Medical Prescription Detection and Health Guidance System Using Machine Learning

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Project Proposal Report

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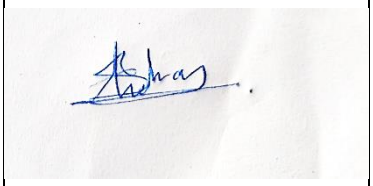
DECLARATION

I declare that this is my own work and this proposal does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other university or Institute of higher learning and to the best of my knowledge and belief, it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

Name	Student ID	Signature
T S Mallawaarachchi	IT19955582	

The above candidate is carrying out research for the undergraduate Dissertation under my supervision.

Signature of the supervisor Date

....

(Supervisor: Mr Ravi Supunya)

Signature of the Co-supervisor Date

....

(Co-supervisor Ms. P. K. Suriya Kumari)

ABSTRACT

Arthritis is one of the most common diseases all over the world. Although common, There is no correct guidance for the patients to pharmacy suggestion to buy drugs for the disease which is primarily based on joint pain. In Sri Lanka, most patients neglect medical treatments due to the fact that medicines cannot be found when they are needed.
Painkillers are used in diseases like arthritis and it is essential to find them at the right time. In such cases, patients have seen cases of extreme suffering.

In this research, focus on Assistance in purchasing medicines using prescription detection and suitable pharmacy suggestion and through Machine learning technique. In the first place of the system, user can upload their prescription. The system detects drugs in prescription according to the uploaded image as the first phase. The system will be identified drugs for arthritis which will be helped to help to get understand the drugs Efficiently. The system will predict the suitable pharmacy for buying drugs. The system will be considering the availability of the identified drugs, price of the each drug and user ratings for the pharmacy and the distance between the user and the pharmacy when predicting the suitable pharmacy. And also the system will facilitate users to connect with the pharmacy through the system the ordering process. Through this system, the user can purchase quality medicines at competitive prices.

This system utilizes ANN technology to identify pharmaceuticals based on the picture of the prescription, as well as a technique of employing a classification model to identify drugs used to treat arthritis. To produce predictions, it implements the regression model, which is a machine-learning approach

Keywords— ANN, Regression Model, Machine Learning, Prediction

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LIST OF ABBREVIATIONS

ANN Artificial Neural Network

AWS Amazon Web Services

ML Machine Learning

NPL Natural Language Processing

1 INTRODUCTION

1.1 Background

The majority of the world population uses medicine to treat their varied diseases. One of the most widespread diseases in the world presently is arthritis. arthritis" refers to joint discomfort. Arthritis is the most common cause of disability and affects people of all ages, races, and sexes. Although it's not an age-related disease, arthritis affects women more often than males and some forms are more frequent in older individuals than in younger generations There are more than 100 different varieties of arthritis 3 of them are common and associated disorders. Patients being treated for such long-term diseases should understand and be knowledgeable about the drugs they are obtaining.

according to the World Health Organization, everyone has the right to access the medications they need and to obtain them correctly. The goal of Universal Health Coverage (UHC) is to ensure that all people obtain the health services they need without suffering financial hardship when paying for them [1]. Sustainable Development Goal 3.8 supports UHC by aiming to achieve "access to safe, effective, quality, and affordable essential medicines and vaccines for all" [2]. In Sri Lanka, pharmacists must be contacted while purchasing medications in the traditional way.

According to the current situation in Sri Lanka, due to the shortage of medicines and the rise in prices, many patients are considering only the price while purchasing in addressing the pharmacy. Not being able to find medicines at the right time makes our patients uncomfortable and some patients die.

People are increasingly using the internet to buy drugs online, which might be considered as a trend. As most of the research already done in online pharmacy category. Small pharmacies used to provide their clients medicine even during Covid Situation 1 by uploading the necessary prescriptions over the WhatsApp app. Numerous studies have been carried out regarding drug purchases made online in Sri Lanka. there are several websites and mobile apps that function alone and in the form of an online pharmacy for clients to use.

1.2 Literature Review

Online pharmacies are companies that can only be obtained with a prescription online and other pharmaceutical preparations by postal delivery. Generally speaking, there are two types of online pharmacies: [3] legitimate Internet pharmacies that provide high-quality pharmacy services by verification standards, and [4] illegal online pharmacies that might not adhere to local, national, or international professional standards and regulations**.**
There are many websites and mobile apps in Sri Lanka that act independently in the form of online pharmacies for their customers. Most of these programs are virtually identical to those used for online shopping. The user must search for the name of the drug of interest before purchasing [7].
However, Sri Lanka lacks a well-organized pharmacy network where customers can easily purchase medicines online. Among the features available for online pharmacies that provide pharmaceutical services are taking a specific prescription order, connecting the user to multiple pharmacies, and displaying pharmacies close to the user's location [6]. . To read pharmaceutical information and place orders for prescriptions to be mailed to the user or picked up at a pharmacy's retail location, several existing on-line pharmacies connect several internet users to a pharmacy's network server [7].
As the primary factors to reflect in an active online pharmacy. Online pharmacies should make efforts to enhance. delivery system since the delivery of medications may be urgent. Numerous respondents reported having negative online experiences with pharmacy-related issues with delivery delays. When consumers search for pharmaceuticals, generic medication suggestions ought to be provided to better serve customers. Additionally, while selling medications online, the vendor has extra responsibilities. Uncompleted information might have serious repercussions. Additionally, there should be clear usage warnings[8].
The characteristics of each prescription, such as dosage for each age group and probable side effects, should be mentioned to fully advise the public. Online pharmacies should do more than just sell; they should also educate their customers because taking pharmaceuticals with inappropriate drug management can result in serious health hazards. It should be necessary to upload scanned prescriptions for some drugs[9].

The benefits of using an online pharmacy are clear to patients Drug availability for the confined or incapacitated, Access available 24/7An almost limitless selection of products Relative to privacy, which can entice patients to raise questions about uncomfortable situations, and lower costs. Free research and online comparison shopping absence of meaningful interaction with pharmacists and medical experts [8].

Discussing the potential drawbacks of ordering prescription drugs online. The fact that products from online pharmacies cannot always be as high-quality as those from a retail pharmacy is frequently not known to customers. It is difficult to determine whether drugs purchased online are unapproved, or illegal, thus it is also difficult to determine whether a website is legitimate. improper drug usage and misdiagnosis These disadvantages and risks are compounded even more when dealing with unlicensed and illegally operated online pharmacies [8].The trend of purchasing medications online has increased due to the pandemic situation, and it is important to consider the relevant study publications.
Research of online pharmacy management system for individual pharmacies. Major drug storage solutions will be provided by the system. users to keep drugs. By doing research defines purchasing rare drugs and users can search for drugs. The system offers assistance with the consideration of drugstore management solutions [8].

considering the research associated with online pharmacies, Checking the availability of medicines is a key element. The system used a central database to store drag stocks which are available in registered pharmacies. Then the search is done through the system. Boyer Moore algorithm is one of the accelerated string searching sssssssss used to search for drugs through the store. After users ca obtain medicines through an online order after correctly confirming the availability of medicines through the system[11].

Small pharmacies used to provide their clients medicine even during Covid Situation 1 by uploading the necessary prescriptions over the WhatsApp app. Numerous studies have been carried out regarding drug purchases made online in Sri Lanka. there are several websites and mobile apps that function alone and in the form of an online pharmacy for clients to use. The majority of these programs are surprisingly similar to those used for online purchasing. The user must search for the name of the medication he needs before making a purchase [13].
However, Sri Lanka does not have a well-organized pharmacy network where a customer may easily purchase medication online. The features offered by the available research on online pharmacies that provide pharmaceutical services include accepting a specific prescription order, connecting the user with numerous pharmacies, and displaying pharmacies close to the user's location [12].

Table 1 comparison of previous researches

1.3 Research Gap

Features	**Research A**	Research B	**Research C**	Research D	Proposed System
Identifying the drugs for arthritis using prescription detection	×	×	×	×	✓
Connecting multiple pharmacies	✓	×	×	×	✓
Drug price comparison among pharmacies	×	×	×	×	✓
Showing the nearest Pharmacies	✓	×	×	×	✓
Contact with pharmacy	✓	×	✓	✓	✓
predicting the suitable pharmacy	×	×	×	×	✓
Storing the prescription in the database	✓	×	✓	✓	✓

As mentioned in the above table, A, B, C and D researches that I have studied have been done after detecting prescriptions for various diseases. But the details of the research that we propose is to identify the types of drugs related to arthritis only.

A,B,C D Researches which is designed to be a mobile phone application, does not offer any guidance in choosing the pharmacy. They are unable to provide a reliable recommendation system . only research A able to show the client which pharmacy is nearest to users.

Key feature of the propose system able to predict the suitable pharmacy for users . Through the process ,system will be considering the availability of the identified drugs through the prescription , price of the each drug and user ratings for the pharmacy and the distance between the user and the pharmacy .

BCD researches only capable of ordering the appropriate medications when based on a single pharmacy. But in the system we propose, more pharmacies can store data and analyze and can be provide comprehensive service to its users

A - Healthnet Mobile Application[12]

B- Online Pharmacy Management System[10]

C- Mobile Application For Checking The Status Of Stock Availability In Pharmacy[11]

D- Conversational Bot For Pharmacy: A Natural Language Approach[14]

1.4 Research Problem

Fail to check the availability of drugs among pharmacies and Not being able to find the medicines needed for conditions like arthritis at the right time.
Due to the current economic situation, many people are having difficulty finding drugs in pharmacies. Struggle to identify medicine availability among pharmacies. Due to a lack of pharmaceuticals during this time period, most patients must visit multiple pharmacies until they find the drug. This takes a significant amount of time and work. People struggle so much in an emergency to find the correct drugs at the right moment

Unable to obtain the medications at a reasonable price
While buying medicine, people must check in many pharmacies to find drugs to a fair price. But most of the time patients must ended up in the quality drugs for lower prices.

2 OBJECTIVES

2.1 Main Objectives

In our research, In our research, the main objective is to finding quality drugs for arthritis and recommending the most suitable pharmacy for the patient to buy.

2.2 Specific Objectives

- Maintaining a positive relationship with the patient and offering the chance to purchase with a clear awareness of the medicine

- By comparing competitive prices and choosing the right quality and fast reachable pharmacy for buying medicines in a short period of time.

- identify the best available pharmacy via the app, and provide a drug ordering option via the app.

3.0 METHODOLOGY

The proposed mobile app to guide to finding quality drugs for arthritis and recommending the most suitable pharmacy for the patient to buy.
System able to detect the drugs using the uploaded image of prescription using the ANN ML technology. After use of classification model correctly identify the drugs which are specializing in arthritis .
Users gps location and identified drug details of prescription ,pharmacy details, drug prices where stored in cloud(AWS S3) will be input data to regression model and it predict the best suitable pharmacy for ton buying drugs .

3.1 User Research

we planed survey and gathered information on the adverse effects or fatalities reported from all around the Sri Lanka as a result of the challenge of purchasing the wrong mendicants And focused at the between the country's current economic challenges and the difficulties of finding and buying drugs.

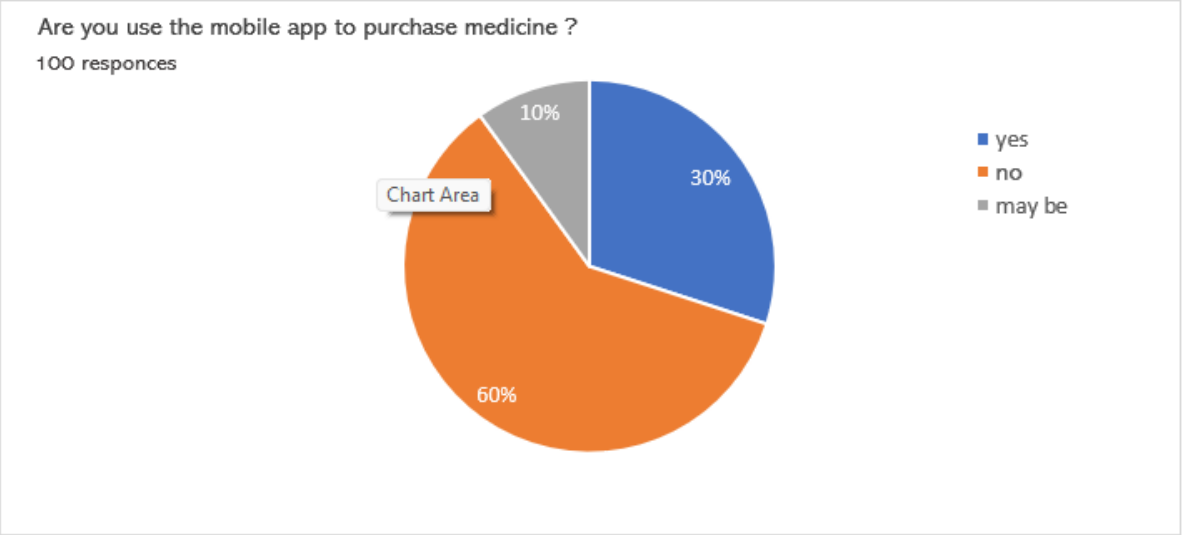

Figure 1 summary of responses shows need of mobile app

More than 60% of respondents to the survey claimed they had never bought prescription medications using a specialized mobile application. So, based on our proposed approach, we decided to develop the mobile app.

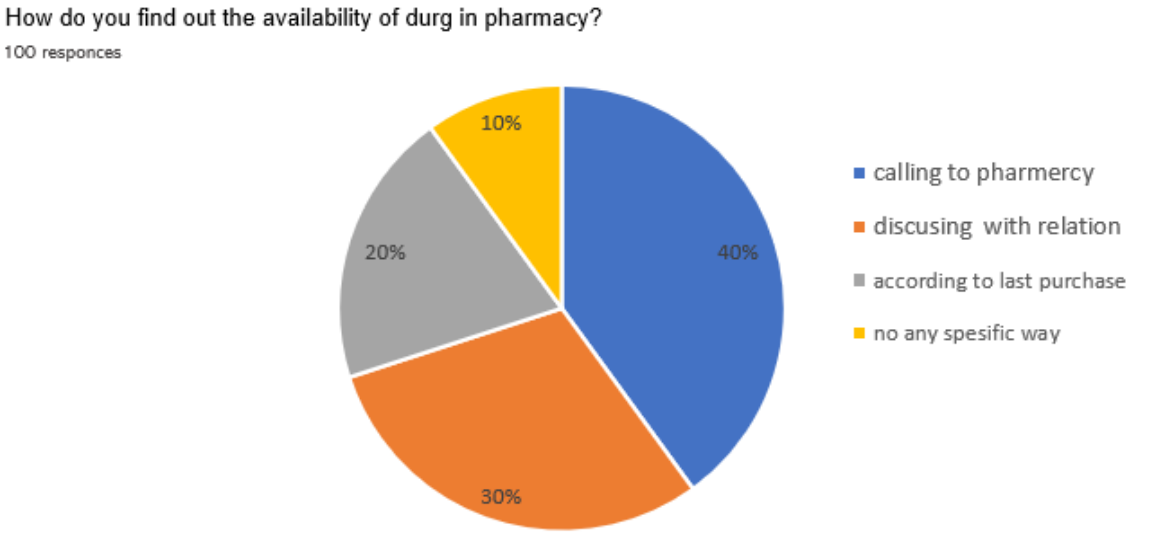

Figure 2 summary of responses check availability

this survey illustrates most of users do not have no accepted method for them to determine availability needed drug in pharmacy .Propose system. Through the process, system will be considering the availability of the identified drugs through the prescription , price of the each drug and user ratings for the pharmacy and the distance between the user and the pharmacy .

What are the reasons for taking so long to buy medicine?
Price of drug
Quality of drug
Distance of pharmacy
Availability of drug

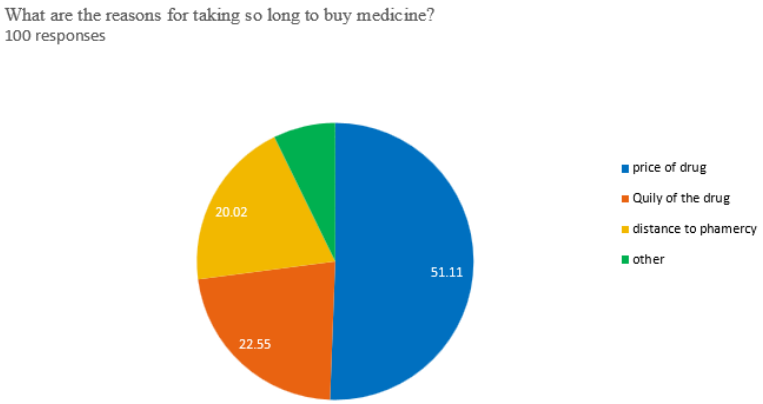

Figure 3 summary of responcess resons for wasting time while purchasing medicines

90% of patients, according to a survey, spend more time check quality and cost comparisons before making a purchase. the distance to the pharmacy is less impact.
Propose system. We planned that Through the process ,system must considering the availability of the identified drugs through the prescription , price of the each drug and user ratings for the pharmacy and the distance between the user and the pharmacy when predicting pharmacy .

3.2 Feasibility Study

Technical Feasibility

Project is a fully functional mobile application.

Drawing tools Drow.io, Microsoft Project, and Visio Studio Code are the major tools and tools related to React native, Python backend, and code. Each technology is publicly accessible, and the necessary technical abilities are manageable. The simplicity of building manageable solutions utilizing these technologies and the time constraints of product development are linked. The server will initially be hosted in a free web hosting environment, but later implementations will move it to a commercial web hosting environment with enough capacity.. From these it's clear that the project is technically feasible.

Economic Feasibility

Project will have a hosting fee development phase. The system doesn't involve any multimedia data transfer, hence the bandwidth needed to run this server is relatively low.

The system will guide to the standards for freeware software then no cost be charged . All team members cable for developing app while sharing knowledge as no development cost .

Scheduling Feasibility

Microsoft planner will be using to scheduling the task of development process.Accoding to the time bound of research we planned the all task with team. Furthermore, be present to ensure that the finished product is delivered on time.

Operational Feasibility

In order to carry out the project, we will first connect with numerous drug stores, then contact a doctor and periodically monitor the system..

3.2 System Overview

1. A patient first register and log in to the system for authentication purposes. Then user select prescription detector for analyze prescription. User can upload prescription as image . System automatically detect the prescription and identify the drugs. System display to the user drug saw specialize for arthritis are available in the prescription.

2. User select find pharmacy feature for get the suitable pharmacy to buy those medicines. The system will predict the best suitable pharmacy detected for drugs .Through out the processing system get the user's location and distance with registered pharmacies, the user rating about pharmacy , comparing drag prices, available pharmacies. The system will send ca confirmation message to the nearest pharmacies to the user check the availability of drugs .The system display the predicted pharmacy as best suitable pharmacy for to buying medicine.

3. Users can able to order arthritis drugs via connecting through the application. If user needed any drug created details or according to the order . user able to send messages through the chat facility of the system connecting the seller.

4. After order confirmation by both user and the pharmacist the system will send e-mail and notification messages to them and store order details and prescriptions. By the clicking the rating button the system allows to give their ratings according to that order for a pharmacy.

5. Pharmacist register their pharmacies in the system and they needed to add drugs and prizes to the database and they able to get orders.

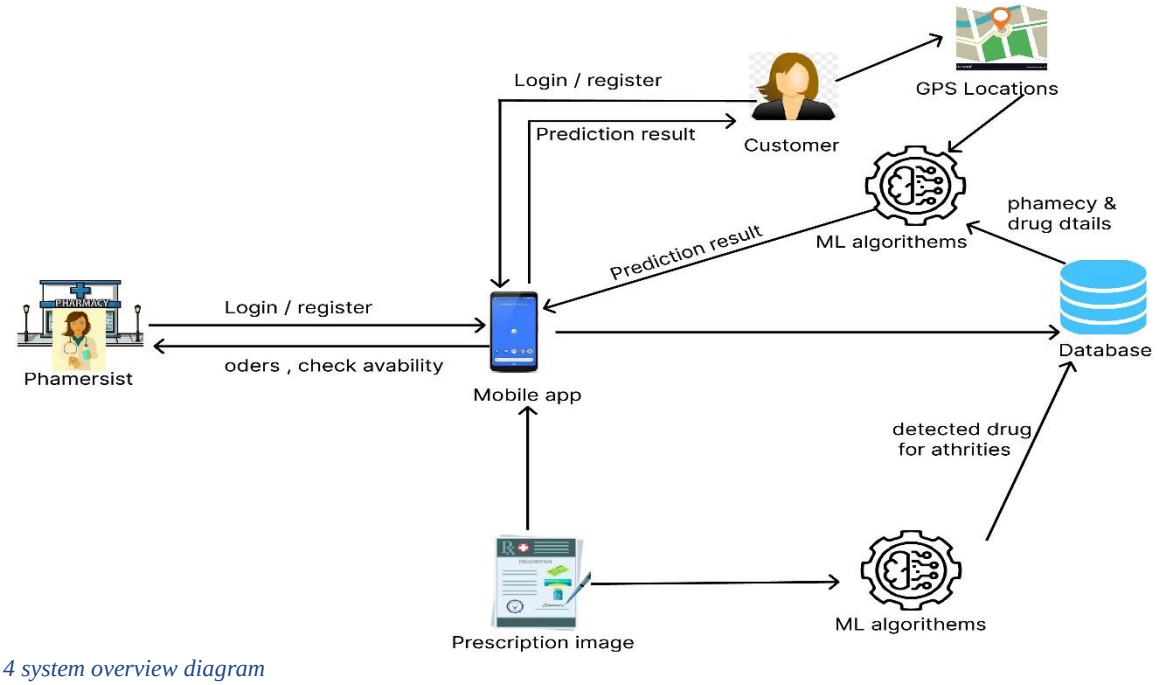

Figure 4 system overview diagram

3.4 Tools And Technologies

• Visual studio code
• Jupiter notebook
• Firebase
• Android studio
• React JS • Node JS • Mongo DB • Python.

3.5 Work Breakdown Structure

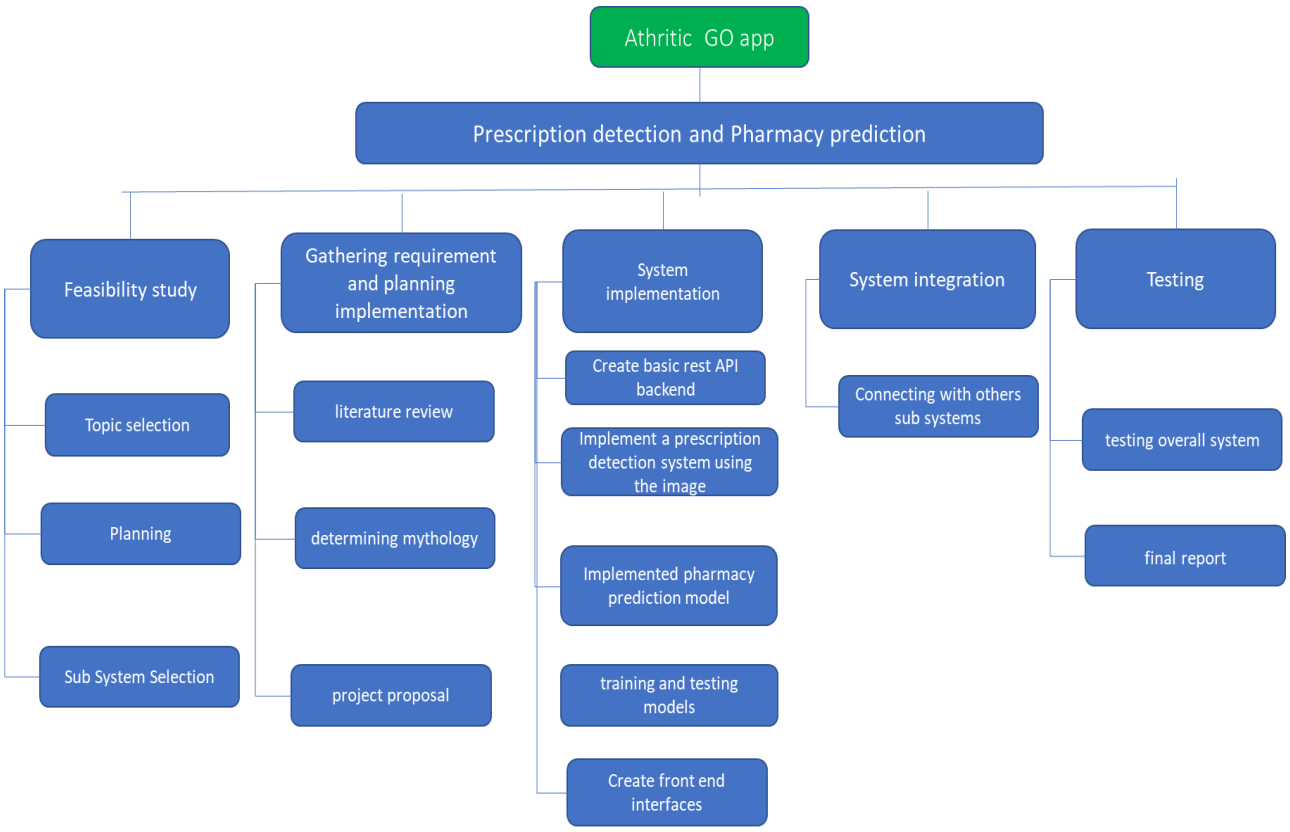

Figure 5 work breakdown chart

3.6 Gantt Chart

Figure 6 grant chart of system

4.0 PROJECT REQUIREMENTS

4.1 Functional Requirements

- A mechanism for detecting substances in submitted prescription image should be available.
- System should be feasible to appropriately classify and recognize medications used to treat arthritis.
- System should be feasible to forecast the best and most appropriate pharmacy to purchase medications for people who use them.
- System should be feasible to purchase drugs online using predictive pharmacy and provide chat functionality to communicate between the pharmacist and the patient.

4.2 Non-Functional Requirements

Usability
Users should be able to identify the flow of the app, App should be able to use the app without any guidance.

Performance
When an application is designed to start up, the initial screen should not take more than three seconds to load.
It should also be ensured that the app will not take to mush time to predicting the suitable pharmacy.

Security
Users' information, prescription information, and submitted photographs should be secure, inaccessible to unauthorized individuals, and there should be no opportunity for users to manipulate the program to their advantage or get around essential safeguards.

Availability
The system to be designed should be non-disruptive in service delivery and should be able to respond accurately while using.

5 DESCRIPTION OF PERSONNEL AND FACILITIES

5.1 Tasks assigned to the component

The tasks allocated to the component are shown in the Table.

Table 2 task assign to component

Registration Number	Name	Functions
IT19955582	T S Mallawaarchchi	Conducting a discussion with an arthritis specialist about the types of diseases and symptoms related to the disease. Discussing the information that About the problems that occur in the purchase of medicines and the correctly identify factor to effect drug ordering. Create basic rest API backend using Django.and Implement a prescription detection system using ML. Develop the pharmacy prediction model using regression Training and testing models using data. Create front end interfaces Connecting with others sub systems and testing overall system

5.2 Resource Personnel for development

Table 3 resource personnel for development

Name	Designation	
Charuni Pinnaduwa	Doctor	District Base Hospital Theldeniya
Namal Pathirana	Doctor	Badulla General Hospital

5.3 System and Software Requirements for development

- **System Requirements**

  - x86 64-bit CPU (Intel / AMD architecture)
  - 4 GB RAM
  - 5 GB free disk space
  - Android Phone/tab

- **Software Requirements**
  - Android Emulator
  - NPM package manager
  - Node runtime environment
  - Python v3

6.0 BUDGET AND BUDGET JUSTIFICATIONS

6.1 Justification

We estimated the cost of the project based on the need for budgeting due to the project requirements. We also have to purchase some clients to build our system.
As per our calculations, we will have to incur costs for the project as follows and these calculations may change with the upcoming project flow.

6.2 Budget

Recourses	Price
AWS S3 Cloud Service	**1500.00**
Data connection cost	**4000.00**
Server cost	**5000.00**
Educational survey cost	**1500.00**
Travelling cost	**2000.00**
Documentation and printing cost	**1000.00**
Stationary	**1000.00**
Total	**16,000.00**

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