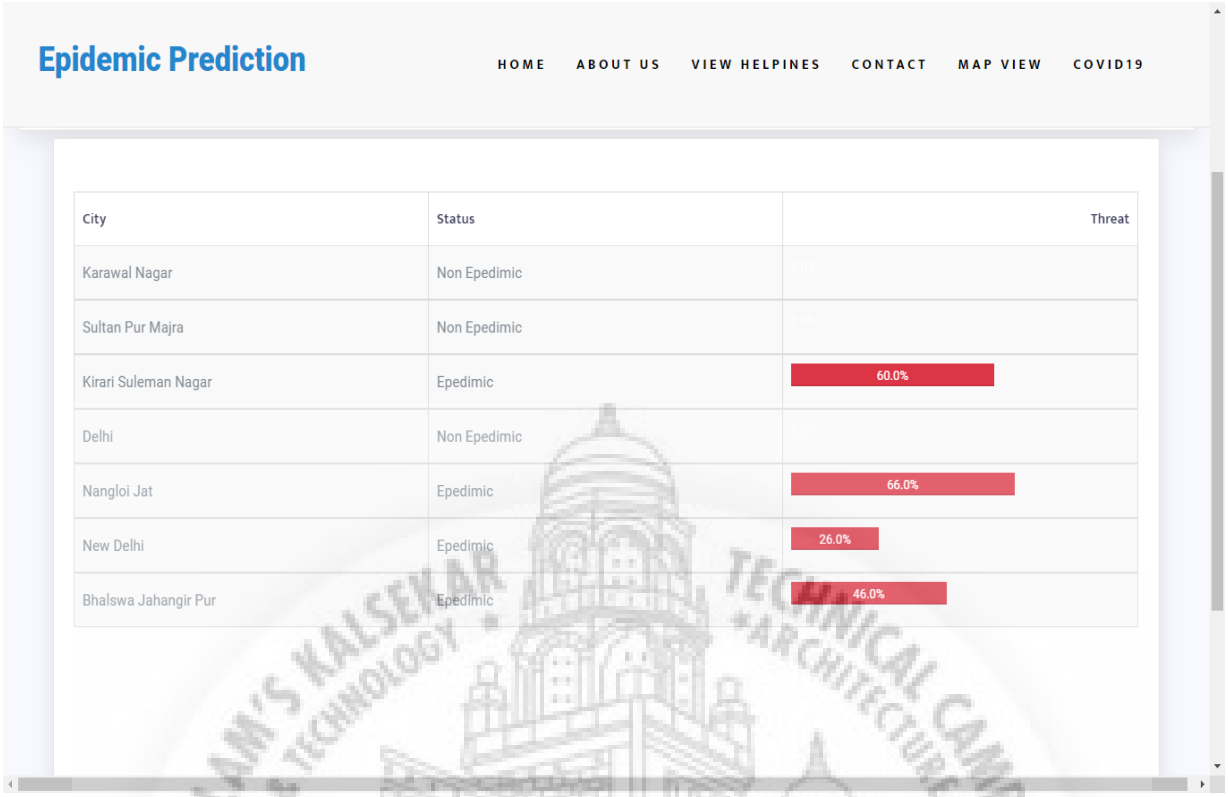

Figure 8.12: Search Bar Result of State

8.2 COVID-19 Live Tracker

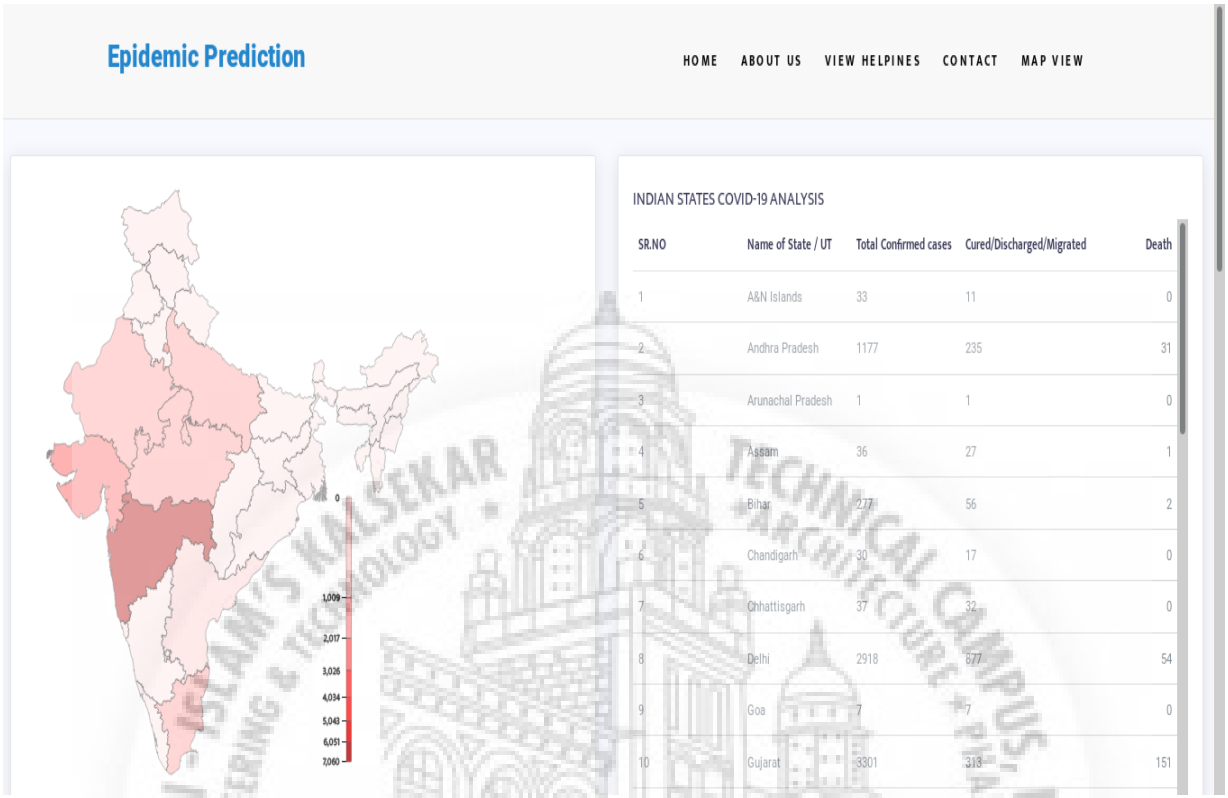

Figure 8.13: Covid online Tracker as on 28/4/2020

Figure 8.14: Graphs for Visualization

IR@AIKTC-KRRC

Chapter 9

Conclusion and Future Scope

9.1 Conclusion

In 21st century Epidemic has become one of the dangerous threat There is a need to predict the spread of epidemics as this will give rise to the implementation of a warning system so that people can be prepared and hence we can overall reduce the number of cases in a given year.

Epidemic Prediction Website predict the status of a particular epidemic in a specific region using historical data and current data of social media such as twitter. Our model uses SVM algorithm and sentiment analysis to check the polarity of tweets. A lot of preprocessing of the unstructured data is done to make it structured data and different feature extraction techniques is used.

9.2 Future Scope

- Tracking location of user can be added in our proposed system so that helpline numbers are shown according to users nearby location.
- Sending the data to NGOs and suggesting the list of medicines to be prepared of the upcoming epidemic disease.
- In our proposed system we will consider environmental factors according to a particular region which may increase the accuracy to a greater percentage.

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Achievement

1. Project Competitions

   (a) *Epidemic Outbreak Detection and Prediction using Machine Learning*;Ayan Poonawala, Salman Ansari, Sahil Sakharkar, 6th National Level Project Exhibition cum Poster Presentation, 13th March 2020(Venue: Universal College of Engineering, Vasai)

Figure 9.1: Participate Certificate