Medical Information Extraction System for Patient History

BY

Shekh Abdullah- Al- Noman

ID: 173-15-10461

Md Nasim

ID: 173-15-10463

and

Ahmed Ragib Hasan
ID: 173-15-10487

This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Computer Science and Engineering.

Supervised By

Mr. ABDUS SATTAR
Assistant Professor
Department of CSE
Daffodil International University

DAFFODIL INTERNATIONAL UNIVERSITY

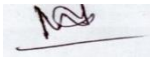
DHAKA, BANGLADESH

January 2022

APPROVAL

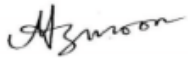
This Project/internship titled **"Medical Information Extraction System for Patient History"**, submitted by Shekh Abdullah- Al- Noman ID No:173-15-10461, Md Nasim ID No: 173-15-10463 and Ahmed Ragib Hasan ID No: 173-15-10487 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 4th January 2022.

BOARD OF EXAMINERS



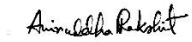
Chairman

Dr. Md. Ismail Jabiullah
Professor
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University



Internal Examiner

Nazmun Nessa Moon (NNM)
Assistant Professor
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil International University



Internal Examiner

Aniruddha Rakshit (AR)
Senior Lecturer
Department of Computer Science and Engineering
Faculty of Science & Information Technology
Daffodil Interational University

External Examiner

Dr. Md Arshad Ali
Associate Professor
Department of Computer Science and Engineering
Hajee Mohammad Danesh Science and Technology University

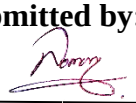
DECLARATION

We hereby declare that, this thesis base project has been done by us under the supervision of **Mr. Abdus Sattar, Assistant Professor of CSE Department,** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

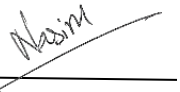
Supervised by:

Mr. Abdus Sattar
Assistant Professor
Department of CSE
Daffodil International University

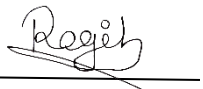
Submitted by:



Shekh Abdullah- Al- Noman
ID: 173-15-10461
Department of CSE
Daffodil International University



Md. Nasim
ID: 173-15-10463
Department of CSE
Daffodil International University



Ahmed Ragib Hasan
ID: 173-15-10487
Department of CSE
Daffodil International University

©Daffodil International University

ACKNOWLEDGEMENT

First, we express our heartiest thanks and gratefulness to almighty God for His divine blessing makes us possible to complete the final year project/internship successfully.

We are really grateful and wish our profound our indebtedness to **Mr. Abdus Sattar, Assistant Professor of CSE Department**, Daffodil International University. Deep Knowledge & keen interest of our supervisor in the field of "**Medical Information Extraction System for Patient History**" to carry out this project. Our research base project base on web platform"

His endless patience, scholarly guidance, continual encouragement, constant and energetic supervision, constructive criticism, valuable advice, reading many inferiors draft and correcting them at all stage have made it possible to complete this project.

We would like to express our heartiest gratitude to Prof. **Dr. Touhid Bhuiyan Head, Department of CSE**, for his kind help to finish our project and also to other faculty member and the staff of CSE department of Daffodil International University.

We would like to thank our entire course mate in Daffodil International University, who took part in this discussion while completing the course work.

Finally, we must acknowledge with due respect the constant support and patients of our parents.

ABSTRACT

We have surveyed some remote area samples through both online response and physical survey, where we focused on the parameters and specific keywords that constructed and novel updated data samples of the conducted survey regions. Through our conducted survey and processed novel dataset, we concluded the percentage of dominant demographics common health issues, their treatment locations, their further treatment of doctor suggested treatment locations, the origination capabilities of physical medical documents, and many other parameters. Our survey generated a decision where the larger demography expressed their recurring need to visit remote doctors and medical centers for treatment. Different sections of our survey report concluded that while visiting these remote medical centers, they have often failed to organize their medical history documents. These reports solidify the need for a digital patient history database and the centralization of this database for ease of access from any location or medical center, or doctor’s chamber. Our project has also shed some light on the software and technical architecture that could be the foundation of a centralized database for patients' medical history.

TABLE OF CONTENTS

LIST OF FIGURES

CHAPTER 1
INTRODUCTION

1.0 Introduction

The population of our country is distributed in geographical hierarchy divisions such as the village, Thana, Upazila, Divisions, and such. Hospitals, Specific specialists, diagnostic centers, and all other medical facilities did not reach each of these geographic locations. As a result, patients have to usually travel to immediate hierarchy locations such as from village to thana or from Upazila to a central city in the division. But on the other hand, the internet and mobile or laptop devices have reached almost all corners of the landscape. As a result, the documentation of medical records, history, reports prescriptions can be managed remotely, and data integrity can be ensured. Utilizing this digitized advantage, we introduce a web application that will contain the medical history data of every patient for hospitals, doctors, or patients can access data from anywhere anytime. Easy and User-friendly data input methods for users will be available to help enrich the database as efficiently as possible. They are making the process of reading medical reports and prescriptions and entering those data into the database. An opportunity for digital collaboration between the databases created by the hospital surfaces with this infrastructure and proposed methodology. Individual profiles for doctors and patients will create a safe and organized data environment for access and lifetime backup. The interface will guide the average users to input their medical records.

1.1 Motivation

Nowadays, keeping medical records as hard copies is a hassle for everyone. Therefore, our system will keep medical records online that everyone can easily access from anywhere, anytime. Without previous patient data, doctors hesitate for proper treatment.

Some well-known Health institutions maintain different databases to keep their patient information. However, even some of them follow the traditional ways to retain information. As each hospital and clinic use separate databases, we aim to create a central database.
Every hospital will have access to our database as we keep the entire history of patients. So that doctors in hospitals can use patients' previous medical history for better treatment in the

future. And this is very important for a doctor to have prior records. Doctors can make accurate decisions if doctors have an organized previous medical history. We want to ensure a more hands-on proactive control from the user ends in our database so that the general public can use or access their health information no matter where they are taking their treatments from.

We are motivated to solve this discrete and analog medical information extraction system, fully digital and centralized with quick accessibility.

1.2 Problem Definition

People can't keep their entire medical history from birth if they try to maintain their paper documents; those documents destroy over time.

After a diagnosis, people usually store their reports. But when they needed their previous reports, they didn't find something that seemed missing. So sometimes they lose their report. Also, they have to carry their reports if they move on to another place or the doctor refers them to another hospital in another district.

Not every user can use our system frequently. Mainly older people who don't know how to use digital applications too much. And also the rural areas where not everyone has smart devices.

1.3: Research Question

Here are the main questions that are focused on our system, given below:

1. How can we maintain the entire database?
2. What are the impacts on users?
3. Is every user benefited from using our system?
4. What are the limitations of working with machine learning in this system?

1.4: Research Objective

- To establish a central database to collaborate and integrate all the medical information of as many medical and healthcare centers as possible.

-The database will contain the users' medical history for medical personnel to access anytime. In addition, well-known hospital databases will collaborate with the central database for quick access to all medical information to the patient.

- Patients will also input their health information in the application to keep track of their health.
- Integrated AI inside the application will make the process of inputting medical info into the database more easy, quick, and as automated as possible.

1.5: Expected Outcome

1. Centralized database to store medical information.
2. Make sure patients can save their medical reports.
3. Every Hospital/Clinics have access to the database.
4. Doctors have access to patient information.

1.6: Report Layout

Chapter 1: In chapter one we will cover introductory lessons, motivation, problem definition, research question, research methodology and the expected outcome of our system.

Chapter 2: We will discuss the background of our project, some related work done before, the Bangladeshi perspective of this project, scope of the problem and about the challenges.

Chapter 3: Research Methodology section we show some experiments on data set, data pre-processing, architecture of the model. How we optimize our model shows the data augmentation. And how we train our model, validation of the model, model efficiency also research conclusion, requirements.

Chapter 4: In this chapter we put requirement and collection analysis features of our projects. We add our project UML diagram, ERD diagram and description, Activity diagram, Sequence diagram and back-end design and description of our project.

Chapter 5: We add some design layout and UI designs and descriptive analysis.

Chapter 6: Implementation and testing was an important part of the project so we discuss it in this chapter.

Chapter 7: We describe what is our future scope for this project.

CHAPTER 2
BACKGROUND

2.0 Introduction

There are no similar projects in Bangladesh that digitalize the entire medical system and put everything into a single database for ease of access. So the background is the medical information extraction system for patient history. Recent pandemic events have created a vast reformation demand in the medical sector, and we have also found some problems that could be technically addressed. Many private hospitals in our country utilize a patient database and digitalize all information, ensuring its safety and longevity. But we could benefit more from a collaborative system. Not only that but from the patient perspective, there's usually no dedicated system or access to the medical records that the concerned hospitals or centers collected. Their data can't be utilized in other centers or hospitals. This is why our platform could provide a standard interface for the patients to manage their medical records and collaborate with any system in any location for the benefit of accurate and efficient treatment.

2.1 Related work

We have conducted some related work studies to decide which aspects need more focus and have room for improvement. Previous work knowledge in the relevant field is an absolute must for our project. We found some successful applications of centralized medical databases and cited the paper in this section.

Research that focuses on the collaboration between distributed medical data that the patients face great complexity and usually don't have access to a full extent. The discrete medical data collected by different centres does not benefit the patients. Which is the issue this paper addresses [1].

Similar research shines a light on the problem of patients not having any access to their medical data beyond hospital limits. A reliable web-based infrastructure was introduced utilizing the web modules. Secure collaboration between the healthcare structures databases could be a challenging task in this research [2].

A study that is not technically relevant to our work, but the premise and the analyzed result proved a role model conclusion. This paper analyses the aftermath of a national and political reformation in the medical infrastructure in Denmark that is not digital but very much physical. It discusses the side effects of physical medical centers centralization and the reported results were compelling [3].

This article combines the collaboration of doctors, engineers and market analysts under the authorization of a telemedicine service provider to introduce an infrastructure that can tackle the issues of central medical administration and maintenance of medical cases and reports that are exchangeable among users. Users are provided with a platform for accessing and processing conversational, audio visual and other types of relevant medical data. Being quite old research the obstacles the face for web technology limitations can be overcome and integrated to derive more fruitful experience fora different settings [4].

Legacy research that tried to utilize the internet application to bring forth a fundamental change in the medical industry from a business service perspective. The proposed conceptual model locked on to a more personalized customer care and achieved significant business changes. Technological limitations kept it to an abstract form but worked as a road map for further research and development [5].

Another predecessor research that shed light on the IT and Telemedicine collaboration an alyzing multiple examples available in the research time [6].

The authors introduced CSCW (computer-supported cooperative work) procedures integrated and optimized for the medical service area. The research proposed a system to incorporate teleconsultation and remote diagnosis [7].

To tackle the scarcity of web-based medical collaboration, the authors introduced a multimedia object database that is web-based and allows real-time collaboration for the doctors to share patient records and intercommunication that sums up to be a medical system called CoMed[8].

At the time of this conducted research, the medical portal system was distributed. It could be accessed through public or corporate portals that shared the standard interface, which is the browser. The authors have reduced this vast information portal to manageable and accessible for specific departments and local concerns such as a doctor or physician's desk, insurance officer, or medical service consumers [9].

This research was conducted in the Pulmonary Department of the University Regional Hospital Patras, Greece to test the efficiency of AI based medical decision support concept called DSS. The interface took the form of a data evaluator implementing a generic DSS and having a KIB (knowledge information base) at its core [10].

The limitations of these relevant researches align with the technological constraints of their times.

2.2 Bangladesh Perspective

From the perspective of Bangladesh, our survey has concluded some results from minimal responses that there is a heavy demand for medical database centralization and medical record organization in cloud platforms for ease of access and data longevity. Many private hospitals have gathered massive data for their patients, which does not collaborate outside the hospital. However, it could be effective if a centralized collaboration could be established. Our research has considered both facts and figures of the system efficiency in this locality.

2.3 Scope of the problem

The scope of the problem is countrywide, where the main concerns are the remote areas. Right now, we conducted our survey on a minimal demographic and covered a very insignificant area but the same conclusions can be drawn all over the distributed areas and the prototype solution can be implemented to bring forth a solution. An easy-to-use platform has to be introduced to the population. There is still a massive lack of encouragement for using cloud storage and digital data instead of hardcopy. The idea of cloud data longevity is still absent and such technical awareness should be created in a world where online transactions, online educations, and online healthcare is in maximum demand. The physical world could be paralyzed at any moment by such disasters as pandemics. Lack of a digital infrastructure could be a huge disadvantage in the medical sector.

2.4 Challenges

1. Conducting more surveys to gain a clear insight into the situation and compare initial reports.

2. Making the interface simple enough for the concerned population to understand and utilize.

3. Coping with the transition of digitization of medical data from hard copies to cloud storage.

4. Ensuring reliable servers and cost-management for the centralized database to stay active.

CHAPTER 3
RESEARCH METHODOLOGY

3.0 Introduction

We have initiated a carefully constructed survey form with specifically targeted parameters to create our novel dataset and locked it on to some specific requirements. The research methodology was decided on the conclusive statistics from the survey. Survey results worked as a road map for our research and project methodology.

3.1 Research Survey

For our model, we have used our novel data set surveyed and collected from concerned demographics focusing on specific parameters that helped us come to necessary conclusions. A data set performs as good as the data it is allowed to work with

And we had to make sure our dataset was aligned with the redeeming qualities of a good dataset that is ideal for training and testing a model for maintaining specific accurate predictions.

In this regard, the size of the dataset is an important factor. Larger datasets help the research explore larger possibilities and enable more accurate clustering or classification to decide on a result.

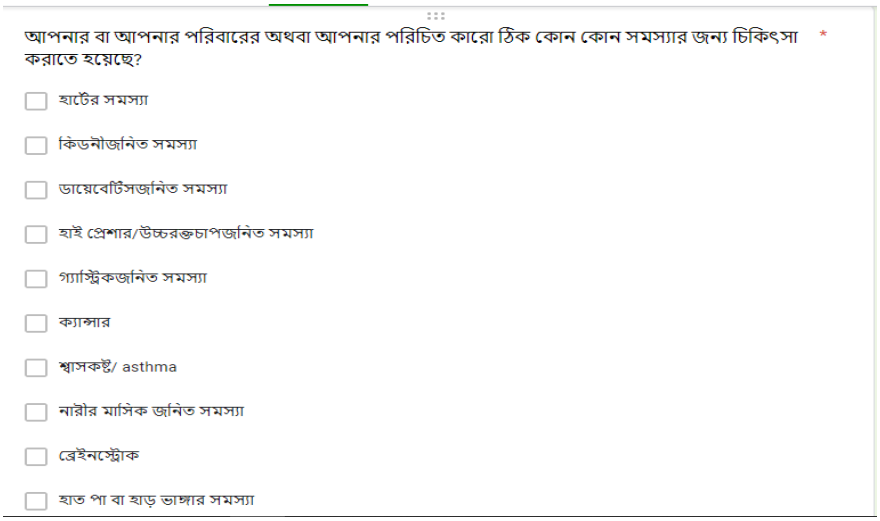


Figure 3.2.1 – Survey from sample

3.2 Data Pre-Processing

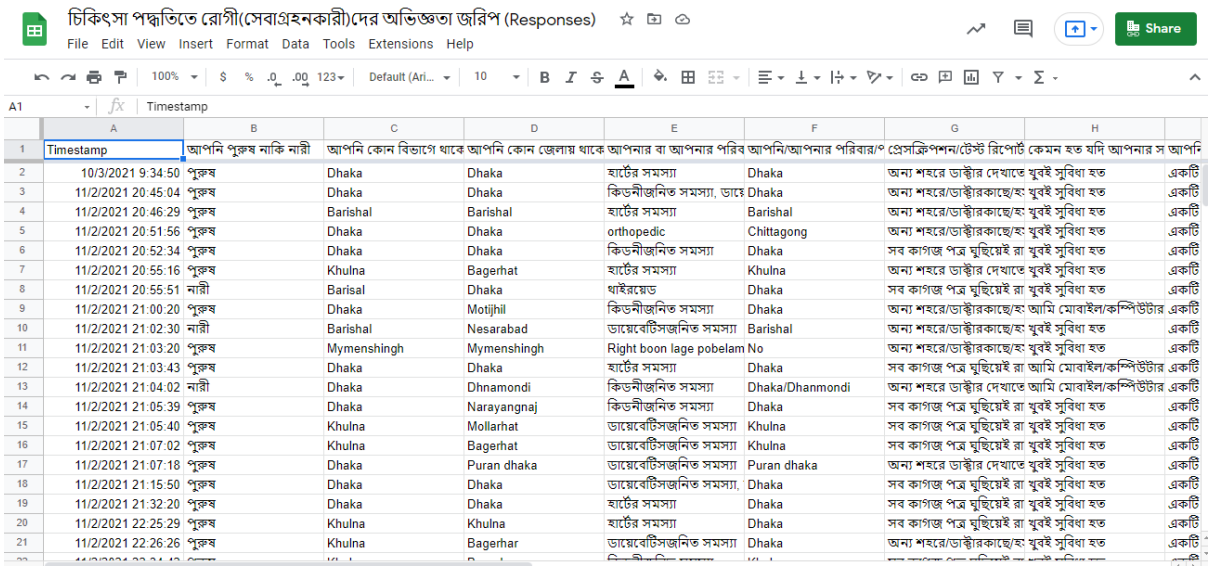
Noise-free clean data set where null values or errors aren't dominant is also a prerequisite for accurate predictions.

Numerical or more specifically binary dataset proves to be much more appropriate than text format datasets.

We also pre-processed it to perfection where all kinds of noise, null, the overlap were avoided, as a result, we were able to come to effective decisions with the help of our dataset analysis.

Though this also means the data is very specific and does not explore in-depth information.

But the dataset helped us full fill our objective in discriminating a specific set of symptoms into disease pre-coursers.


চিকিৎসা পদ্ধতিতে রোগী(সেবাগ্রহনকারী)দের অভিজ্ঞতা জরিপ (Responses)

File Edit View Insert Format Data Tools Extensions Help

Share

A1 Timestamp

	A	B	C	D	E	F	G	H	
1	Timestamp	আপনি পুরুষ নাকি নারী	আপনি কোন বিভাগে থাকে	আপনি কোন জেলায় থাকে	আপনার বা আপনার পরিব	আপনি/আপনার পরিবার/	প্রেসক্রিপশন/টেস্ট রিপোর্ট	কেমন হত যদি আপনার স	আপনি
2	10/3/2021 9:34:50	পুরুষ	Dhaka	Dhaka	হার্টের সমস্যা	Dhaka	অন্য শহরে ডাক্তার দেখাতে	খুবই সুবিধা হত	একটি
3	11/2/2021 20:45:04	পুরুষ	Dhaka	Dhaka	কিডনীজনিত সমস্যা, ডায়ে	Dhaka	অন্য শহরে/ডাক্তারকাছে/হ	খুবই সুবিধা হত	একটি
4	11/2/2021 20:46:29	পুরুষ	Barishal	Barishal	হার্টের সমস্যা	Barishal	অন্য শহরে/ডাক্তারকাছে/হ	খুবই সুবিধা হত	একটি
5	11/2/2021 20:51:56	পুরুষ	Dhaka	Dhaka	orthopedic	Chittagong	অন্য শহরে/ডাক্তারকাছে/হ	খুবই সুবিধা হত	একটি
6	11/2/2021 20:52:34	পুরুষ	Dhaka	Dhaka	কিডনীজনিত সমস্যা	Dhaka	সব কাগজ পত্র ঘুছিয়েই রা	খুবই সুবিধা হত	একটি
7	11/2/2021 20:55:16	পুরুষ	Khulna	Bagerhat	হার্টের সমস্যা	Khulna	অন্য শহরে ডাক্তার দেখাতে	খুবই সুবিধা হত	একটি
8	11/2/2021 20:55:51	নারী	Barisal	Dhaka	থাইরয়েড	Dhaka	সব কাগজ পত্র ঘুছিয়েই রা	খুবই সুবিধা হত	একটি
9	11/2/2021 21:00:20	পুরুষ	Dhaka	Motijhil	কিডনীজনিত সমস্যা	Dhaka	অন্য শহরে/ডাক্তারকাছে/হ	আমি মোবাইল/কম্পিউটার	একটি
10	11/2/2021 21:02:30	নারী	Barishal	Nesarabad	ডায়েবেটিসজনিত সমস্যা	Barishal	অন্য শহরে/ডাক্তারকাছে/হ	খুবই সুবিধা হত	একটি
11	11/2/2021 21:03:20	পুরুষ	Mymenshingh	Mymenshingh	Right boon lage pobelam	No	অন্য শহরে/ডাক্তারকাছে/হ	খুবই সুবিধা হত	একটি
12	11/2/2021 21:03:43	পুরুষ	Dhaka	Dhaka	হার্টের সমস্যা	Dhaka	সব কাগজ পত্র ঘুছিয়েই রা	আমি মোবাইল/কম্পিউটার	একটি
13	11/2/2021 21:04:02	নারী	Dhaka	Dhnamondi	কিডনীজনিত সমস্যা	Dhaka/Dhanmondi	অন্য শহরে ডাক্তার দেখাতে	আমি মোবাইল/কম্পিউটার	একটি
14	11/2/2021 21:05:39	পুরুষ	Dhaka	Narayangnaj	কিডনীজনিত সমস্যা	Dhaka	সব কাগজ পত্র ঘুছিয়েই রা	খুবই সুবিধা হত	একটি
15	11/2/2021 21:05:40	পুরুষ	Khulna	Mollarhat	ডায়েবেটিসজনিত সমস্যা	Khulna	সব কাগজ পত্র ঘুছিয়েই রা	খুবই সুবিধা হত	একটি
16	11/2/2021 21:07:02	পুরুষ	Khulna	Bagerhat	ডায়েবেটিসজনিত সমস্যা	Khulna	সব কাগজ পত্র ঘুছিয়েই রা	খুবই সুবিধা হত	একটি
17	11/2/2021 21:07:18	পুরুষ	Dhaka	Puran dhaka	ডায়েবেটিসজনিত সমস্যা	Puran dhaka	অন্য শহরে ডাক্তার দেখাতে	খুবই সুবিধা হত	একটি
18	11/2/2021 21:15:50	পুরুষ	Dhaka	Dhaka	ডায়েবেটিসজনিত সমস্যা,	Dhaka	সব কাগজ পত্র ঘুছিয়েই রা	খুবই সুবিধা হত	একটি
19	11/2/2021 21:32:20	পুরুষ	Dhaka	Dhaka	হার্টের সমস্যা	Dhaka	সব কাগজ পত্র ঘুছিয়েই রা	খুবই সুবিধা হত	একটি
20	11/2/2021 22:25:29	পুরুষ	Khulna	Khulna	হার্টের সমস্যা	Dhaka	সব কাগজ পত্র ঘুছিয়েই রা	খুবই সুবিধা হত	একটি
21	11/2/2021 22:26:26	পুরুষ	Khulna	Bagerhar	ডায়েবেটিসজনিত সমস্যা	Dhaka	অন্য শহরে/ডাক্তারকাছে/হ	খুবই সুবিধা হত	একটি

Figure 3.3.1 – Data Pre-processing

3.3 Data Augmentation

The pre-processed data was used to generate individual charts and graphs and necessary augmentation provided more insight and custom reports for specific outcomes can be generated.

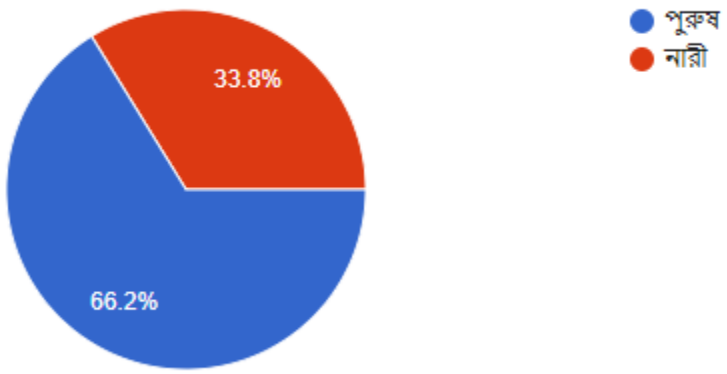


Figure 3.4.1 - Survey Report Sample 1

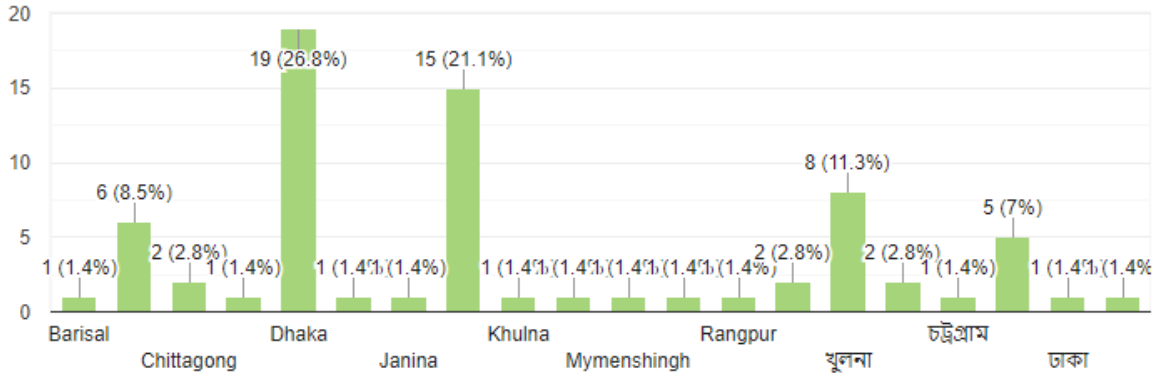


Figure 3.4.2 - Survey Report Sample 2

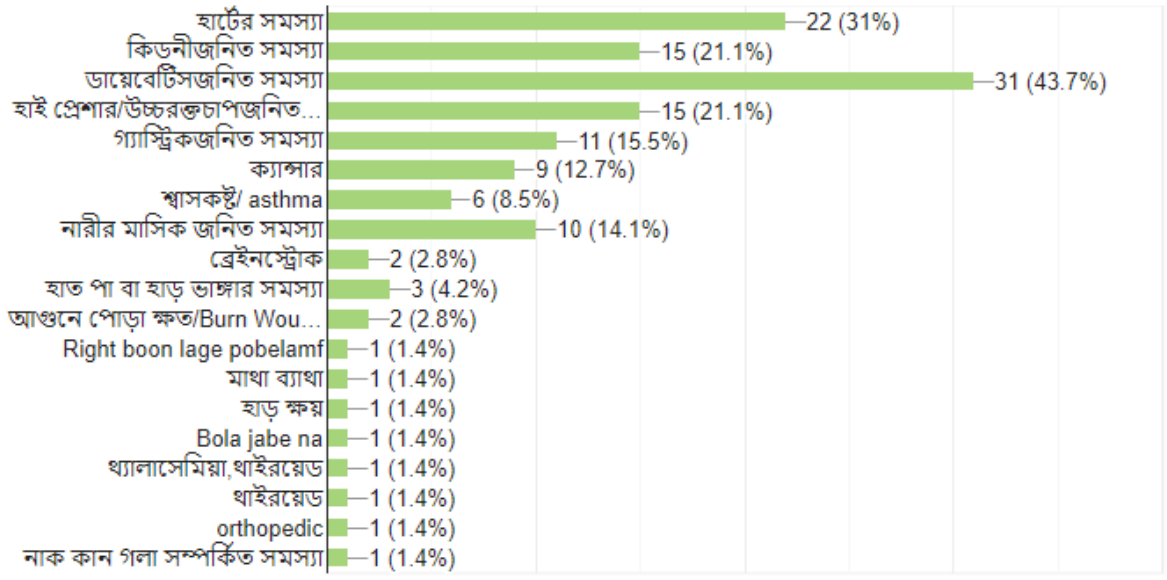


Figure 3.4.3 - Survey Report Sample 3

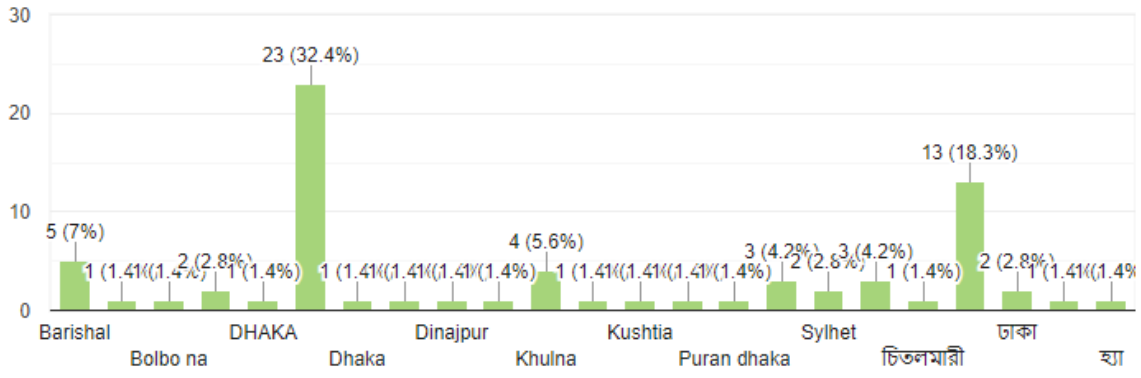


Figure 3.4.4 - Survey Report Sample 4

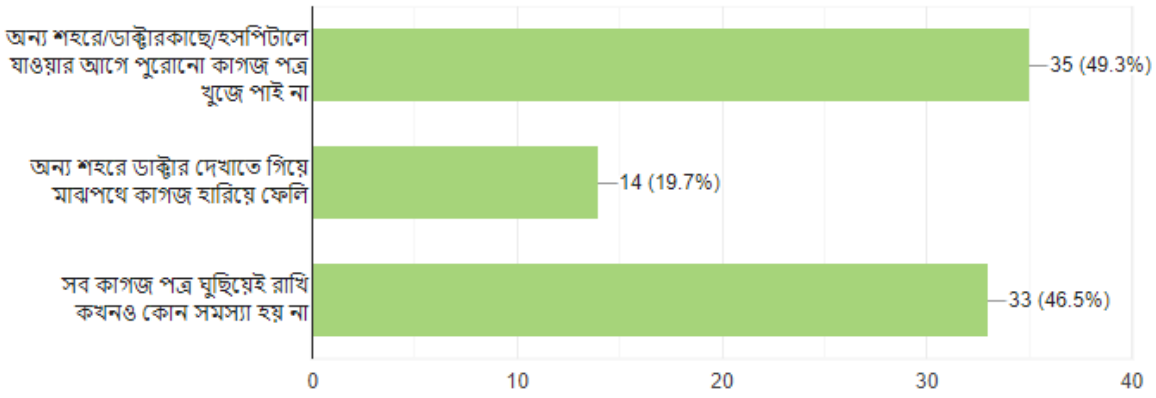


Figure 3.4.5 - Survey Report Sample 5

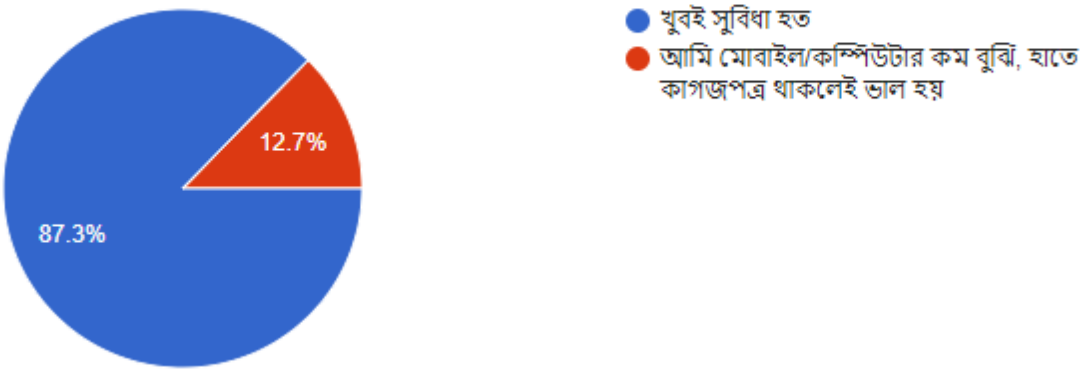


Figure 3.4.6 - Survey Report Sample 6

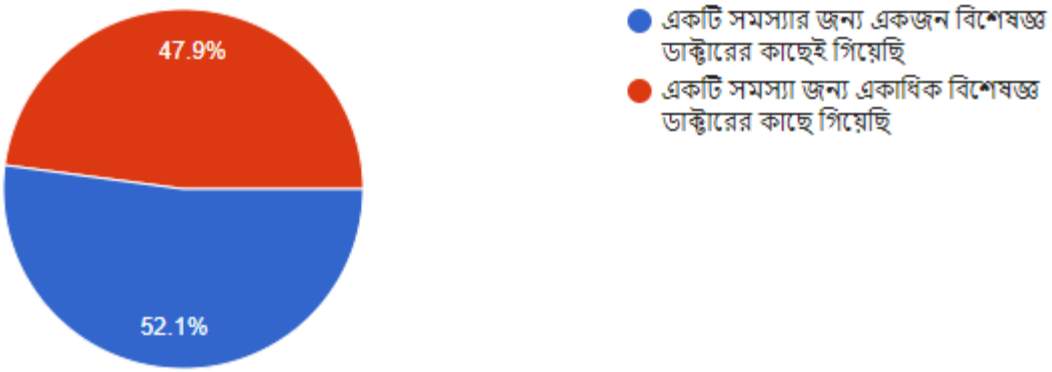


Figure 3.4.7 - Survey Report Sample 7

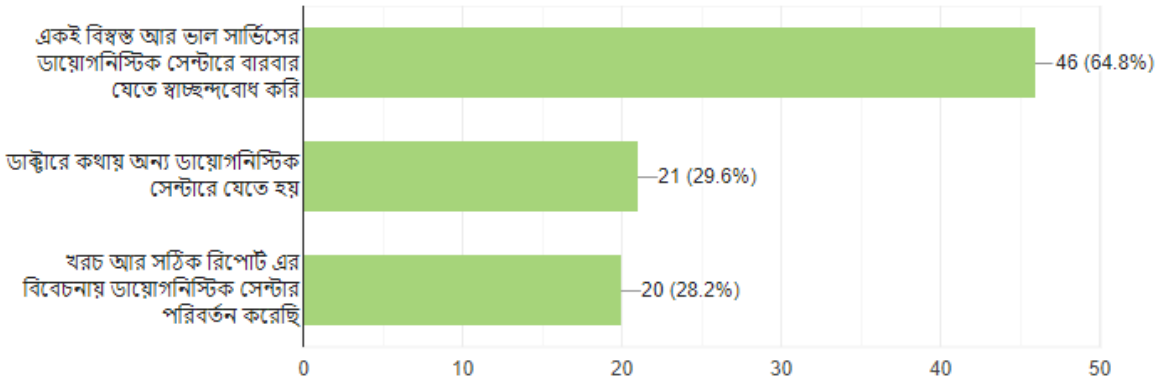


Figure 3.4.8 - Survey Report Sample 8

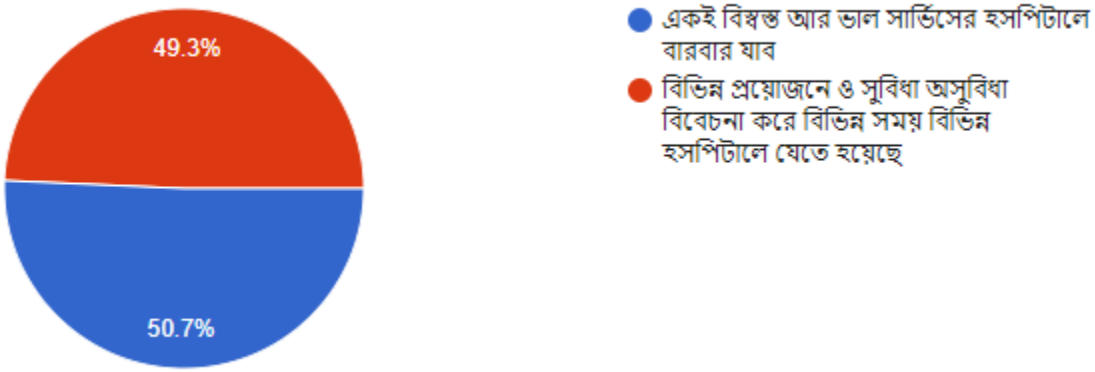


Figure 3.4.9 - Survey Report Sample 9

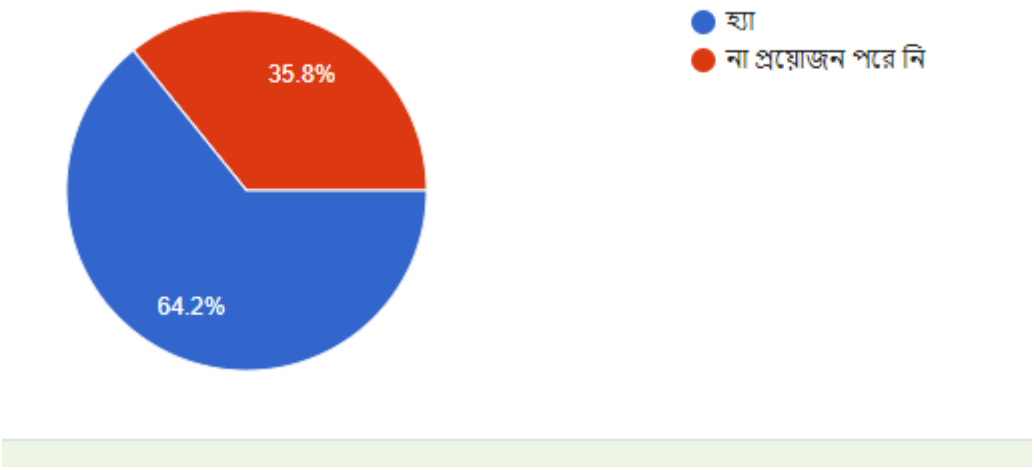


Figure 3.4.10 - Survey Report Sample 10

CHAPTER 4
REQUIREMENT SPECIFICATION

4.0 Requirement collection:

Our System UI is based on the Web application. It is also proper responsive for most of the devices available on the market. Being a web application, users can access it from any internet-connected device.

Hardware configuration required:

- Internet-connected device.
- Web browser.

Web application configuration required:

- OS: Any
- Tools: VS code
- Frontend: HTML5, CSS, Bootstrap, JavaScript.
- Backend: PHP, AJAX, JQuery.
- DB: MYSQL Database
- Server: AWS

It also provides the following requirements that are required:

- Availability
- Proper responsive
- User Friendly
- Efficiency working

4.1 Features

- Patient Management
    - Manage Prescription
    - Manage Report
    - Make Appointment
    - Check doctor schedule

- Doctor Management
    - Doctor Information
    - Doctor Time Management
    - Doctor Appointment
- Hospital Management
    - Manage employee information
    - Manage Doctor management
    - Manage patient information
    - Manage report
    - Manage appointment.

4.2 Use Case Modelling and Description

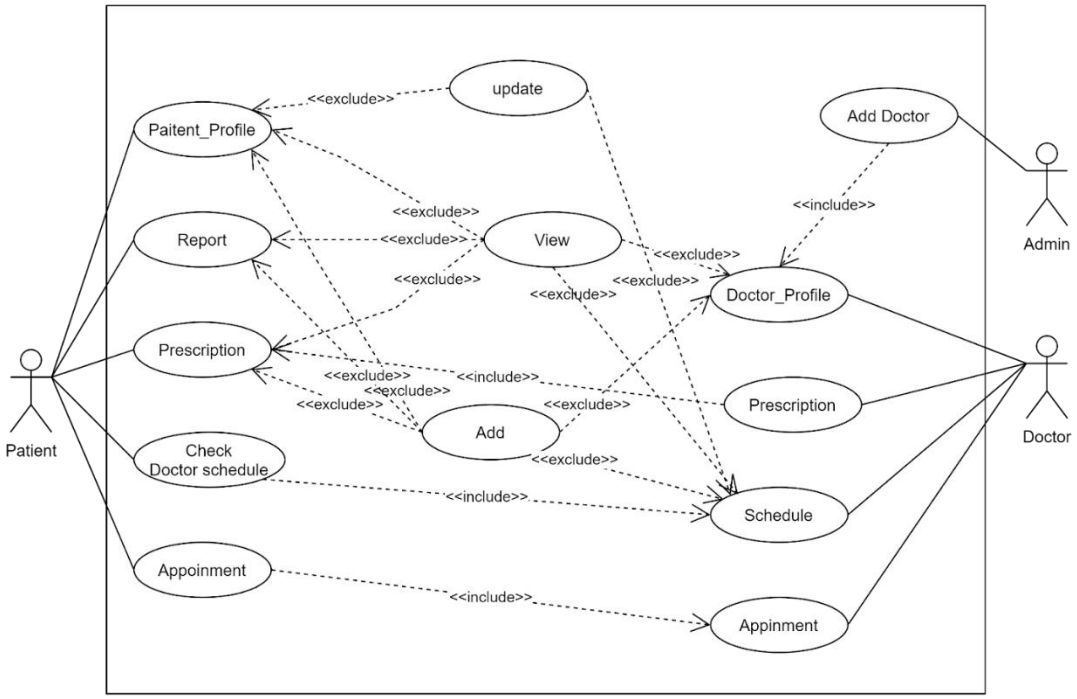


Figure 4.2.1: Use-case diagram.

In our system, there are three actors. Those are Admin, patient, and doctor.

Admin: - Admin can overview entire system data. They also can modify data if the system requires it. For example, only the admin can add a doctor to our system.

Doctor: - Doctors are one of the main actors in our system. They are arable to update their profile and schedule. Daily or weekly basis appointment checking is also a use case for them.

Patient: -They are the main actor in our system. Making an appointment, Checking the Doctor's schedule, report management, Prescription management, and managing own profile are the primary uses of our system for a patient.

4.3 Entity Relationship Diagram and Description

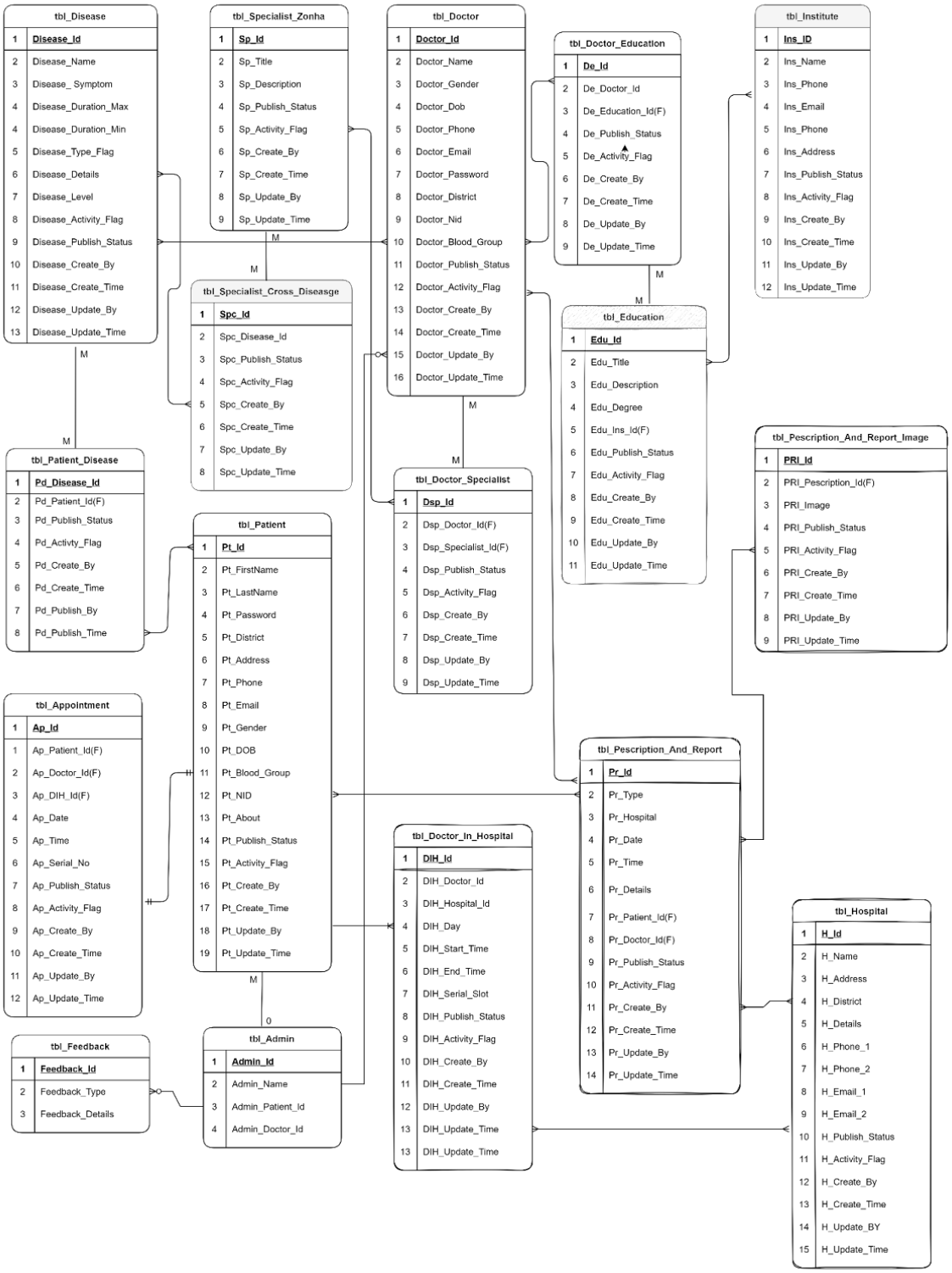


Figure 4.3.1: Entity relationship diagram.

Our system includes 17 entities with 21 interconnected relations. Therefore, three users' data is interconnected with many entities. For example, Doctors and patient entities connect with the doctor's schedule and create an appointment entity.

By using this diagram, our system can access selective data efficiently. It also stores the data created and updated time for future research and security purposes.

This diagram also follows the proper database designing format.

4.4 Activity Diagram and Description

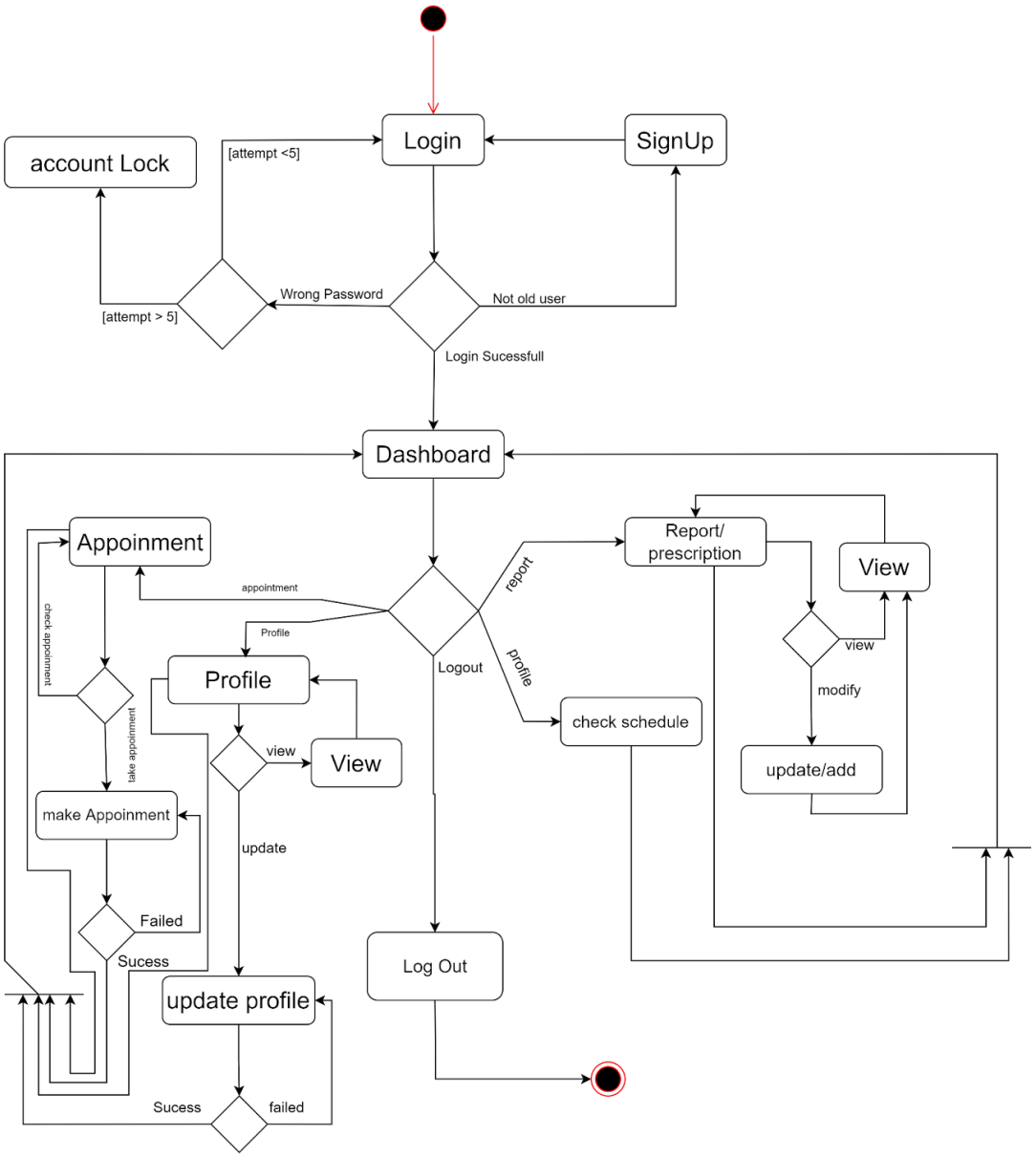


Figure 4.4.1: patient activity diagram

Activity diagram based on patient uses functionality within our system after successful login/signup user can access the dashboard.

Five options are available to the user in the dashboard. Each function has its unique feature. For example, a user can update/view his profile. Then, check and make an appointment also up to date his prescription and reports.

The system will terminate for a user when the user logout from the system.

4.5 Sequence Diagram and description

Sequence diagrams help to understand the proper flow of the system. For example, the sequence diagram is divided into three parts in the system.

I. Login/Signup Sequence Diagram-

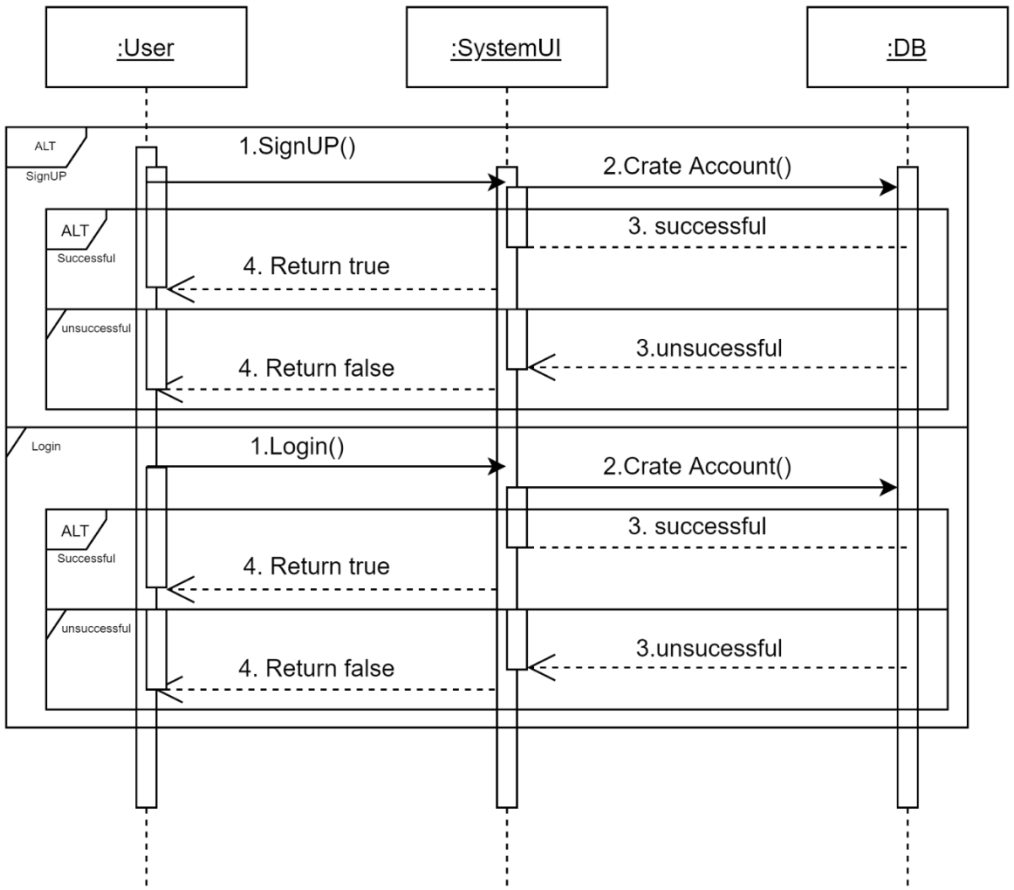


Figure 4.5.1: User Login Sequence Diagram

The first one explains the signup and login sequence. Without signup, users can't log in within our system. Therefore, we are maintaining the login flow priority basis of our system.

II. View Prescription and Report-

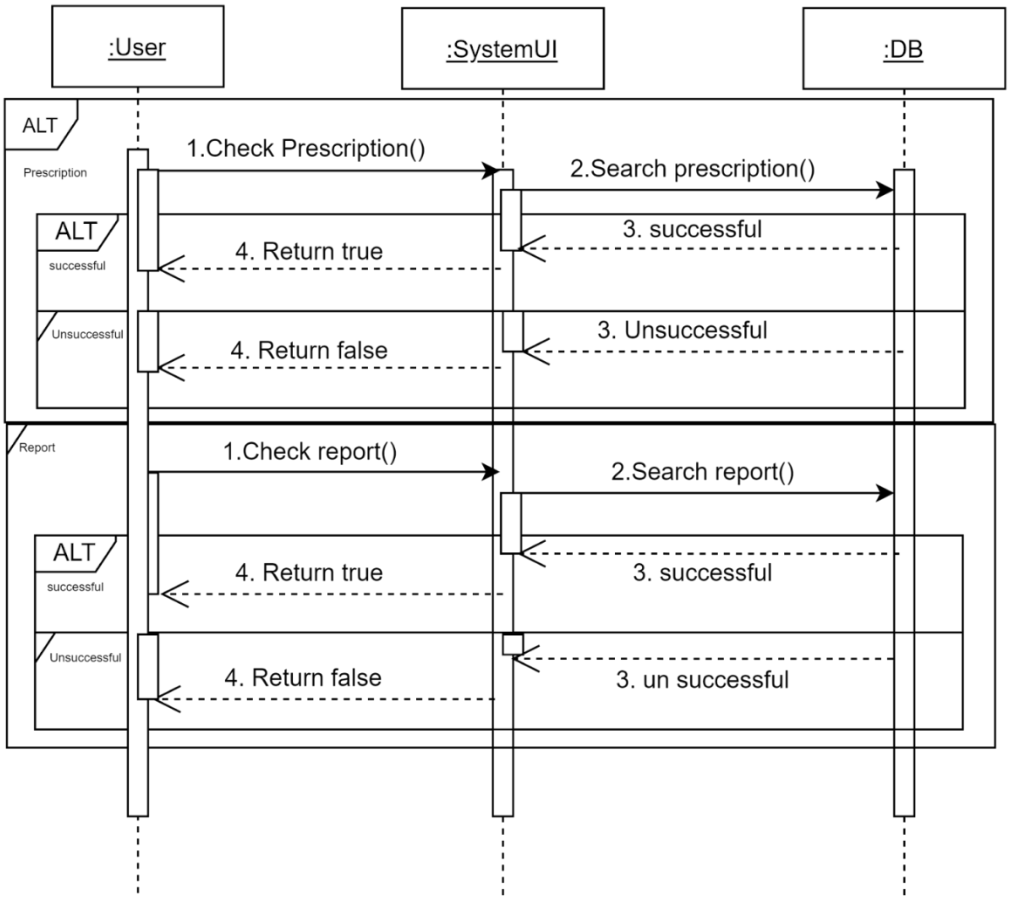


Figure 4.5.2: Checking Prescription or Report Sequence Diagram

The second one explains the prescriptions and reports storing the system's flow. Patients have to store/maintain data to retrieve those data later. WIthout data system shows no data available within our system.

II. Taking appointment-

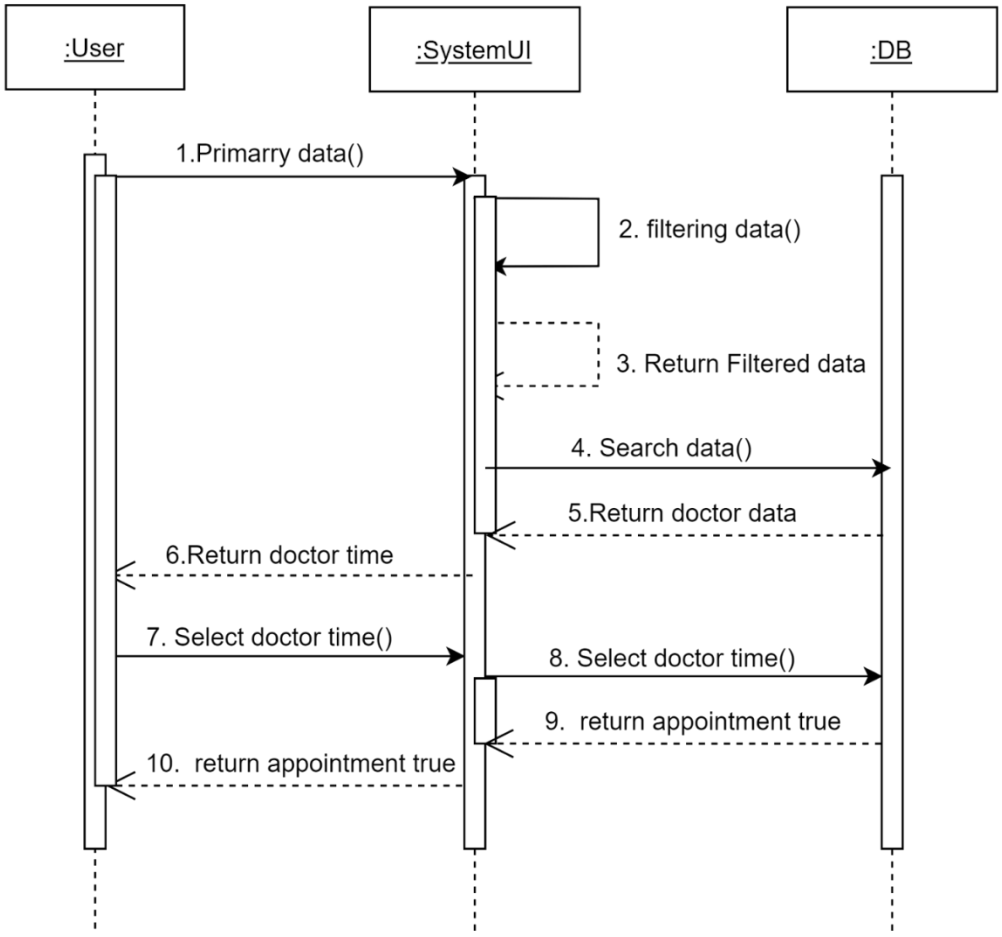


Figure 4.5.3: - User Appointment booking sequence

In the appointment sequence, the patient provides his problem, and our system will analyze the data. Then the patient has to select the doctor and his time for an appointment. After a successful appointment, our system provides the patient with an appointment serial number.

4.6: Back End Developing and Description

I. Server-side programming:

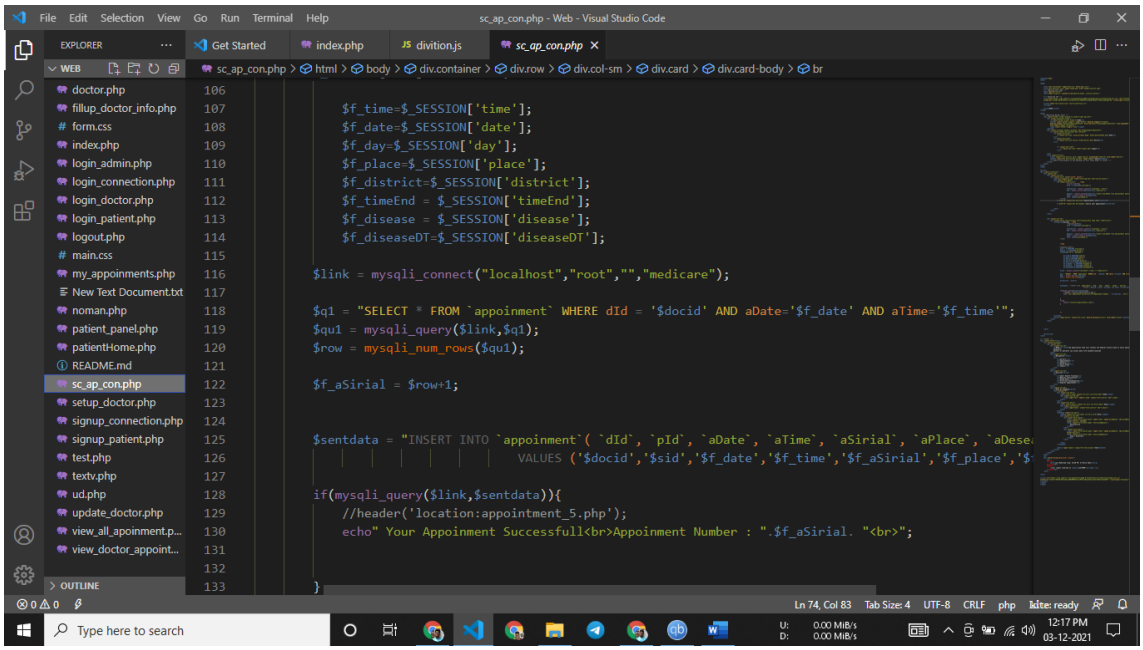


Figure 4.6.1: Backend developing using PHP and ajax

For backend development, we used PHP for server-side programming. Side by side, ajax helps us to provide dependent data without loading the main page.

II. Database on the server-

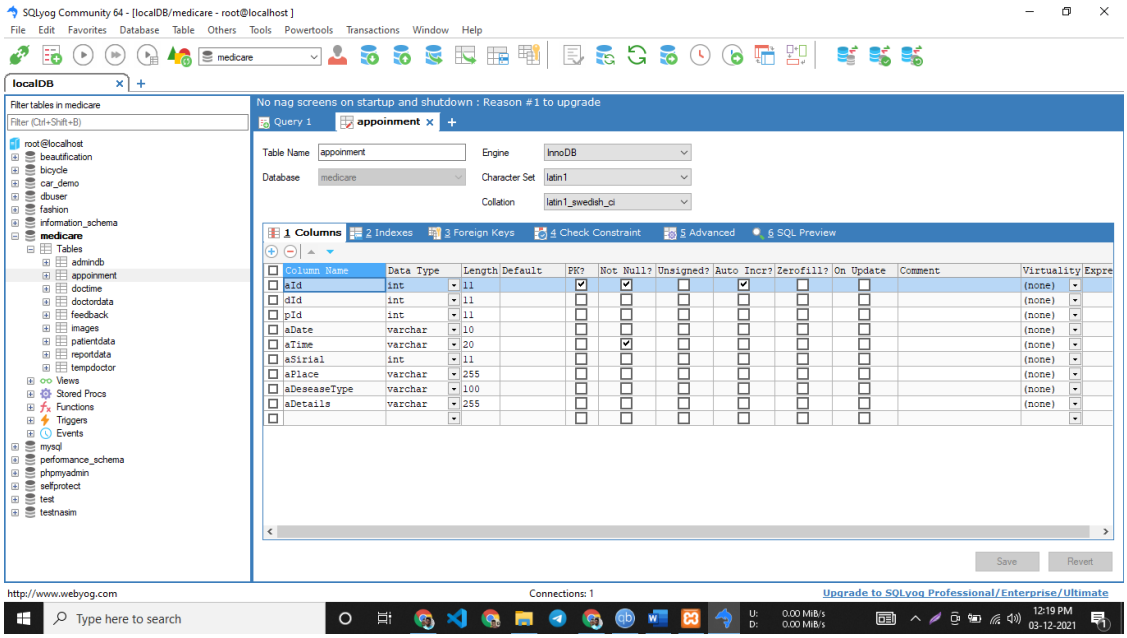


Figure 4.6.2: MySql Database on server

Our system uses the MySql database to maintain the whole data flow of our system. In addition, we place our database into AWS server for 24/7 reliability.

CHAPTER 5
DESIGN SPECIFICATION

5.0: Introduction

Technology plays an important role in the medical sector, here we digitize the whole medical system**.** To make sure of the use of our system our design should be interactive to the user end. A system without a clean interface is not a good system. The system has to be user-friendly, we want to give a good environment to the user and it's important to attach them with our system. As our system has all kinds of users we have to make sure that users can use our system properly and it's only possible to make a good user interface.

5.1: Front Page or UI design

Our front page presents the menu or options of this application with a navigation bar and a short brief about us.

5.1.a: Starting Window

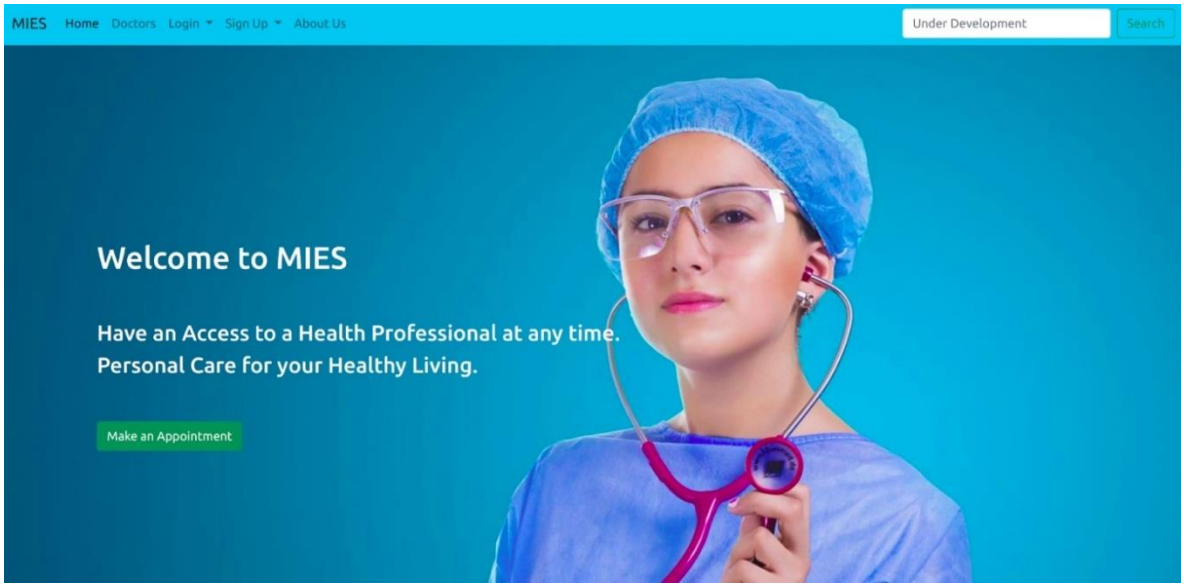


Figure 5.1.1: Homepage 1

5.1.b: Short brief about us

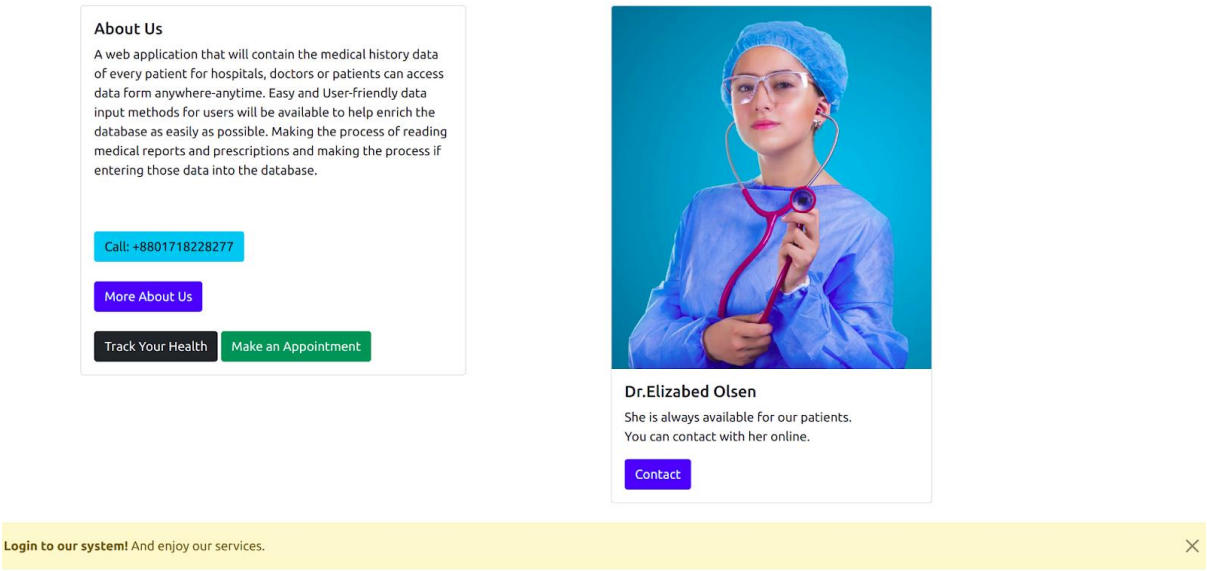


Figure 5.1.2: Home page 2

5.1.c: Patient search window

In this window, the admin can perform a patient search function and also view all patients.

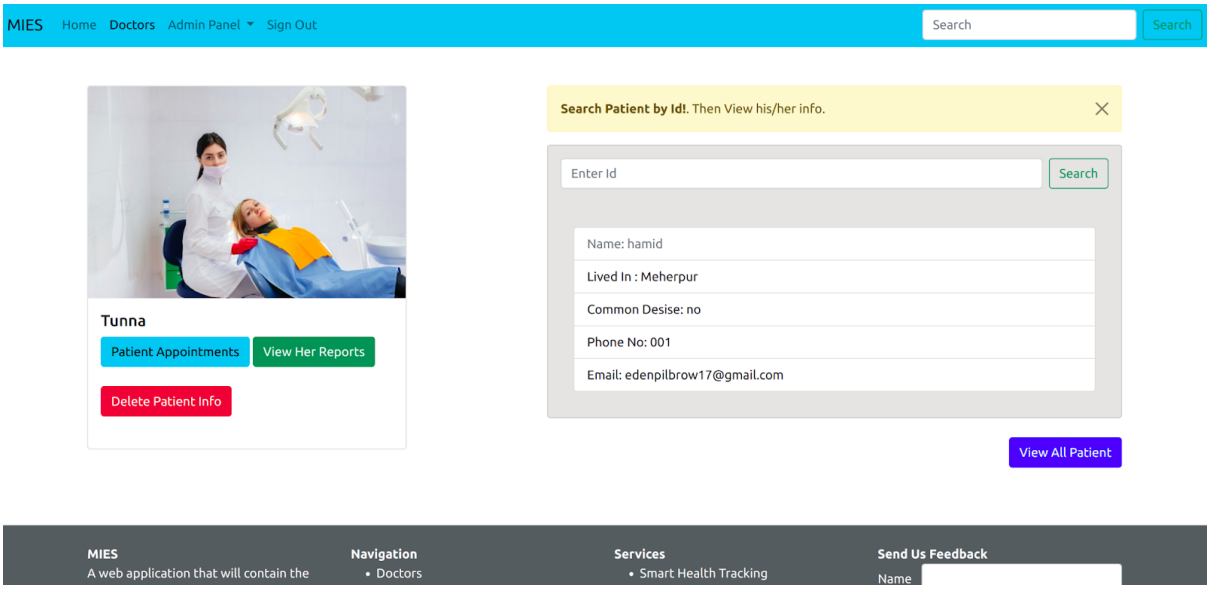


Figure 5.1.3: Search Page

5.2: Descriptive analysis

In our entire application, we have to display all options to the user. We have three login pages for users, doctors, and admin. We use the same login interface to make a good theme for users. We add a search function for every user individually. To make a good user interface we add some alert and success popup windows to give them clarification that their task is done or not. We add our services window at the start of our application so that users have an idea about our services without signing in to our application. Users have direct access to doctors through our doctor's view page, users can contact them directly. Every user can give feedback and the option will be found in the application footer area. Our application is fully responsive so that users can use our system on any kind of smart device. Even though it's a web application it will act as a mobile application on smartphones.

We want to make our application easy for every user end. The easier to use the application, the more users will be engaged with our system.

CHAPTER 6

IMPLEMENTATION AND TESTING

6.0: Requirements for Implementation

1. Firstly, for this project we need a database.
2. Databases have to be live on the server 24/7.
3. Fully functional web application.
4. The application has to be responsive.
5. Application has to adapt to a minimalistic function formation to perform on poor internet connectivity.

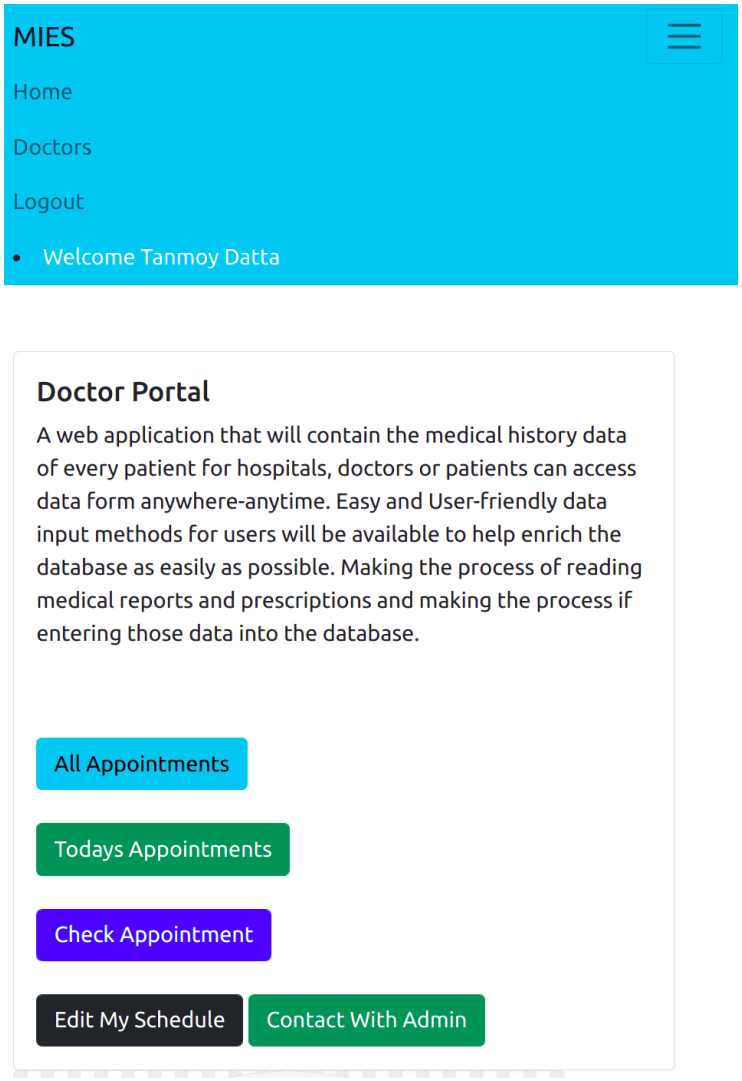


Figure 6.0.1: Responsive interface

If all the above requirements are satisfied then the users of this application will be able to use our system without any problem.

6.1: Testing Implementation

This process was little hard, implementing every different page of the application was really a difficult task. During the development phase, normally many errors occur but some errors are like database query performing errors, uploading and retrieving an image from database & form validation using JavaScript. To solve these kinds of problems we needed proper testing of each and every function page.

These problems occur at the initial stage of development, in the end, we coped with every functional problem.

Table Name: Testing result

Test case	Test input	Expected outcome	Obtained outcome	Passed/ Failed	Testing period
Setup	Setup MySQL database	Setup Successfully	Setup Successfully	Passed	27-1-2021
Connection	Login connection	Connection successful	Connection failed	Failed	3-2-2021
Connection	Signup connection	Connection successful	Connected	Passed	4-3-2021
Connection	Login connection	Connection successful	Connected	Passed	4-3-2021
Appointment	Fix appointment	Appointment successful	Appointment failed	Failed	6-5-2021
Appointment	Fix appointment	Appointment successful	Appointment Success	Passed	7-5-2021

Validation	Form validation	Validation done	Validation failed	Failed	8-7-2021
Image files	Move image	Moved	Move failed	Failed	9-9-2021
Image files	Move image	Moved	Moved	Passed	10-9-2021
Validation	Form validation	Validation done	Validation done	Passed	10-11-2021
Responsive	Responsive pages	Responsive	Responsive	Passed	10-11-2021
Prescription	Store prescription	Prescription saved	Prescription saved	Passed	1-12-2021

CHAPTER 7

CONCLUSION AND FUTURE SCOPE

7.0: Discussion and Conclusion

After all of the testing and implementation, our work will be completed. We will have a prototype platform for digitizing the medical system. We successfully combine everything into one application. This project mainly extracts every piece of information from patients and stores it in a central database. Our application also provides digital appointments, artificial recommendations, smart health tracking & blood bank. Lastly, we make sure that every patient doesn't have any problem keeping their medical reports, they can fix appointments with doctors easily & better treatment options. Also, hospitals and clinics can manipulate their system easily and effectively.

7.1: Scope for Further Developments

We are not retiring until we build this application to be better. We have some future plans too, as technologies develop day by day. Sometimes it’s hard to read prescriptions for pharmacists or medicine shoppers. Because they don’t understand what medicine is written by the doctor. And this is a big problem, for this patient will be affected. So pharmacists should have proper clarification about the medicine. That’s why we think in the future we will digitalize the prescription also. We will apply machine learning there and the doctor will have the auto recommendation corresponding to the patient's disease. Then the prescription will be nice, clean, and understandable.

REFERENCES

[1]. Quantin, C., Jaquet-Chiffelle, DO., Coatrieux, G. et al. Medical record: systematic centralization versus secure on demand aggregation. BMC Med Inform Decis Mak 11, 18 (2011).

[2]. A Web Approach To Medical Data And Services Centralization G. TRIANTAFYLLOU1, G.KOUTELAKIS1, C. BOUKOUVALAS2, G. MANDELLOS1 , M. KOUKIAS1, D. LYMPEROPOULOS1 1 Wire Communication Lab, Electrical & Computer Engineering Dept., University of Patras, GREECE 2 OTE S.A. (Greek PNO),Research & Development Dept, Athens,

[3]. Terkel Christiansen, Karsten Vrangbæk,Hospital centralization and performance in Denmark—Ten years on,Health Policy,https://doi.org/10.1016/j.healthpol.2017.12.009.

[4]. E. Karavatselou, G. Economou, C. Chassomeris, V. Danelli, D. Lymberopoulos, 'OTETS- A New Value-Added Telematics Service for Telemedicine Applications', IEEE Transactions on Information Technology in Biomedicine, vol.5, No.3, pp 210-224, September 2001

[5]. K. Siau, 'Health Care Informatics', IEEE Transactions on Information Technology in Biomedicine, vol.7, No.1, March 2003

[6]. G. Wallace, 'Information technology and Telemedicine', CMAJ, September 18, 2001; 156 (6), pp 777-779

[7]. L. Makris, I. Kamilatos, E. V. Kopsascheilis, M. G. Strintzis, 'Teleworks: A CSCW Application for Remote Medical Diagnosis Support and Teleconsultation', IEEE Transactions on Information Technology in Biomedicine, vol.2, No.2, pp 62-72, June 1998

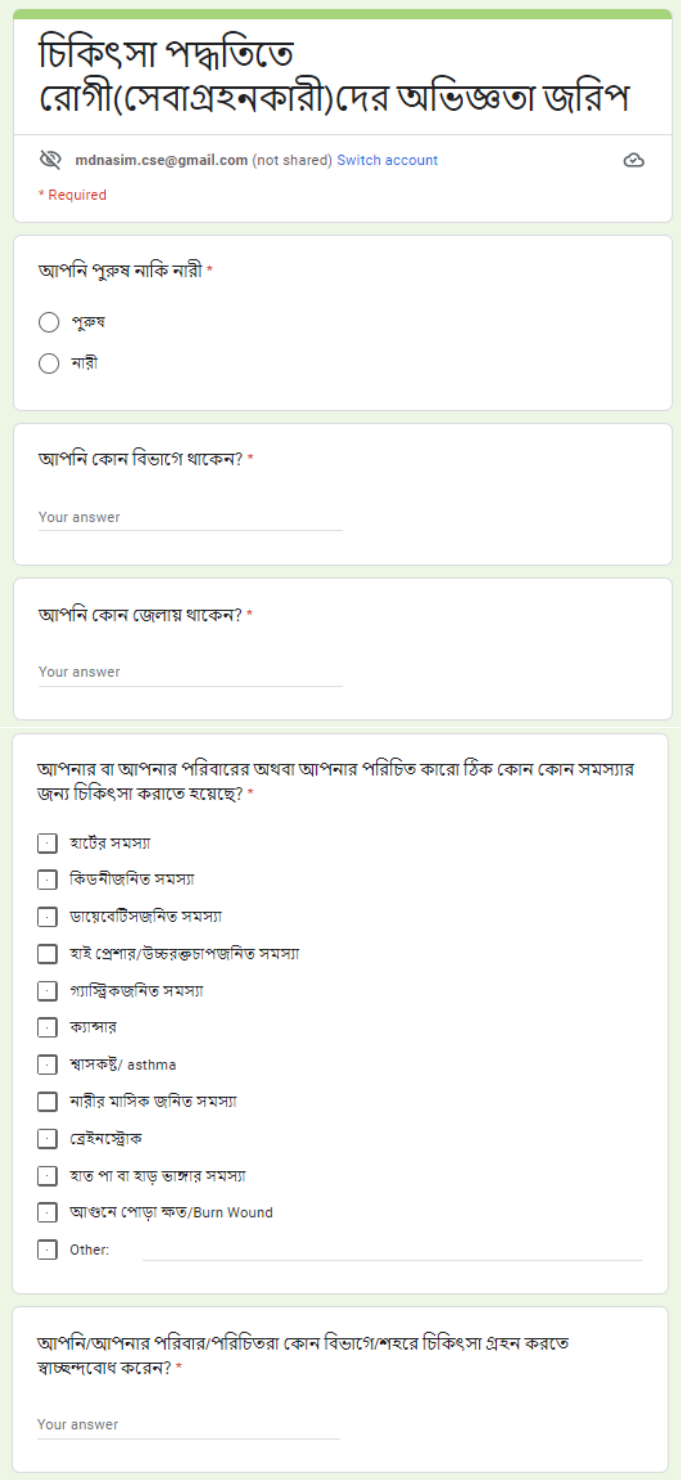
[8]. M. Y. Sung, M. S. Kim, E. J. Kim J. H. Yoo, M. Sung, 'CoMed: a real time collaborative medicine system', International Journal of Medical Informatics, Elsevier Science, vol 57 (2000), pp 117-126, 2000

[9]. M. Shepherd, D. Zitner, C. Watters, 'Medical Portals: Web-Based Access to Medical Information', 33rd Hawaii International Conference on System Sciences, IEEE, 2000

[10]. G. Economou, D. Lymberopoulos, E. Karavatselou, C. Chassomeris, 'A New Concept Toward Computer-Aided Medical Diagnosis-A Prototype Implementation Addressing Pulmonary

APPENDIX

Appendix A: Survey form for patient



চিকিৎসা পদ্ধতিতে
রোগী(সেবাগ্রহনকারী)দের অভিজ্ঞতা জরিপ

mdnasim.cse@gmail.com (not shared) Switch account

* Required

আপনি পুরুষ নাকি নারী *

- পুরুষ
- নারী

আপনি কোন বিভাগে থাকেন? *

Your answer

আপনি কোন জেলায় থাকেন? *

Your answer

আপনার বা আপনার পরিবারের অথবা আপনার পরিচিত কারো ঠিক কোন কোন সমস্যার জন্য চিকিৎসা করাতে হয়েছে? *

- হার্টের সমস্যা
- কিডনীজনিত সমস্যা
- ডায়েবেটিসজনিত সমস্যা
- হাই প্রেশার/উচ্চরক্তচাপজনিত সমস্যা
- গ্যাস্ট্রিকজনিত সমস্যা
- ক্যান্সার
- শ্বাসকষ্ট/ asthma
- নারীর মাসিক জনিত সমস্যা
- ব্রেইনস্ট্রোক
- হাত পা বা হাড় ভাঙ্গার সমস্যা
- আগুনে পোড়া ক্ষত/Burn Wound
- Other:

আপনি/আপনার পরিবার/পরিচিতরা কোন বিভাগে/শহরে চিকিৎসা গ্রহন করতে স্বাচ্ছন্দবোধ করেন? *

Your answer

প্রেসক্রিপশন/টেস্ট রিপোর্ট/এক্সরেরিপোর্ট/ চিকিৎসা বিষয়ক কাগজ পত্র নিয়ে নিচের কোন অভিজ্ঞতা গুলো আপনার হয়েছে? *

- [ ] অন্য শহরে/ডাক্তারকাছে/হসপিটালে যাওয়ার আগে পুরোনো কাগজ পত্র খুজে পাই না
- [ ] অন্য শহরে ডাক্তার দেখাতে গিয়ে মাঝপথে কাগজ হারিয়ে ফেলি
- [ ] সব কাগজ পত্র ঘুছিয়েই রাখি কখনও কোন সমস্যা হয় না

কেমন হত যদি আপনার সব মেডিকাল কাগজপত্র/প্রেসক্রিপশন/রিপোর্ট মোবাইলে বা কম্পিউটারে নিজে নিজেই Save করা থাকত? ডাক্তার নিজেই Save করে দিত তার প্রেসক্রিপশন? ডায়গনিস্টিক সেন্টার আপনার রিপোর্ট অনলাইনে পাঠিয়ে দিত আর ডাক্তার দেখে নিত? *

- ( ) খুবই সুবিধা হত
- ( ) আমি মোবাইল/কম্পিউটার কম বুঝি, হাতে কাগজপত্র থাকলেই ভাল হয়

আপনি কি একই বিশেষজ্ঞ ডাক্তার বারবার দেখান? *

- ( ) একটি সমস্যার জন্য একজন বিশেষজ্ঞ ডাক্তারের কাছেই গিয়েছি
- ( ) একটি সমস্যা জন্য একাধিক বিশেষজ্ঞ ডাক্তারের কাছে গিয়েছি

আপনি কি একই ডায়োগনিস্টিক সেন্টারে বারবার টেস্ট করাতে পছন্দ করেন? *

- [ ] একই বিস্বস্ত আর ভাল সার্ভিসের ডায়োগনিস্টিক সেন্টারে বারবার যেতে স্বাচ্ছন্দবোধ করি
- [ ] ডাক্তারে কথায় অন্য ডায়োগনিস্টিক সেন্টারে যেতে হয়
- [ ] খরচ আর সঠিক রিপোর্ট এর বিবেচনায় ডায়োগনিস্টিক সেন্টার পরিবর্তন করেছি

আপনি কি যে কোন প্রয়োজনে একই হসপিটালে প্রতিবার ভর্তি হবেন বা পরিচিতদের ভর্তি করাবেন? *

- ( ) একই বিস্বস্ত আর ভাল সার্ভিসের হসপিটালে বারবার যাব
- ( ) বিভিন্ন প্রয়োজনে ও সুবিধা অসুবিধা বিবেচনা করে বিভিন্ন সময় বিভিন্ন হসপিটালে যেতে হয়েছে

আপনার দেখানো ডাক্তার কি কখনও আপনাকে অন্য শহরের হসপিটাল বা ডাক্তারের কাছে আরো ভাল চিকিৎসার জন্য যাওয়ার উপদেশ দিয়েছে?

- ( ) হ্যা
- ( ) না প্রয়োজন পরে নি

PLAGIARISM REPORT

Plagiarism Checked by Abdus Sattar, Assistant Professor, Department of CSE	 29-12-2021

Medical Information Extraction Application for Patient History

ORIGINALITY REPORT

5%	4%	0%	4%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to Daffodil International University Student Paper	3%
2	dspace.daffodilvarsity.edu.bd:8080 Internet Source	1%
3	Submitted to University of East London Student Paper	1%

Exclude quotes	Off	Exclude matches	Off
Exclude bibliography	Off		