

Infectious Disease Modeling for Public Health Management (IDMP)



By

Capt Muhammad Hanan Gohar

Capt Muhammad Jamshaid

Capt Ali Raza Faheem Khan

Capt Muhammad Jalal Khan

Supervised by:

Dr Ihtisham Ul Islam

Submitted to the faculty of Department of Computer Software Engineering,
Military College of Signals, National University of Sciences and Technology, Islamabad,
in partial fulfillment for the requirements of B.E Degree in Software Engineering.

June 2022

In the name of ALLAH, the Most benevolent, the Most Courteous

CERTIFICATE OF CORRECTNESS AND APPROVAL

This is to officially state that the thesis work contained in this report

“Infectious Disease Modeling for Public Health Management”

is carried out by

Capt Muhammad Hannan Gohar

Capt Muhammad Jamshaid

Capt Ali Raza Faheem Khan

Capt Muhammad Jalal Khan

under my supervision and that in my judgement, it is fully ample, in scope and excellence, for the degree of Bachelor of Software Engineering in Military College of Signals, National University of Sciences and Technology (NUST), Islamabad.

Approved by

Col Asim Dilawar Bakhshi

Supervisor

Dr Ihtisham Ul Islam

Date: _____

DECLARATION OF ORIGINALITY

We hereby declare that no portion of work presented in this thesis has been submitted in support of another award or qualification in either this institute or anywhere else.

PLAGIARISM CHECK

This thesis has 11% similarity index. The document contains <https://www.check-plagiarism.com> report endorsed by Supervisor is attached.

ACKNOWLEDGEMENTS

We are thankful to our Creator Allah Subhana-Watala to have guided us throughout this work at every step and for every new thought which He imparted in our mind to improve this research. Indeed, we could have done nothing without His blessings, help and guidance. Whosoever helped us throughout the course of our thesis, whether my parents or any other individual was His will, so indeed none be worthy of praise but Him, The exalted Lord of the universe.

We are profusely thankful to our beloved parents who raised us when we were not capable of walking and continued to support us throughout in every department of our life.

We would also like to express special thanks to our supervisor Dr Ihtisham Ul Islam for his guidance and torch bearing in our thesis. We can undoubtedly say that we weren't as equipped with the fundamentals of engineering as we are now after the completion of project.

We would also like to pay special thanks to Col Asim Dilawar Bakhshi for his tremendous support and cooperation. Each time we got stuck in something, he came up with the solution. Without his help we wouldn't have been able to complete my thesis. We appreciate his patience and guidance throughout the whole thesis.

We would also like to extend special gratitude to Engineer Bashir Bilal for his out of the way favors in guidance and teaching. We also extend our respect and gratitude to able instructors like Dr Tauseef Rana , Prof Athar Mohsin Zaidi, Asst Prof Mobeena Shahzad and Dr Nauman for treating us like their own children upon our mistakes and going extra miles to correct and improve us in their respective knowledge areas. Their efforts will stay in our hearts forever.

Finally, we would like to express my gratitude to all the individuals who have rendered valuable assistance to my study

Plagiarism Certificate

This thesis has 11% similarity index. The document contains <https://www.check-plagiarism.com> report endorsed by Supervisor is attached.

Muhammad Hannan Gohar
00000280989

Muhammad Jamshaid
00000280990

Muhammad Jalal Khan
00000280993

Ali Raza Faheem Khan
00000281007

Signature of Supervisor

ABSTRACT

The modern world is at a very fast pace when it comes to every day developments in research and data science. As it is rightly said that there are hardly any problems left in the world with no solutions at all. Humans are at the peak of their technological achievements. Saying all that, we've seen very recently that once Mother Nature decides a change, we are still not ready enough to face it instantly. Nature's disasters are so abrupt and unexpected that they take all the countermeasures by storm. We have recently faced a global pandemic of COVID-19 which was so unexpected that the world went hopeless for some time. Consistent research and evolution of human advancement started from a point zero and we are well capable to manage it in the span of two years with the help of Allah SWA.

Through this project, an effort has been made to timely predict any upcoming diseases (which may particularly lead to a pandemic level outbreak). The concept of this project is to carry out a national monitoring of the spread of such diseases in a way that it will detect the spread pattern of the virus. Filtered spread patterns of the viruses (in focused areas) will further predict the area wise outbreak of the disease and hence shall assist in curtaining, containing and preventing the spread of the virus. As modern technology has revolutionized almost every facet of our lives and made things unbelievably easy, the medical systems have a lot of merit to adapt to the technology and improve upon the existing systems in such a way that pandemics should be curbed before appearing. All we need are strong, self-intelligent softwares being fed with accurate raw data, so that the clear understanding of outbreak may be predicted and can be accessed by top tier of governments. The timely decision making and efforts as per the technology based data can boost a nation's resistance against such unexpected outbreaks.

Table of Contents

INTRODUCTION	1
Chapter 1 : Introduction	2
1.1 Overview	2
1.2 Objectives of IDMP	4
1.3 Problem Statement	4
1.4 Proposed Solution	5
1.5 Working Principle	5
1.5.1 Datasets and annotations:	5
1.5.2 Dataset training and processing:	6
1.5.3 Output Extraction:	6
1.5.4 Decision Based Output:	6
1.5.5 GUI presentation:	7
1.6 Objectives	7
1.6.1 General Objectives:	7
1.6.2 Academic Objectives:	7
1.7 Scope	7
1.8 Deliverables	8
1.9 Relevant Sustainable Development Goals	8
1.10 Structure of Thesis	8
LITERATURE REVIEW	10
CHAPTER 2 : LITERATURE REVIEW	11
2.1 Industrial background	11
2.2 Existing solutions	12
2.2.1 Systems using edge detection techniques	12
REQUIREMENT ANALYSIS	14
CHAPTER 3 : REQUIREMENT ANALYSIS	15
3.1 Users Classes and Characteristics	15
3.3.1 User	15
3.3.1 Admin	15
3.3.1 Developers	15
3.2 Design and Implementation Constraints	15
3.3 Assumptions and Dependencies	16
3.4 External Interface Requirement	16
3.5 Software Requirements	17
3.6 Non Functional Requirements	17
3.6.1 Performance Requirements	18
3.6.2 Safety Requirements	19

3.6.3 Security Requirements.....	19
3.6.4 Software Quality Attributes.....	19
3.6.5 Business Rules.....	19
CHAPTER 4: IDMP DESIGN	20
4.1 Purpose	21
14.2 System Overview.....	21
4.2.1 System Architecture	22
4.2.2 Architectural Design.....	24
4.2.2 Activity Diagram.....	25
4.3 Data Design	27
4.4 Data Dictionary.....	27
4.5 Component Design	28
4.6 Human Interface Design.....	29
CHAPTER :5 QUALITY ASSURANCE	29
5.1 Test Items	300
5.2 Features Required to be Tested.....	311
5.3 Pass or Fail Measure.....	312
5.4 Standard for Deferral and Renewal Requirements	323
5.5 Test Deliverables	323
Chapter 6: Conclusion.....	37
CHAPTER 7: FUTURE WORK	400
References and Work Cited.....	411

List of Figures

Figure 1: Disease Spread Pattern	03
Figure 2: Architechtural Design	22
Figure 3: Activity Diagram (Users)	24
Figure 4: Activity Diagram (Admin)	25
Figure 5: Test Design (Test 1)	33
Figure 6: Test Design (Test 2)	34
Figure 7: Test Design (Test 3)	35
Figure 8: Test Design (Test 4&5)	36

CHAPTER 1
INTRODUCTION

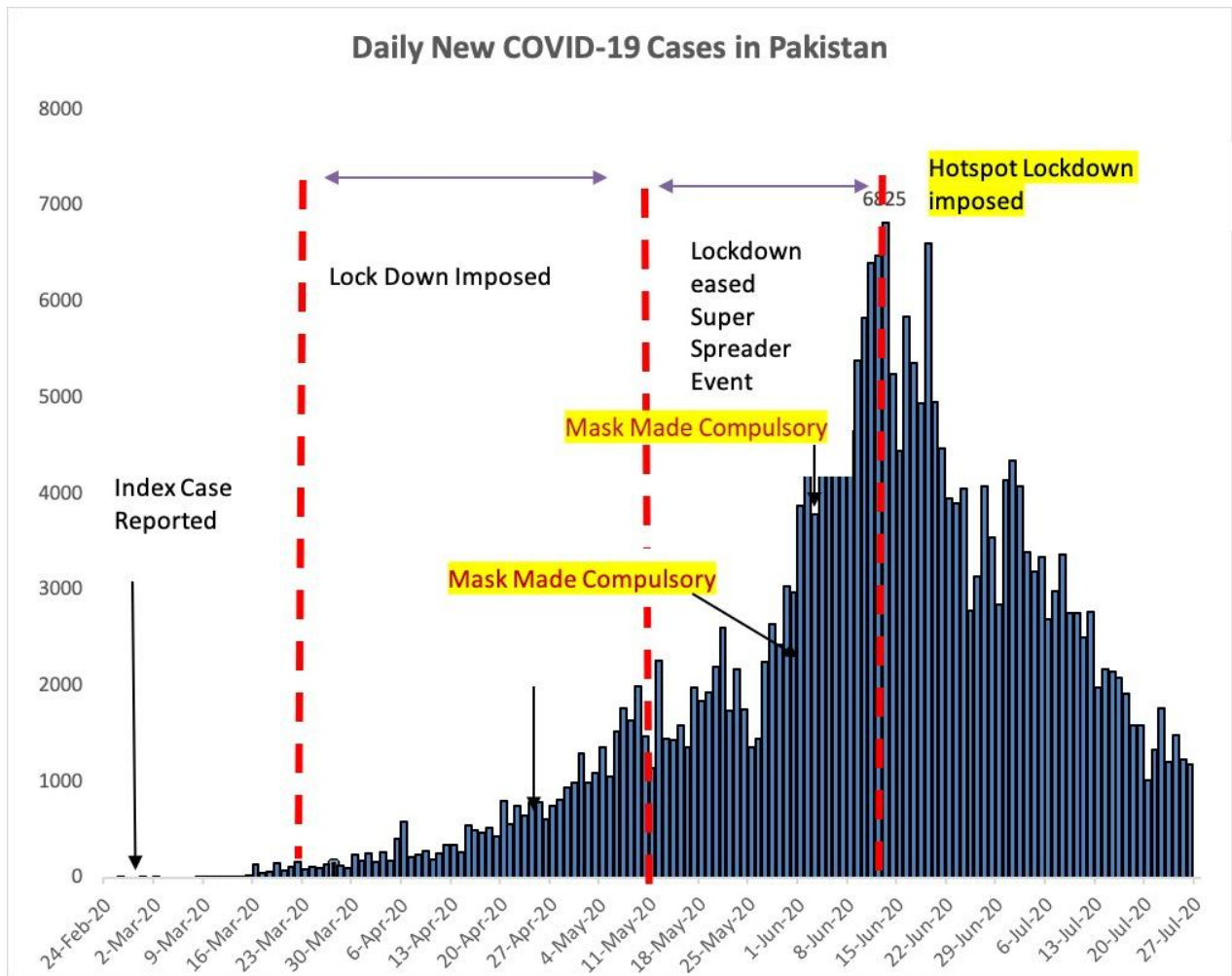
Chapter 1 : Introduction

Studies have shown that there remain only few landscapes on the Earth that are still in their natural state. Due to anthropogenic activities, the Earth surface is being significantly altered in some manner and man's presence on the Earth and his use of land has had a profound effect upon the natural environment thus resulting into an observable pattern in the land use/land cover over time. Viewing the Earth from space is now crucial to the understanding of the influence of man's activities on his natural resource base over time. In situations of quick and often unrecorded land use change, observations of the earth from space provide objective information of human utilization of the landscape. Over the past years, data from Earth sensing satellites has become vigorous in planning the Earth's features and infrastructures, handling natural resources and learning environmental change.

1.1 Overview

2 Today's world is a domain of digitalization. The growing tech field and exponential development in the fields of transport, medicine, mechanics, information technology, communication and infrastructure is bringing new trends in respective fields. The use of scientific knowledge for luxuries is still not a preference as compared to the lifesaving efforts. Metropolitan cities have become the most influential developed entities in the lives of human beings. Disease prevention is also a procedural problem that can be dealt with effectively using engineering principles and scientific innovations. World's population is increasing and is bringing along a hike in number of diseases. Even the most advanced systems are insufficient to govern this large number of diseases and outbreak cases. The lack of effective quarantine facilities and limited testing capacities at the crossing sites resulted in the ingress of the virus

in underdeveloped countries. Careful and responsible behaviors from people, preparedness, and planning, including sentinel scrutiny at the district level, are required for the sustainability of disease control



3 Figure 1: Spread pattern of covid 19 in Pakistan [1]

4

5 It is the need of the hour to inaugurate some policy or mechanism to avoid such enormous scaled pandemics. Hence in our proposed system of disease prevention, we not only focused on the disease detection but also encountered the spread of disease to get the best results.

1.2 Objectives of IDMP

IDMP project is primarily be focusing on data collection & presentation of data using GUI and data visualization techniques to detect areas of disease spread. This tool will help health management agencies, students, disaster management authorities to find out the desired detection and the out spread of infectious diseases.

1.3 Problem Statement

Pakistan is a third world underdeveloped country. For Disease administration, traditionally methods of paper reports (manuals) are used, but it has many limitations that lead to ever-increasing disease spread. Following are some highlights of the disease data procurement & evaluation system:

1. Manual transmitting of data in form of letters and reports demand a lot of resources like man power, logistics and capital.
2. By the time the report reach the decision making bodies viruses are already spread hence time sensitivity is a factor impossible to achieve.
3. Public and private hospitals have different standards for declaring different retorts to specific situations. Hence there is a case of non-uniformity.
4. Competing hospitals (mostly private) are stingy in sharing their hospital data for various economic reasons and often give wrong exaggerated data. This leads to incomplete or wrong conclusions on the basis of data, making the complete national response to deviate from eradication goals on national level.
5. Increased human irritability is another cause of viruses spread, people don't care or are ignorant in ways in which they are facilitating in the spread of various diseases.

1.4 Proposed Solution

The major objective of our proposed system is to continuously monitor the diseases in Pakistan. Traditional reporting systems must be replaced by modern networking systems. The proposed system is capable of learning, detecting and predicting the spread pattern of different diseases, and later by the use of AI predict the suspected outbreak of the disease.

1.5 Working Principle

The project mainly works on the principles of machine-learning algorithms with amalgamations of graphical maps. The project is segmented into various modules and every module is linked with the next module. The list of modules is as under:

- Datasets and annotations
- Dataset training and processing
- Output extraction
- Decision based upon Output
- Integration
- GUI presentation

1.5.1 Datasets and annotations:

The essential part of the project is the preparation of datasets. The dataset encompasses in itself various type of compiled medical reports present on the hospitals, the data set is then cleaned and filtered and then send for processing by the machine learning algorithm

1.5.2 Dataset training and processing:

The prepared dataset is used as input to train detection models using machine learning.

1.5.2.1 Algorithm:

The dataset is then trained. It is trained by the percentage of 60 and 40 percent. The training data set is about 60 percent .Algorithm trains till it reaches near 0.1 or 0.01 which is considered a good learning rate. After training of data and complete algorithm, the system is then placed on testing.

1.5.3 Output Extraction:

The outputs are extracted on the basis of demand (priority or volume) detected, these objects are counted and stored to keep a record.

1.5.4 Decision based upon Outputs:

The extracted outputs, the spread pattern and its likely growth, is used in decision making.

1.5.4.1 Density based decision:

The primary decision is based upon the density of the cases present on the map: prioritization on the basis of density.

1.5.4.1 Integration:

The different modules is then integrated in to one stand-alone entity. This stand-alone entity is essential for a compact solution.

1.5.5 GUI presentation:

The visual demonstration of the project is done through the aid of GUI (graphical user interface).

1.6 Objectives

1.6.1 General Objectives:

“To build an innovative state of the art software integrated hardware prototype powered by Machine Learning (ML) and Internet Protocol (IP) techniques, providing a smart administrative tool which learns, detect, predict and display the spread of infectious diseases”

1.6.2 Academic Objectives:

- Development of a Machine Learning system which learns, detect, predict and display the spread of infectious diseases
- To implement Machine Learning techniques and simulate the results
- To increase productivity by working in a team
- To design a project that contributes to the welfare of society

1.7 Scope

This project finds its scope wherever there is a nearby Basic health unit and hospital. It is an innovating state of the art software powered by machine learning tools to collect, predict and help in reducing the spread of diseases to save the sacred life of people as its not only about saving a single life, but the whole humanity.

1.8 Deliverables

A system that shows the graphical locations of areas which have been affected by the infectious diseases and using Machine learning algorithms to show the spread pattern of those diseases on the map, also showing the graphs and charts of the rate by which the cases have been increasing or decreasing by months weeks or days in real time.

1.9 Relevant Sustainable Development Goals

What is the Locally Relevant Socio-Economic Issue that the Project Addresses?

This Project mainly focuses on the attainment of better health and quality of life as without the health out of the equation of life, all other colors of life such as relations, ambitions ,joys are very less colorful.

Justify how particular SDG is related to your FYP?

Our project focuses on the health of the society when a society is healthy as a whole it will invest itself in other aspects which will improve it like sports, tourism and festivals which will bring economic incentives and generate revenue for the local population bringing prosperity which in turn brings higher education standards in research and technology which in turn will bring further fruits of joy and happiness, thus having a healthy population brings happy and prosperous societies.

1.10 Structure of Thesis

Chapter 2 contains the literature review and the background and analysis study this thesis is based upon.

Chapter 3 contains the design and development of the project.

Chapter 4 introduces detailed evaluation and analysis of the code.

Chapter 5 contains the conclusion of the project.

Chapter 6 highlights the future work needed to be done for the commercialization of this project.

CHAPTER 2
LITERATURE REVIEW

CHAPTER 2 : LITERATURE REVIEW

A new product is introduced in the market only after it has been altered, requisite adjustments had been made, previous flaws removed and efficiency is enhanced (not mentioning a ground breaking invention). Evaluation of the work done on an idea to bring it into the form of economically viable working prototype is necessary to further develop an idea. Likewise, for the development of a product, and for its replacement, related to Disease predictive system, a detailed study concerning all alike projects is obligatory. Our research is divided into the following points.

- Industrial Background
- Existing solutions and their drawbacks
- Research Papers

2.1 Industrial background

In today's era, one of the major issues faced across the world is fight against infections and infectious diseases. It has led to many further problems, as discussed in Problem Statement, which increases need for a disease predictive system. Ultimately, it results in a big marketplace for industrial development.

Initially, Pakistani medical systems were unproductive. Then, these started growing under liberal policies resulting in increase in industrial growth due to the rapid expansion of domestic demand and encouragement from local inhabitants. Regardless the declination of development, Pakistan succeeded to create headway and mature in the new century. And now businesses are leaning towards smart activities, automation, based on

new technologies (Internet of Things (IOT), Machine Learning (ML) techniques, Artificial Intelligence. Hence, disease predictive system offers good market progression and influences economy directly as it is a fully automated system.

2.2 Existing solutions

Different solutions are previously being provided for the disease prediction problem, but every product has some pros and cons. Following are some solutions which are already being prepared and being implemented.

- Artificial Neural Networks
- Decision Trees

2.2.1 Systems using edge detection techniques

Artificial neural networks are a chains of algorithms that endeavors to distinguish essential affiliations in a set of data through a method that impersonates the way the human brain functions. In this logic, neural networks denote to systems of neurons, either organic or artificial in nature.

2.2.1.1 Pros

- Accumulation information on the complete network
- Ability to perform with inadequate data
- Good error acceptance
- Distributed memory
- Gradual Corruption
- Ability to train machine
- The ability of parallel processing

2.2.1.2 Cons

- “Black box” nature
- Greater computational burden
- Proneness to over fitting
- Empirical nature of model development

2.2.2 Decision trees

Decision trees incline close to be the practice of selection for predictive modeling since they are fairly easy to comprehend and are also very optimal in their performance. The elementary objective of a decision tree is to splinter a large chunk of data into smaller fragments.

2.2.2.1 Pros

- Very fast and efficient compared to KNN and other classification algorithms.
- Easy to comprehend, interpret, envisage.
- The decision tree can handle any type of data type numerical, categorical, or Boolean.
- Normalization is not required in the decision Tree

2.2.2.1 Cons

- They are unstable, meaning that a small change in the data can lead to a large change in the structure of the optimal decision tree.
- They are often relatively inaccurate.

Numerous other predictors achieve improved results with alike data

CHAPTER 3

REQUIREMENT ANALYSIS

CHAPTER 3 : REQUIREMENT ANALYSIS

3.1 User Classes and Characteristics

3.1.1 User-

The user of the system can be anyone. He can use the system as for viewing and making informed decisions based on displayed data/requirement.

3.1.2 Admin-

Admin is a user which will have a specific controls to the application which will allow them to control certain modules in the application. The admin can change the forum settings to make the users happy. Admin will administer the overall control of the system and can override any setting, constraints in any module as he/she wants but he is not able to change processed data received received by the machine learning algorithm .

3.1.3 Developers-

Developers will the team who will make different components of the system and integrate them together.

Operating Environment

This web application can be deployed on Window machine

- Minimum RAM 2 GB
- 320 GB Storage Space.
- Intel i3 Processor.
- Internet Connectivity with Ports configured.

3.2 Design and Implementation Constraints

The main design components of the system are as follows-

3.2.1 System setup module

This module is the centralized module which will be used by the user to register to the system. this module will contain the controlling aspects of the system in which various parameters

can be set and changed also it will include the executing part of the system here data will be analyzed , preprocessed and then fed to the machine learning algorithm which will predict the results

3.2.2 User module

This module will be used for user. First the user will need to provide his username and password for security needs. Once he has successfully logged in as a owner he/she can post view the data. The user can view the data displayed by the system . the user will have the option to view the data in various forms (summarized form ,detailed data down to the smallest possible units)

3.2.3 User Documentation

User documentation components such as user manuals and tutorials will be delivered along with the system. Other tutorials and support form will be made available in case to report any bug or other support related issues. A simple how it works page will be included in package in html static page format.

3.3 Assumptions and Dependencies

- Assumptions is that the user should have some basic knowledge of computer.
- We are assuming that the user should have some basic knowledge of using internet

3.4 External Interface Requirements

User Interfaces

Admin Interface

- In this interface admin will have full control over the system. Various fields will be available on this screen like:
 - Admin Username
 - Admin password
 - System changes
 - System maintenance

User Interface

- In this interface the user has to enter certain details and choose from an option. The various fields available on this screen will be:

- Username
- Password
- set parameters
- get results
- set area
- show various displays of data

Hardware Interfaces

Screen resolution of at least 800X600 is required for proper and complete viewing of screens. Higher resolution will be accepted. The user will need a pointing and a typing interface for the proper functioning of the system.

3.5 Software Interfaces

- **Client** : Web Browser
- **Data Base Server** : MYSQL, Block chain
- **Development End** : QGIS ,J2EE, Java, DB2, OS(WINDOWS 10), Web Server

Communications Interfaces

- User on network will be using HTTP/HTTPS protocol.
- Firewall security is required for securing the server.
- TCP/IP protocol is basic need for client side.

System Features

Provides user friendly interface with varying₄degree of viewing ability (zoom in and zoom out) . showing the current and past trends with comparision

- **Usability:** The interface should use terms and concepts, which are drawn from the experience of the people who will make the most of the system.
- **Efficiency:** The system must provide easy and fast access without consuming more cost.
- **Reliability:** User should never be surprised by the behavior of the system and it's easy to use to stored data and easy to see all details of data.
- **Security:** This system is provided with authentication without which no user can pass. So only the legitimate users are allowed to use the application. If the legitimate users share the authentication information then the system is open to outsiders.
- **Maintainability:** system should be easily maintained by the administrators .

3.6 Nonfunctional Requirements

It describes aspects of the system that are concerned with how the system provides the functional requirements. They are:

3.6.1 Performance Requirements

The system should have high performance rate when executing user's input and should be able to provide feedback or response within a short time span usually 50 seconds for highly complicated task and 20 to 25 seconds for less complicated task.

3.6.2 Safety Requirements

Error should be considerably minimized and an appropriate error message that guides the user to recover from an error should be provided. Validation of user's input is highly essential. Also the standard time taken to recover from an error should be 15 to 20 seconds.

3.6.3 Security Requirements

The subsystem should provide a high level of security and integrity of the data held by the system, only authorized personnel of the company can gain access to the company's secured page on the system and only users with valid password and username can login to view user's page.

3.6.4 Software Quality Attributes

This system should always be available for access at 24 hours, 7 days a week. Also in the occurrence of any major system malfunctioning, the system should be available in 1 to 2 working days, so that the operational process is not severely affected

1

3.6.5 Business Rules

A business rule is anything that captures and implements operational policies and practices. A rule can enforce business policy, make a decision, or infer new data from existing data. This includes the rules and regulations that the System users should abide by. This includes the cost of the project and the discount offers provided. The users should avoid illegal rules and protocols. Neither admin nor member should cross the rules and regulations.

Other Requirements

Appendix A: Glossary

- | | |
|----------|---------------------------|
| 1. MB | Megabytes |
| 2. GB | Gigabytes |
| 3. SQL | Structural Query language |
| 4. Admin | Administrator |
| 5. RAM | Random Access Memory |
| 6. HTML | Hypertext Markup Language |

CHAPTER 4
IDMP DESIGN

CHAPTER 4: IDMP DESIGN

This design document encapsulates all functional requirements and illustrates how they conceptually interact. The low-level design also reveals how these requests have been executed. The document's purpose is to provide details about the design and the design process to stakeholders. This document will assist the developer in implementing the functionality and making it easier to comprehend.

4.1 Purpose

A smart infectious disease predictive model that would facilitate auto detection of spread (outbreak) across the country. whenever there is a viral disease spread our model will be trained to automatically predict the outbreak based on the data and geo location for which it will be trained.

Overview

This document is written according to the standards for Software Design Documentation explained in "IEEE Recommended Practice for Software Design Documentation". Sections contain discussions of the designs for the project with diagrams and also contains the class diagrams. It also contain the setup and configuration needed for the Infectious Disease Predictive Model and a list of functions that are implemented in this version and a list of tools and environment used in the entire project.

Definitions and Acronyms

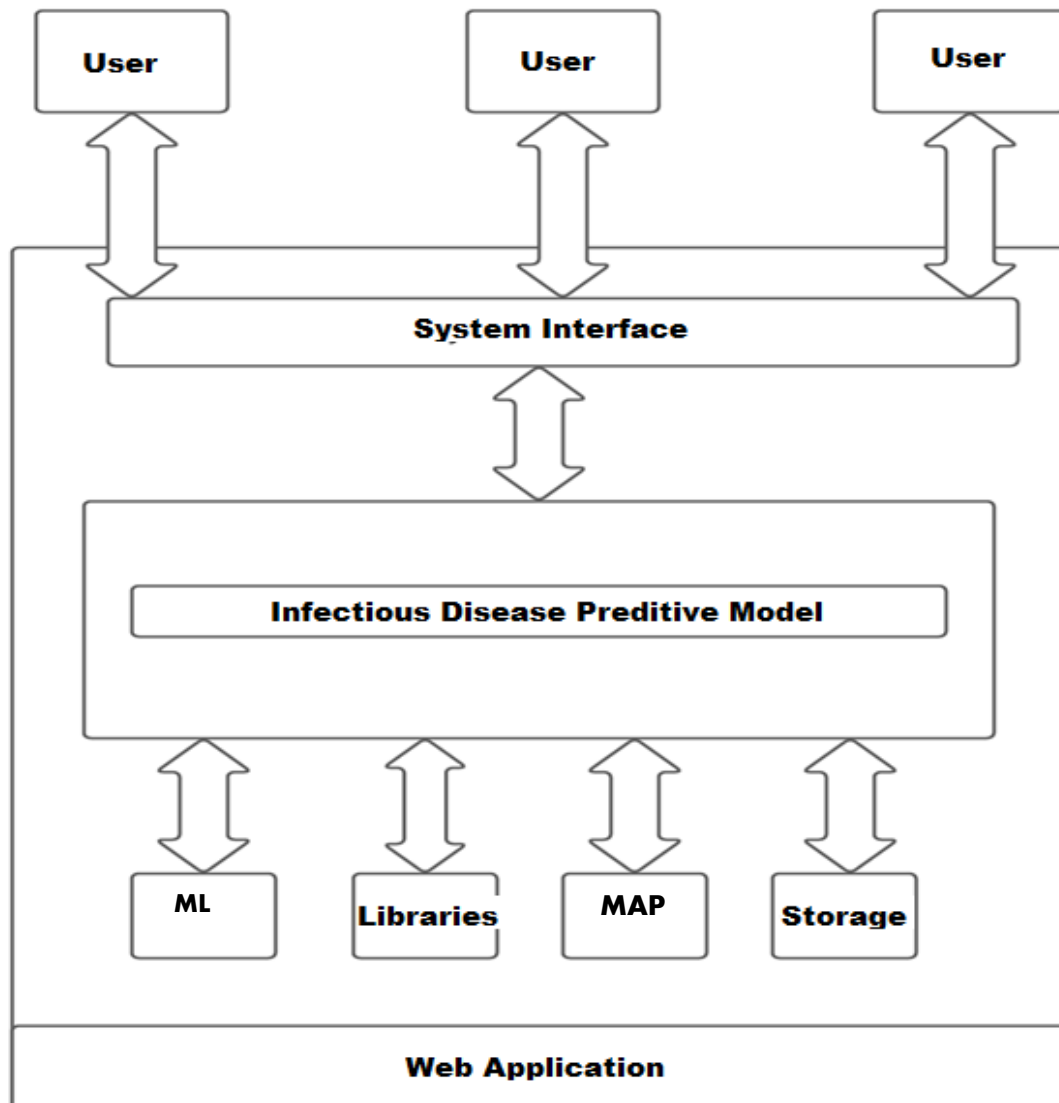
Project Name	Infectious Disease Predictive Model
Language	Java script ,Dart framework (Flutter)
Server	Local
Database	SQL

4.2 SYSTEM OVERVIEW

Give a general description of the functionality, context and design of your project. Provide any background information if necessary.

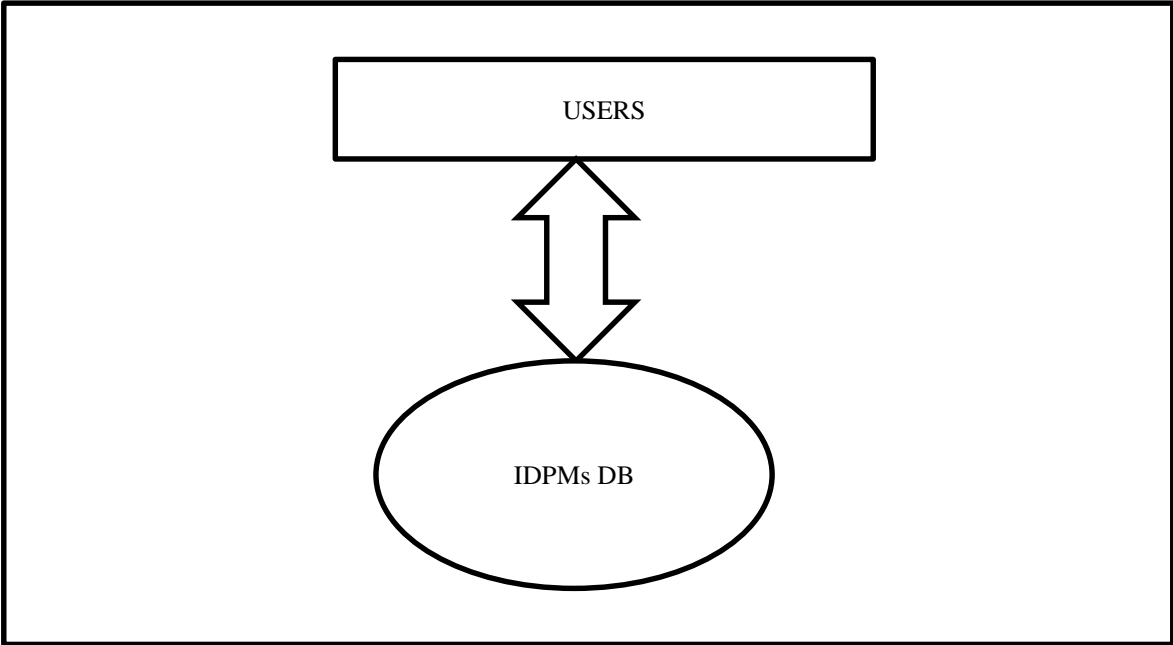
4.2.1 SYSTEM ARCHITECTURE

4.2.2 Architectural Design



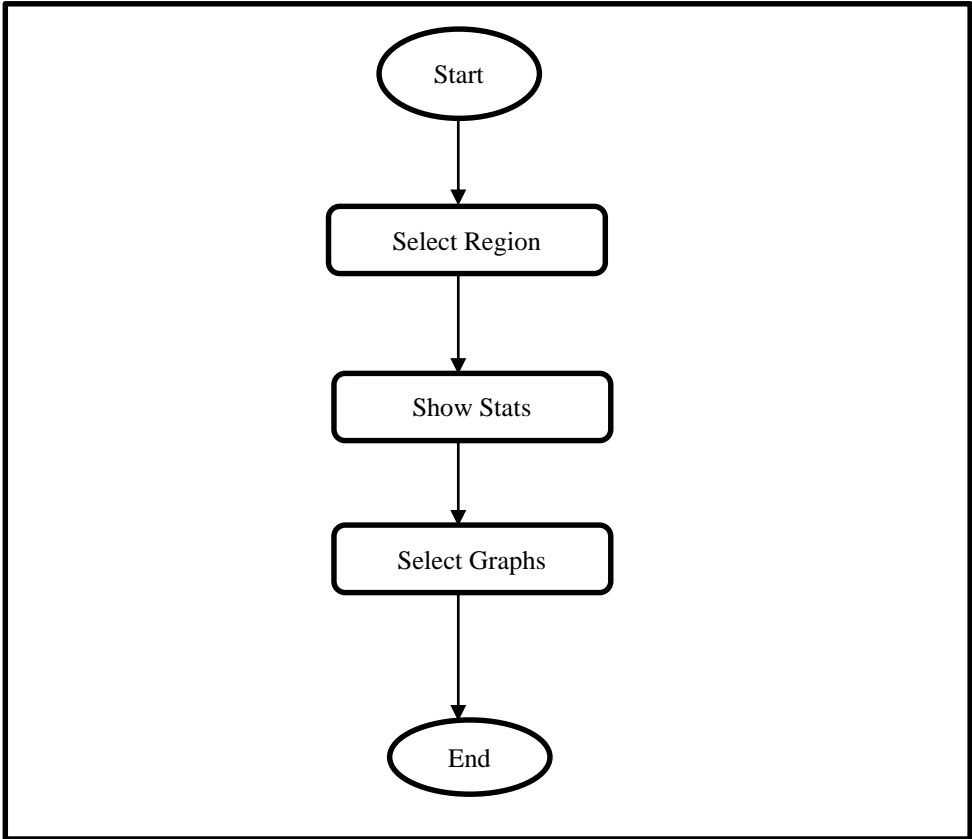
Context Diagram

shows relation of database with entity

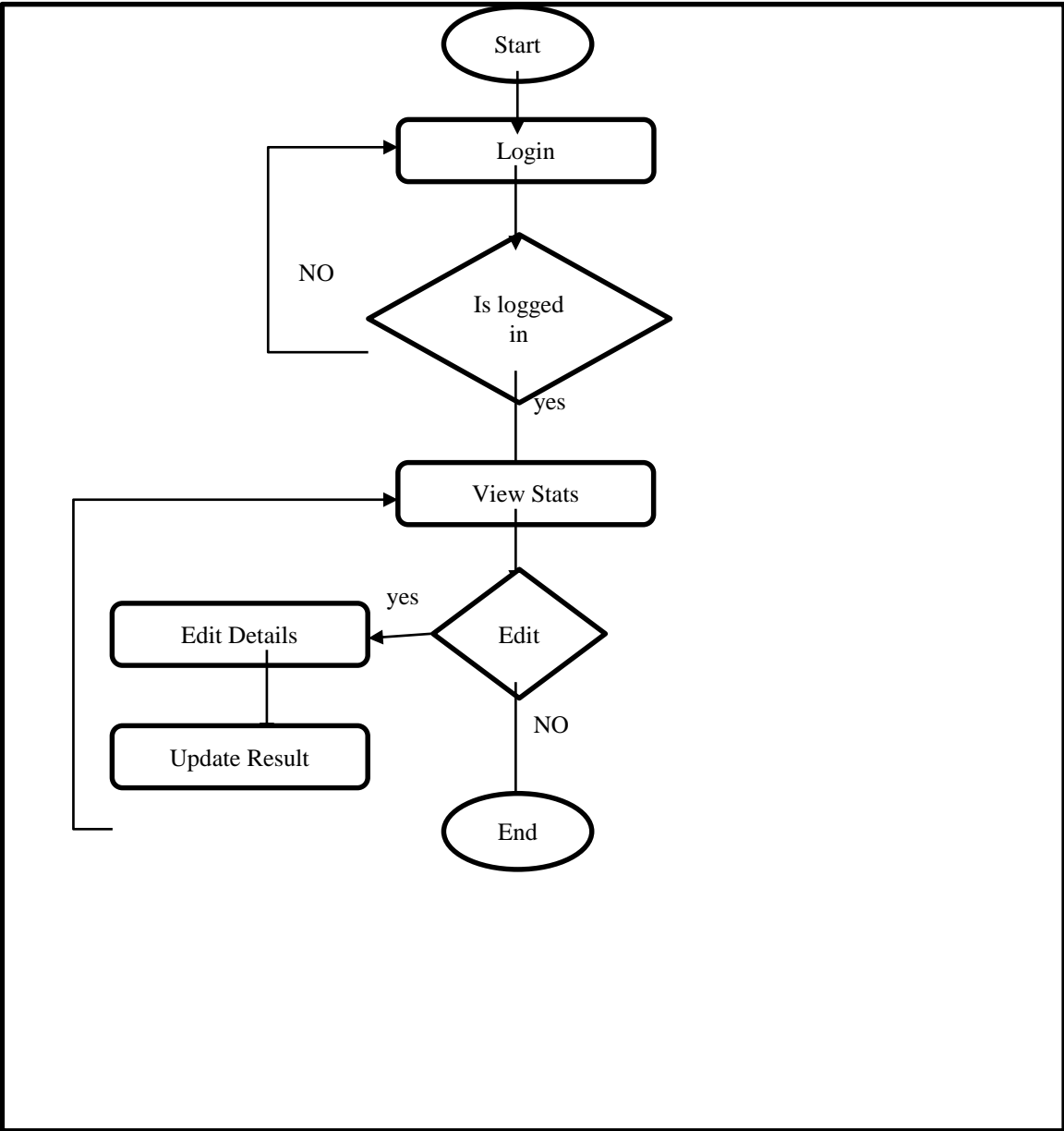


4.2.3 Decomposition Description

ACTIVITY DIAGRAM USER



ACTIVITY DIAGRAM ADMIN



4.3 DATA DESIGN

Data Description

Data design is the first design activity, which results in less complex, modular and efficient program structure. The information domain model developed during analysis phase is transformed into data structures needed for implementing the software. The data objects, attributes, and relationships depicted in entity relationship diagrams and the information stored in data dictionary provide a base for data design activity. During the data design process, data types are specified along with the integrity rules required for the data.

4.4 Data Dictionary

Classes and Models

Patient

Attribute	Attribute type	Description
PID	String, Primary Key	PID is used as primary key to distinguish them among other Patients
Name	String	Patients name not necessary to be unique
Contact	String	Patients contact information

Admin

Attribute	Attribute type	Description
ID	String, Primary Key	ID is used as primary key to distinguish them among other Admins
Name	String	Admin name not necessary to be unique
Contact	String	Admin contact information
Role	string	Admin / User

Disease

Attribute	Attribute type	Description
Disease	String	Unique name that distinguish diseases
Time	Int	not necessary to be unique
Location	String	Location of Patient

Counts	Int	To count number of infected patients
Alive	Int	To show How many alive
Dead	Int	To show how many dead

Outbreak

Attribute	Attribute type	Description
Disease	String	Unique name that distinguish diseases
Time	Int	not necessary to be unique
Location	String	Location of Patient
Status	String	Whether increasing or decreasing

4.5 COMPONENT DESIGN

Functions

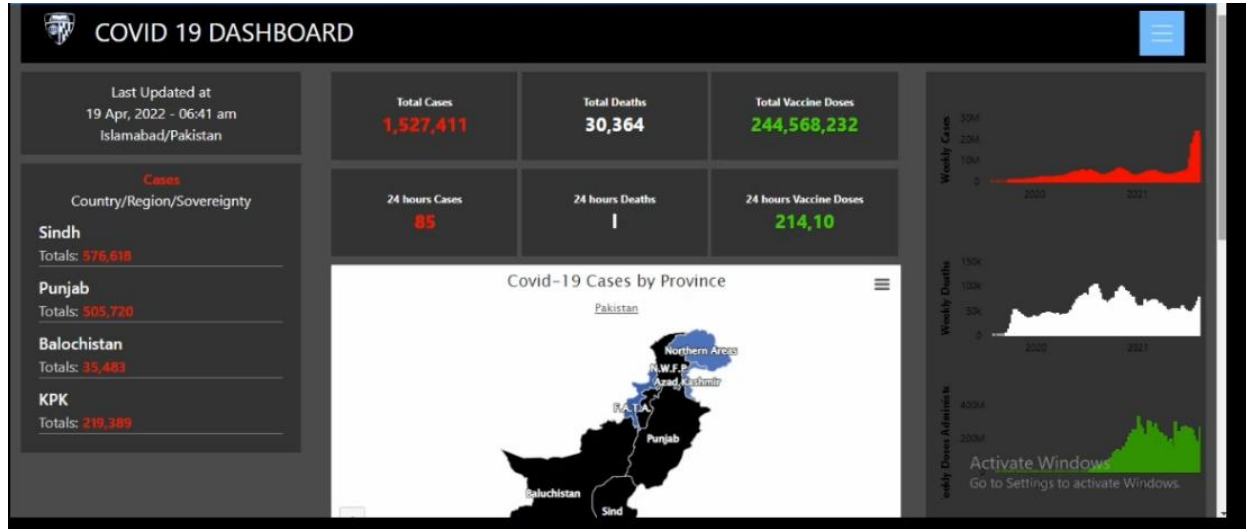
Name	Scope	Input	Output	Description
addpatient()	Public	Patient (complete object)	Void	(complete object)
deletpatient()	Public	String	Void	In case patient is added to death toll
Viewstats()	Public	String	Void	To view the current stats
viewoutbreak()	Public	String	String	To see outbreak
viewgraph()	Pubic	String	string	To see graphs

4.6 HUMAN INTERFACE DESIGN

Overview of User Interface

User interface is created with Flutter in java code combined in this app, all screens and mockup will be user friendly. This interface will include learning ability as much as possible. We will create UI by using Flutter in Java Code.

Screen Images



CHAPTER 5

QUALITY ASSURANCE

CHAPTER :5 QUALITY ASSURANCE

The relevant strategies, process and techniques utilized to design, execute and manage testing of the “Infectious diseases model for public health management” are described in this test plan document. The test strategy will verify that the application’s criteria and standards are met to an approved level by the end user.

Manual testing will be used, which entails testing software without the use of any automated tools or scripts. In this scenario, the tester assumes the role of an end-user and tests the application for any abnormal behavior or bugs. The testers would be preferred to be from the data modeling industry so that an unbiased approach in testing is ensured. All functional, application performance and use case criteria mentioned in the requirement document are covered by the test scope. Software testing can be done at any point during the development phase, depending on the testing approach used. However, after the requirements have been developed and the coding process has been done, the majority of the testing work should be focused on the coding and data entry.

5.1 Test Items

- Development of test scenarios
- Execute multiple tests based on the above-mentioned test scenarios that have been generated
- Inform the project developers about any bugs
- Develop and provide test results
- Manage or incorporate adjustments at a later stage in projects development

5.2 Features required to be Tested

Following features are used:

- User will be able to open the software page by entering URL
- User will be able to proceed to the IDDM dashboard page
- User will be able to upload witness the infectious rates of diseases
- User will be able to select option for map and graph statistics both
- Results for map statistics will be popped up upon placing the cursor on locations
- Result for outspread predictions (for next week) will be available in prediction option

Unit Testing: Unit testing is the responsibility of both testers and developers. Each module's component's implementation will be checked individually.

Integration Testing: The integration test case will be executed when the unit test has passed over the chosen quality level. It's critical to test the product as a black-box after all of the modules have been integrated.

Positive and Negative Testing: This method will be used in conjunction with unit and integration testing. Test cases are written in scenarios that are evident and guarantee that all functional criteria are met. Furthermore, many test cases will be presented to demonstrate how the program responds to invalid operations.

5.3 Pass or Fail Measure

Details of the test cases are specified in section Test Deliverables. Following the principles written below, a test item would be judged as pass or fail.

- Pre-conditions satisfied
- Inputs are correct and carried out as per plan
- The output matches what was specified in output => Passed
- The predictions are approximately equal to the real life case counts => Passed
- The system does not function or does not meet the output requirements => Failed

5.4 Standard for Deferral and Renewal Requirements

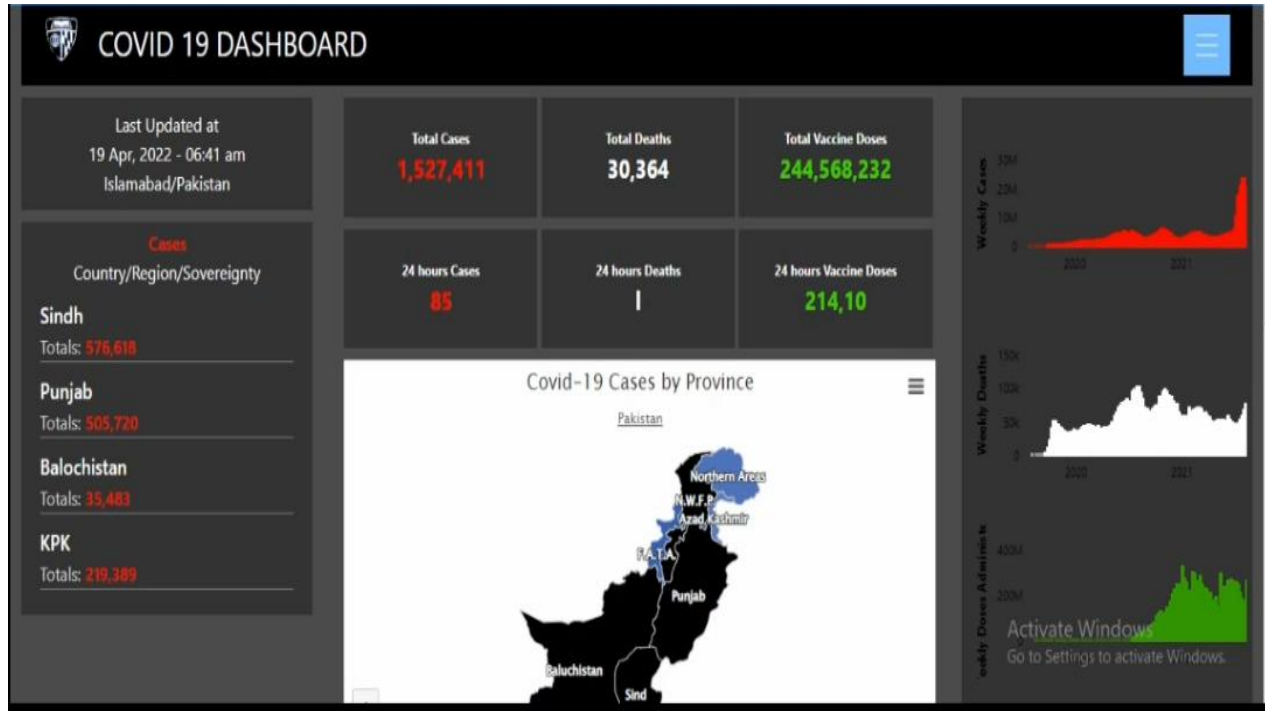
Developers can rapidly correct any flaws discovered, eliminating the need to restart the testing process from the start. However, when serious flaws prevent certain test cases from running because they are interdependent, testing must be suspended.

5.5 Test Deliverables

Following are the Test Cases:

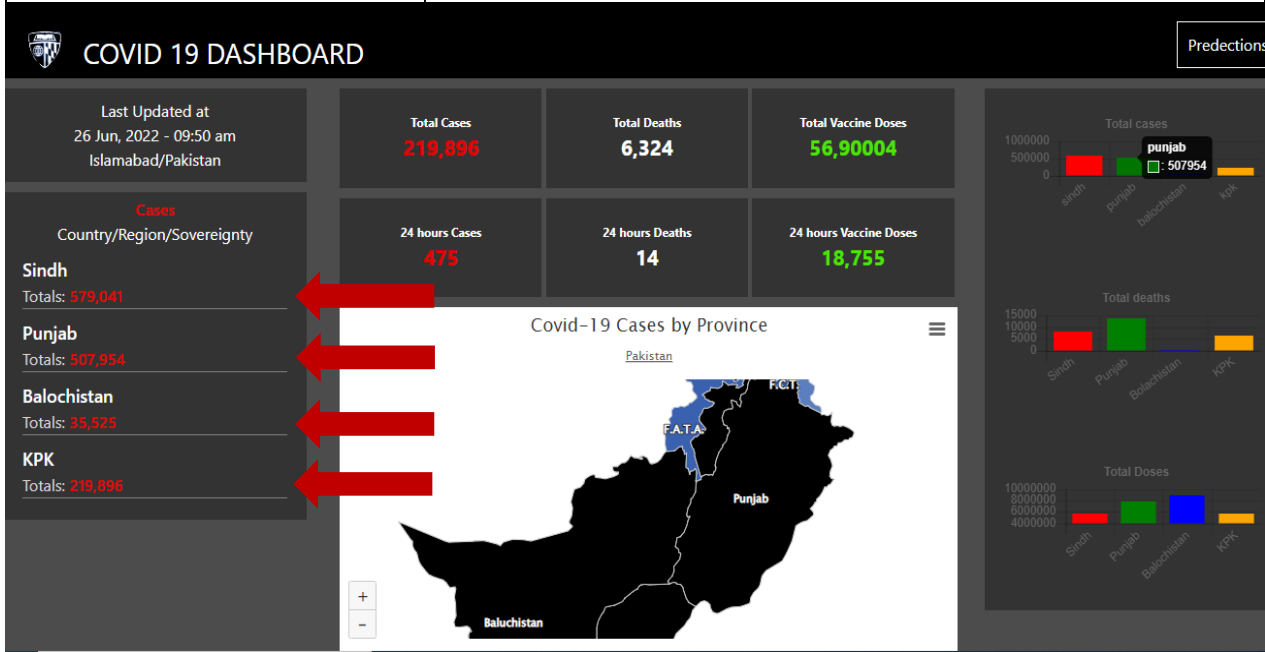
Test Case Number	1
Test Case Name	Open IDDM
Description	Testing application whether it runs on web browser or not
Testing Techniques	Unit Testing, Black Box Testing
Preconditions	Web browser will be there on your system
Steps	Open web browser

	Enter URL of SICD
Status	Test Case Passed Successfully

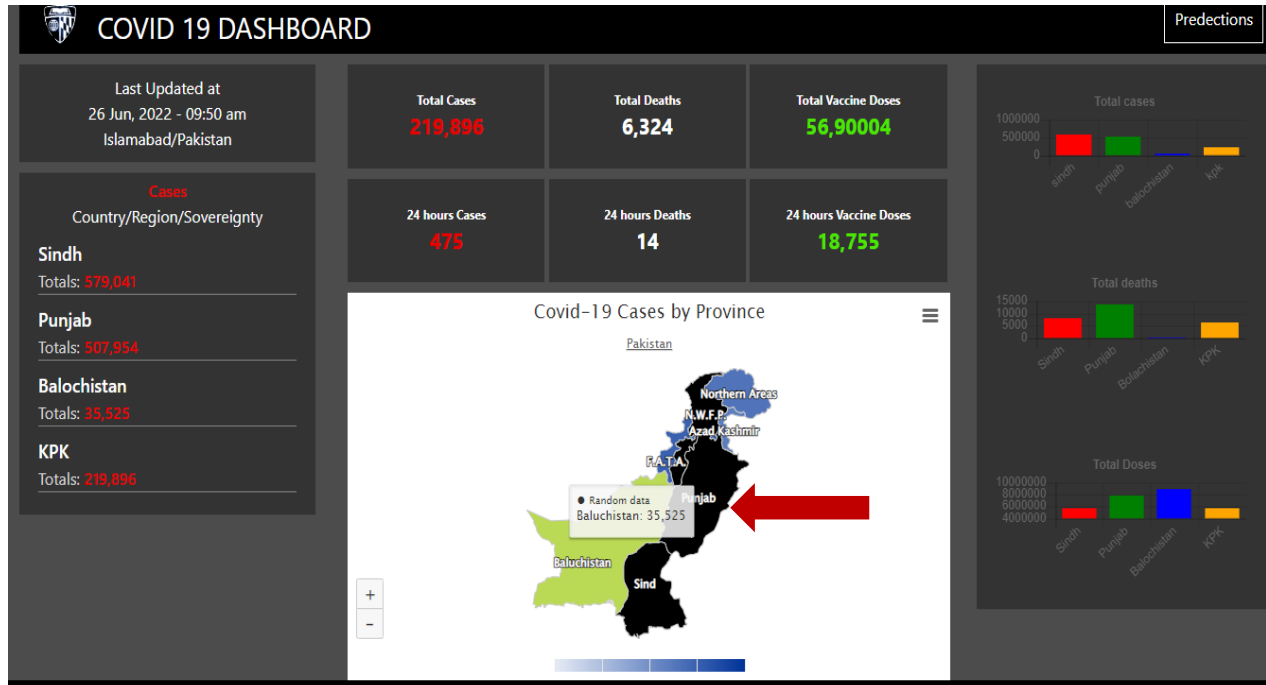


Test Case Number	2
Test Case Name	Move to infectious diseases statistics
Description	Choose data of provinces
Testing Technique	Unit Testing, Black Box Testing
Input Values	Click on diseases button
Expected Output	Province wise outbreak/ vaccination data will be displayed
Actual Output	Province wise outbreak/ vaccination data will be displayed

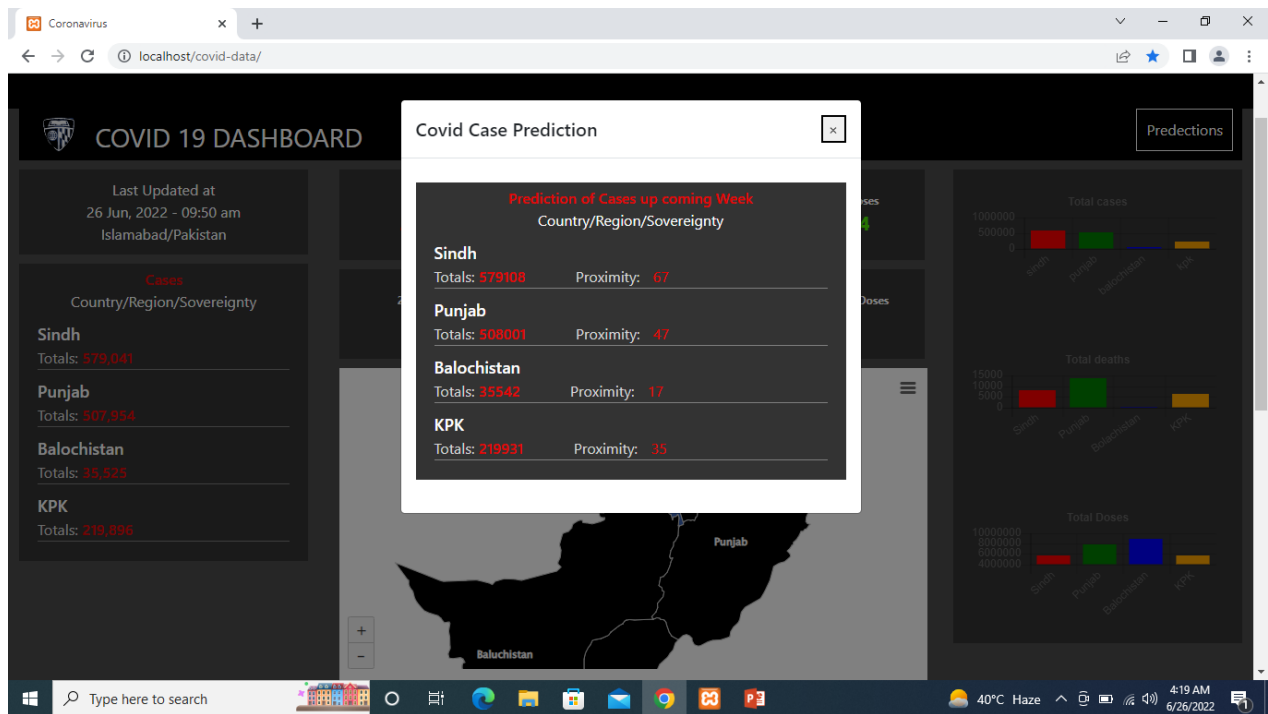
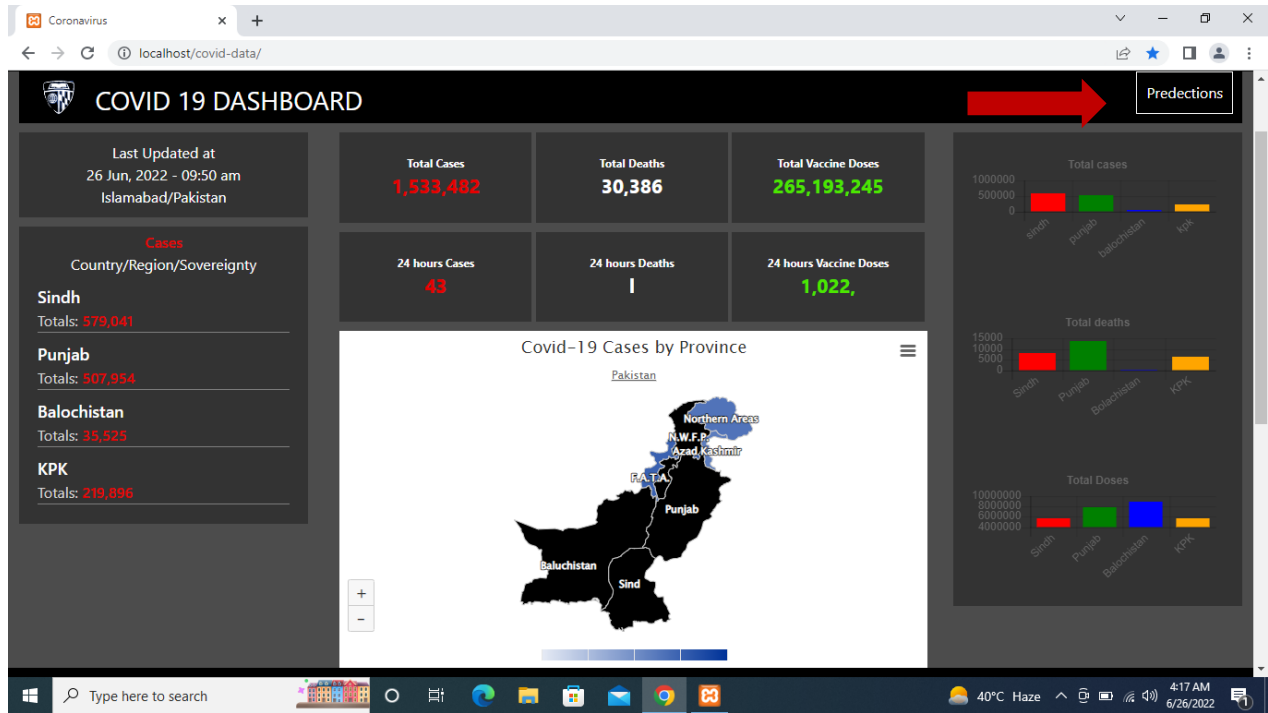
Status	Test Case passed successfully
---------------	-------------------------------



Test Case Number	3
Test Case Name	Geographical statistics
Description	Shows outbreak data against the map
Testing Technique	Unit Testing, Black Box Testing
Input Values	Place the cursor on the locations of map to get pop up data
Expected Output	Disease infection data is popped up
Actual Output	Disease infection data should pop up
Status	Test Case passed successfully



Test Case Number	4
Test Case Name	Predict the infection rate for coming week
Description	Predict infection rate through machine learning algorithms
Testing Technique	Unit Testing, Black Block Testing
Input Values	Click on Identify “Predictions” button
Expected Output	Outbreak predictions will be shown location wise
Actual Output	Outbreak predictions will be shown location wise
Status	Test Case successfully passed



CHAPTER 6
CONCLUSION

Chapter 6: Conclusion

In this thesis, we discussed a disease predictive system that can handle infectious diseases spread problems smartly and more efficiently than the typically used systems by using live data for processing. Our proposed system has an advantage over other traditional systems due to the latest linear regression algorithms used for the detection and predictions. As Pakistan is new in the world of IT and Software use as compared to the rest of the world ,we as a nation are not very much educated in exploiting the full benefit of our resources and protecting our selves from the infectious diseases .This project aims to help the government and the nation to better monitor evaluate ,predict and prevent the spread of various diseases also providing the benefit of not going to very expensive foreign made software solutions but instead relying on the domestic market to meet the demands of the populations and exporting such ideas to the foreign markets. We are concentrating on growing output and overcoming difficulties in prevailed solutions of the past by using the modern practices. Additionally, on attainment of objectives we will be able to save precious time and resources before they are committed. Hence our project will save time as well as the prestigious lives of patients.

CHAPTER 7
FUTURE WORK

CHAPTER 7: FUTURE WORK

Future milestones that need to be achieved to commercialize this project are the following.

Future milestones that need to be achieved to commercialize this project are the following.

7.1 Water Borne Diseases:

Most of the drinking fresh water sources such as rivers, lakes, and streams have explicit quality criteria that specify their quality. Additionally, water conditions for other applications/usages retain their standards. For instance, irrigation water must be neither too salty nor encompass contaminated constituents that can move shift to the plants or soil and consequently abolishing the bionetworks. Water quality for industrial uses also entails diverse properties grounded on the explicit manufacturing practices. Some of the small-estimated assets of fresh water, such as ground and surface water, are natural water assets. Nevertheless, such assets can be soiled by human/industrialized undertakings and other natural progressions.

Therefore, hurried manufacturing growth has triggered the deterioration of water quality at an upsetting degree. Furthermore, infrastructures, with the nonappearance of civic mindfulness, and fewer sterile potentials, significantly distress the quality of drinking water. In fact, the magnitudes of adulterated drinking water are so dangerous and can gravely upset health, the atmosphere, and foundations. As per the United Nations (UN) report, about 1.5 million people perish each year because of polluted aquatic-compelled diseases. In emerging countries, it is stated that 80% of well-being complications are

produced by filthy drinking water. Five million deaths and 2.5 billion ailments are reported annually. Such a mortality rate is higher than deaths resulting from accidents, crimes, and terrorist attacks

References and Work Cited

1. jglobalbiosecurity.com/article available at <https://jglobalbiosecurity.com/articles/66/print/>
2. Cocodataset.org. 2021. *COCO - Common Objects in Context*. [online] Available at: [<https://cocodataset.org/>](https://cocodataset.org/)

check-plagiarism.com/#

89% Unique Content 11% Plagiarized content ✓ COMPLETED 100%

Sentence wise results Matched URLs

unique	3 Output Extraction: 6 1.4.
unique	4 Decision based upon Outputs: 6 1.4.5 Integration: 6 1.4.
unique	6 GUI presentation: 6 1.5 Objectives 7 1.5.
unique	1 General Objectives: 7 1.5.
unique	2 Academic Objectives: 7 1.6 Scope 7 1.7 Deliverables 8 1.
unique	8 Relevant Sustainable Development Goals 8 1.
Plagiarized	9 Structure of Thesis 8 Chapter 2: Literature Review 9 2. Compare
Plagiarized	1 Industrial background 9 2. Compare
unique	2 Existing solutions and their drawbacks 10 2.2.
unique	1 Artificial neural network 10 2.2.
unique	2 Decision trees 11 Chapter 3: Interfacing 12 3.1.1 Interfacing 12 3.1.1 Map 12 3.1.
unique	2 Granhe

Generate Plagiarism Report

Keywords Words Density

Download Extension - Earn \$10
Guaranteed 10% Cash back on your first purchase with us FatCoupon

Open

9:56 AM 5/27/2022

check-plagiarism.com/#

95% Unique Content 5% Plagiarized content ✓ COMPLETED 100%

Sentence wise results Matched URLs

unique	Chapter 2: Literature Review A new product is introduced in the market only after i...
unique	requisite adjustments had been made, previous flaws removed and efficiency is enhan...
unique).
unique	Evaluation of the work done on an idea to bring it into the form economically viabl...
unique	Likewise, for the development of a product, and for its replacement, related to Dis...
unique	Our research is divided into the following points.
unique	• Industrial Background • Existing solutions and their drawbacks • Research Papers 2.
unique	1 Industrial background In today's era, one of the major issues faced across the wo...
unique	It has led to many further problems, as discussed in Problem Statement, which incre...
unique	Ultimately, it results in a big marketplace for industrial development.
unique	Initially, Pakistani medical systems were barren.
unique	Then, these started growing under liberal policies resulting in increase in industrial

Generate Plagiarism Report

Keywords Words Density

Download Extension - Earn \$10
Guaranteed 10% Cash back on your first purchase with us FatCoupon

Open

9:53 AM 5/27/2022

Signature of Supervisor
Dr Ihtisham Ul Islam