Enhancing Patient-Centric Care and Doctor Convenience in Hospitals

Component: - Using a machine learning algorithm to identify the nearest pharmacies with the needed medicines for patients.

Project ID: TMP-2023-24-015

Project Proposal Report

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B.Sc. (Hons) Degree in Information Technology Specialized in Information Technology

Department of Information Technology

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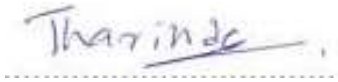
DECLARATION OF THE CANDIDATES AND SUPERVISOR

I declare that this is my own work, and this dissertation 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.

Group Member Name	Student ID	Signature
LAKSHAN J.A.T.	**IT20642150**	

The above candidates are carrying out research for the undergraduate Dissertation under my supervision.

Signature of the Supervisor: Date:

(Dr. Kapila Dissanayaka)

Abstract

Android applications are quite useful, even in the health field, given the growing use of mobile technology worldwide. For efficient quick results while looking up for medical help in case of accidents or medicines and blood requirement emergencies, one can use such mobile-health applications. The proposed paper focuses on making advantageous use of Android and Machine Learning to provide for delivering health-related information on major healthcare units such as pharmacies. Efficiently locating the nearest pharmacies from an individual's current position is a critical challenge in modern healthcare and navigation systems. This research problem revolves around the development of a streamlined method to identify the closest pharmacies, streamlining the process of ordering essential medications. This facility is provided through the developed app in which the data is customized according to the factors viz. user's location, their distance to nearby pharmacies obtained through Google Maps API, availability of medicines and the ratings which are predicted by applying Multinomial Naive Bayes algorithm on the customers' reviews. The list of the pharmacies, their reviews, and medicines in pharmacies are all stored in the Database.

In summary, our research paper presents an innovative and practical solution that leverages Android and Machine Learning to provide timely and accurate health-related information, revolutionizing the way individuals access and interact with healthcare services, particularly pharmacies.

Keywords: Android, Machine Learning, Google maps APIs, Pharmacies

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01. Introduction

1.1 Background

In today's rapidly evolving digital age, the integration of mobile technology into various facets of our lives has become increasingly pervasive. Mobile applications, particularly those running on the Android platform, have demonstrated their utility across numerous domains, including healthcare. The global proliferation of mobile devices offers a unique opportunity to leverage these technologies to enhance the delivery of crucial health-related information, thereby potentially saving lives in emergency situations and improving overall healthcare access.

This research paper focuses on a groundbreaking approach that harnesses the power of Android applications and Machine Learning to address a pressing challenge in modern healthcare and navigation systems – the efficient identification and location of nearby pharmacies. Timely access to essential medications during emergencies is of paramount importance, and this research endeavors to streamline the process of locating the nearest pharmacies through a specialized mobile health application.

The core objective of this study is to develop an Android application that seamlessly connects individuals with vital health-related information, specifically concerning the availability of medications at nearby pharmacies. To achieve this, the application utilizes several key data sources and innovative algorithms. Firstly, it leverages the user's current location, obtained through GPS technology, to identify their proximity to local pharmacies. This geographical information is further refined by integrating the Google Maps API, enabling precise and real-time location-based results.

Beyond geographical proximity, the application takes into account the availability of medicines at these nearby pharmacies. To assess this, the system collects and maintains a comprehensive database containing information about the medicines stocked by each pharmacy. Moreover, the application harnesses the power of user-generated content, specifically customer reviews, to gauge the quality and reliability of these healthcare units. To predict ratings for these pharmacies, a Multinomial Naive Bayes algorithm is employed, analyzing the sentiments expressed in customer reviews.

All this valuable information, including a list of nearby pharmacies, their respective reviews, and the medicines they stock, is meticulously stored in a dedicated

database. This database forms the backbone of our Android application, facilitating efficient and personalized access to health-related information for users.

In summary, this research paper presents a novel and practical solution that combines Android technology and Machine Learning to provide timely and accurate health-related information, ushering in a new era of healthcare accessibility. By simplifying the process of identifying the closest pharmacies and assessing their offerings through innovative algorithms, this research seeks to empower individuals with the information they need to make informed healthcare decisions. In doing so, it promises to revolutionize the way individuals interact with healthcare services, particularly in the context of pharmacies, ultimately contributing to improved health outcomes and well-being in our increasingly mobile-dependent world.

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1.2 Literature Survey

There exist some applications that have been developed using similar technologies or researches based on the utility of mobile-health applications in the community. They contain different functionalities and solutions for different problems in the field of medical health care that are executed through smartphones. One such phone application is proposed in [1], where the details of patients are stored on Firebase which helps the concerned in generating prescription and required doctors. The author in [2], presents the development of a mobile application for an emergency response system which helps rescue service provider in determining the shortest route to incident location and nearby hospitals to it. Another such application is in [3], whose search engine can search hospitals, available doctors and medicines via category, name, and location, blood donation camps. The author in [4], focused on the development of an app that shall improve the health care system in Bangladesh through smartphones by involving features such as hospitals suggestion, cabin booking and appointment scheduling. Their survey showed that such medical apps are found useful by the people as they are convenient and time saving.

The authors' motivation is to implement some of the significant a feature in the general health care, such as listing of the nearby pharmacies. The listing of this health unit(pharmacy) is based on the distance and factors such as availability of the medicines in pharmacies which is sorted in the order of the ratings that are produced on the basis of reviews given by the users. In [5], the authors have proposed the module for the prediction of star ratings based on the reviews. The reviews are tokenized and the generated feature vectors are passed to Multinomial Naïve Bayes theorem for rating prediction. The experiments in [6], showed that that the TFIDF

(Term Frequency-Inversion Document Frequency) conversion to the data greatly improves the results for MNB than the simple Naïve Bayes theorem. Here, in this proposed application, the authors have applied stemming on the words (reviews) for vector generation that undergo supervised learning module to predict ratings for the pharmacies. Based on the factors of distance, availability of resources (medicines) and the ratings, the health units (pharmacies) are listed upon the request of the user for the optimized result.

1.3 Research Gap

The provided Literature Survey discusses various mobile health applications and their functionalities, emphasizing the development of a new application focused on listing nearby pharmacies based on factors such as distance, medicine availability, and user reviews. While the survey provides valuable information on existing applications and their features, it also highlights several potential research gaps.

- **Limited Focus on Pharmacy Listings**

Most of the existing applications discussed in the survey primarily focus on hospital information, doctor availability, and emergency response systems. There appears to be a research gap in terms of applications that specifically concentrate on providing comprehensive information about nearby pharmacies, their stock, and user-generated reviews.

- **Integration of User Reviews for Pharmacy Ratings**

Although the survey mentions the use of user reviews for predicting pharmacy ratings, it doesn't delve into the specific methodologies or algorithms used. A research gap exists in exploring advanced techniques for sentiment analysis and user review integration to improve the accuracy of pharmacy ratings.

- **Usability and User Experience**

The survey mentions that mobile health applications are found useful by people for their convenience and time-saving benefits. However, there is a research gap in understanding the usability and user experience aspects of such applications, including user interface design, accessibility, and user feedback mechanisms.

1.4 Research Problem

Efficiently locating the nearest pharmacies and streamlining the process of ordering essential medications is a critical challenge in modern healthcare and navigation systems. The proposed research aims to develop a streamlined method that utilizes Android technology and Machine Learning to identify the closest pharmacies based on the user's location, availability of medicines, and customer ratings, ultimately enhancing the accessibility and interaction with healthcare services, particularly pharmacies.

This research problem focuses on improving the efficiency and accessibility of healthcare services through innovative mobile applications and data-driven decision-making, combining elements of location-based services, machine learning, and user-generated reviews and ratings.

02. Objective

2.1 Main Objective

- The main objective of this research is to develop an Android application that integrates Machine Learning techniques to efficiently deliver health-related information to users, specifically focusing on locating nearby pharmacies, providing essential medication availability, and place medicines order. The aim is to revolutionize the accessibility and interaction of individuals with healthcare services, enhancing the efficiency of obtaining medical help and information while finding essential medicines.

2.2 Specific Objectives

- **Develop a Mobile Health Application**

Create a user-friendly Android application designed to provide quick access to health-related information, including pharmacy locations, medication availability, and reviews.

- **Implement Geolocation Services**

Integrate Google Maps API to enable precise geolocation of users and nearby pharmacies, ensuring accurate navigation to the nearest healthcare units.

- **Design a Pharmacy Database**

Develop a robust database system to store information about pharmacies, their available medications, customer reviews, and other relevant details.

- **Machine Learning Integration**

Implement a Multinomial Naive Bayes algorithm to predict pharmacy ratings based on customer reviews, enhancing the app's ability to assist users in making informed decisions.

- **Customization based on User Location**

Tailor the app's recommendations to users' specific locations, taking into account their proximity to pharmacies and the availability of required medications.

- **Efficient Ordering Process**

Streamline the process of ordering essential medications directly through the application, minimizing the time taken from prescription to procurement.

03.Methodology

3.1 Requirement Gathering

The most important component of the research process is the phase that entails acquiring and analyzing requirements. It is necessary for us to create a document that will be referred to as the requirement definition document and contain all of the potential requirements that are gathered in this stage. The following methods are utilized by our team for collecting requirements.

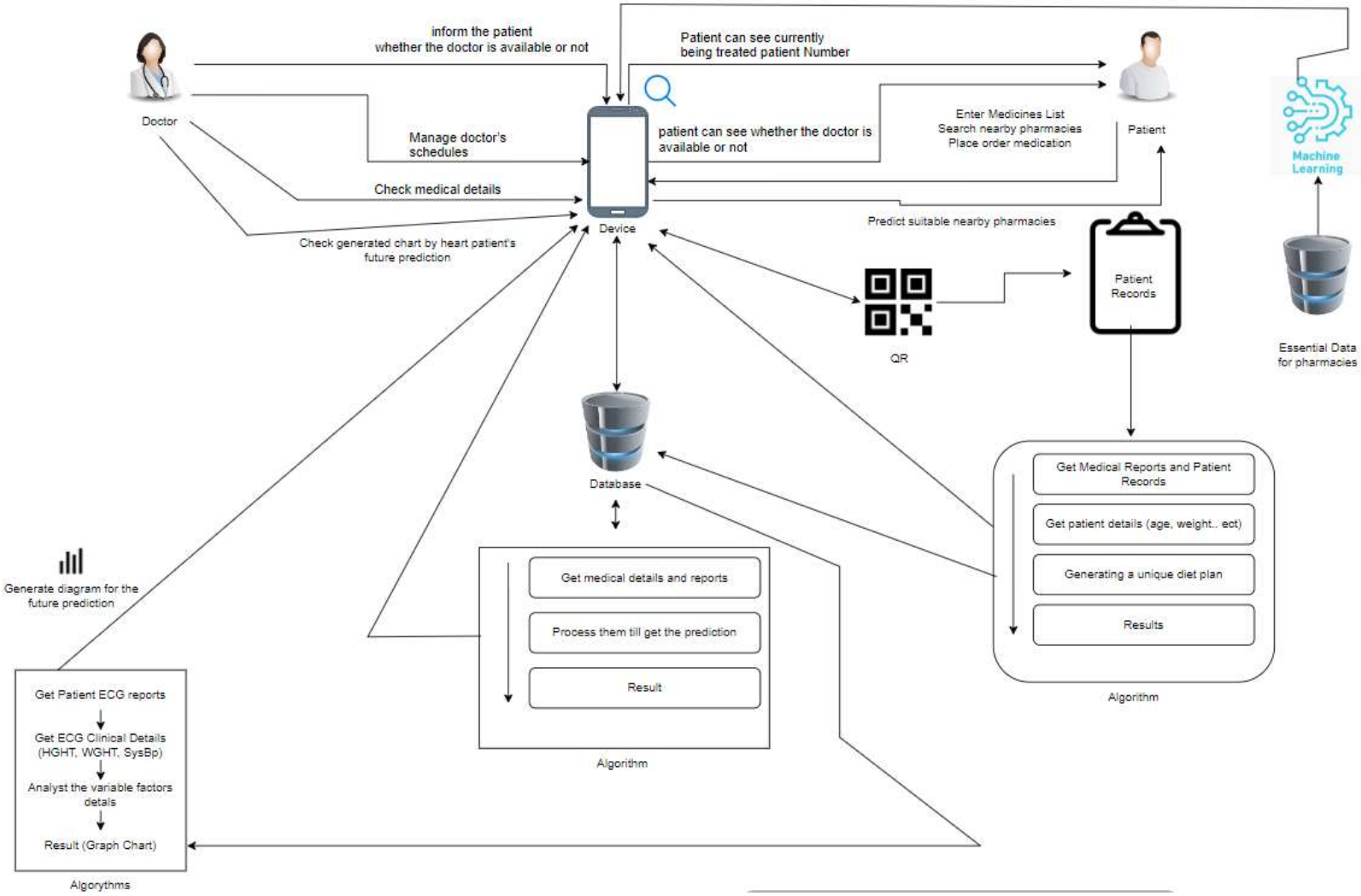
- Reading research papers and publications that are relevant to study subjects and referring to previous work.

- Utilizing and doing research on existing systems.

- with a medical professional on important concepts and procedures.

3.3 Overall System Overview & System Analysis

The proposed system discusses an innovative system that combines Android technology and Machine Learning to enhance the accessibility and efficiency of



healthcare services, particularly related to pharmacies.

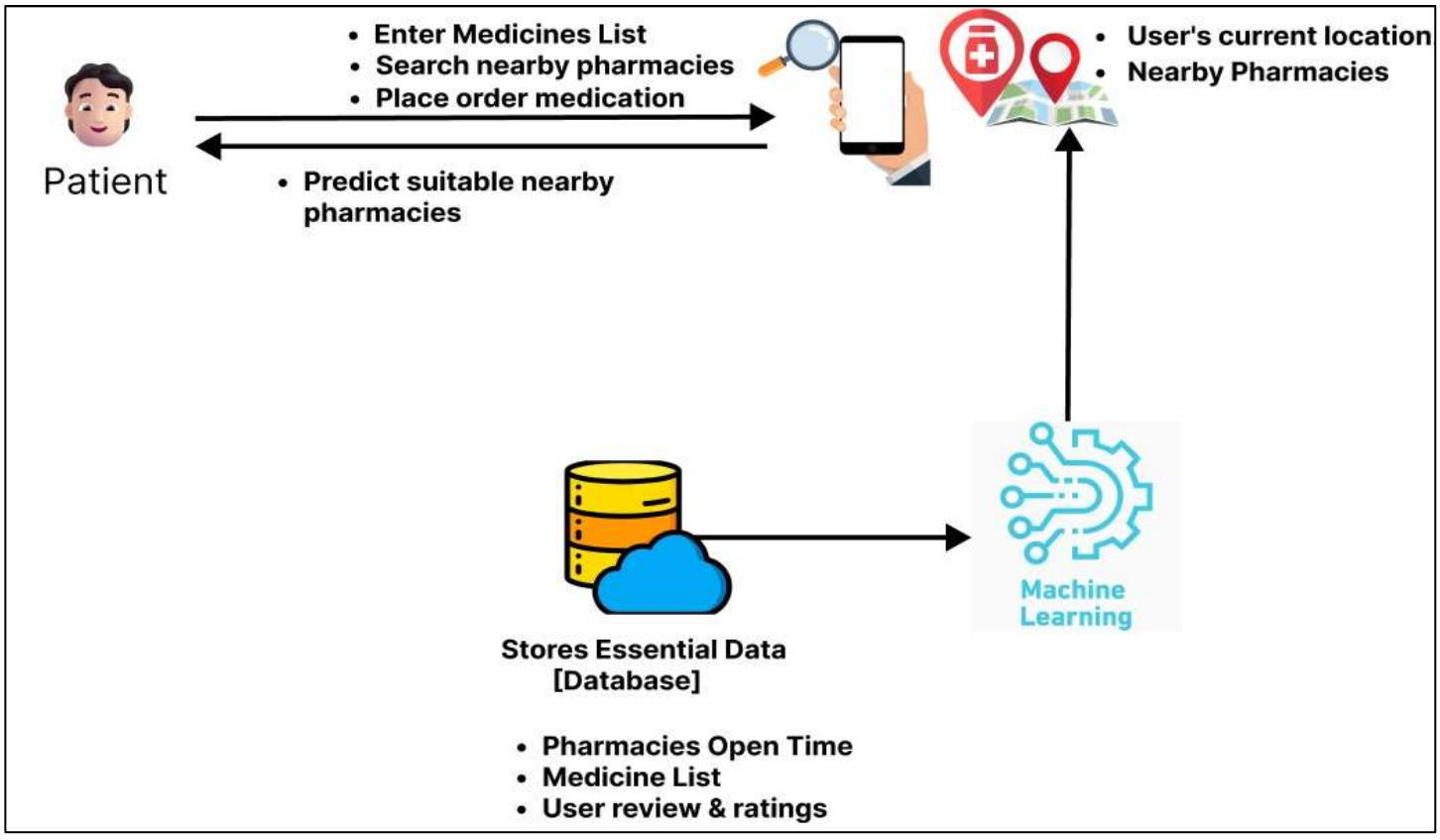
Overall System Overview,

The system under consideration is designed to address the growing need for quick access to health-related information and services using mobile technology. It revolves around an Android application that leverages Machine Learning algorithms and integrates with various data sources to deliver valuable healthcare information.

The primary focus is on streamlining the process of locating and ordering essential medications from nearby pharmacies.

System Analysis,

The core of the system is an Android application. This application serves as a gateway for users to access health-related information, primarily related to pharmacies. It provides a user-friendly interface and efficient features for locating pharmacies, checking medication availability, and reading reviews. To efficiently locate nearby pharmacies, the application integrates with the Google Maps API. This enables real-time tracking of the user's current position and the identification of the closest pharmacies. The system employs Machine Learning techniques, specifically the Multinomial Naive Bayes algorithm, to predict and display user ratings based on customer reviews. This adds a layer of personalization and helps users make informed decisions when choosing a pharmacy. The system customizes data based on various factors, including the user's location, distance to nearby pharmacies, medication availability, and predicted ratings. This ensures that the information presented to the user is highly relevant and tailored to their needs. A database stores a comprehensive list of pharmacies, their reviews, and the availability of medicines in these pharmacies. This data is regularly updated and forms the backbone of the application's functionality. The proposed system leverages the capabilities of Android and Machine Learning to create a mobile health application that transforms the healthcare access landscape. It offers a user-friendly platform that seamlessly integrates geolocation, machine learning-driven predictions, and a comprehensive



database of pharmacies, ultimately making it easier for individuals to access essential healthcare services.

Component Diagram

04. Project Requirements

4.1 User Requirements

- **User Location Services**

The application should have access to the user's location through GPS or other location services to accurately determine their current position.

- **Pharmacy Locator**

Users should be able to easily search for and locate the nearest pharmacies based on their current location.

- **Medication Availability**

The application should provide information on the availability of specific medications in nearby pharmacies.

- **User Reviews and Ratings**

Users should be able to access and contribute to customer reviews and ratings of pharmacies, helping others make informed choices.

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Users should be able to access and contribute to customer reviews and ratings of pharmacies, helping others make informed choices.

- **Ordering Medications**

Users should be able to place orders for essential medications directly through the app, including options for home delivery or in-store pickup.

- **Machine Learning Predictions**

The application should use a Multinomial Naive Bayes algorithm to predict pharmacy ratings based on customer reviews.

- **Database Integration**

All information related to pharmacies, reviews, and medication availability should be stored and accessed efficiently from a database.

- **Customization**

The app should customize the displayed information based on the user's location, preferences, and needs.

4.2 Software Requirements

- NoSQL database
- VSCode
- Flask.
- Multinomial Naïve Bayes algorithm technique
- BeautifulSoup or Scrapy.
- NLTK or the Google Natural Language API

4.3 Functional Requirements

1. **User Authentication and Registration**
    - Users must be able to create accounts and log in securely.
    - User profiles should store relevant information like location and medical history (if necessary).
2. **Location Services**
    - The app should access the user's current location using GPS or other location-based services.

3. **Pharmacy Search**

    - Users should be able to search for nearby pharmacies based on their current location.

    - The app should use Google Maps API to fetch accurate pharmacy locations.

4. **User Reviews and Ratings**

    - Users should be able to read and write reviews for pharmacies.

    - Ratings should be collected and displayed for each pharmacy based on user reviews.

5. **Machine Learning Algorithm**

- Implement a Multinomial Naive Bayes algorithm to predict ratings based on customer reviews.

6. **Database Management**

- Store and manage data related to pharmacies, medicines, user profiles, reviews, and ratings efficiently.

7. **Ordering Medications**

- Allow users to place orders for essential medications directly through the app.

8. **Customized Recommendations**

- Utilize machine learning algorithms to provide personalized pharmacy recommendations based on the user's location and preferences.

4.4 Non-functional Requirements

1. **Scalability**

- The system should be designed to handle an increasing number of users and pharmacies as it scales.

2. **Data Accuracy**

- The information regarding pharmacy locations, medicine availability, and user reviews should be accurate and up to date.

3. **Compatibility**

- Ensure the app works seamlessly on various Android devices and screen sizes.

4. **Usability**

- Design an intuitive and user-friendly interface to make it accessible to a wide range of users, including those with limited technical expertise.

5. **Maintainability**

- Ensure that the app is easy to maintain and update as new features or changes are needed.

6. **Performance Monitoring**

- Implement performance monitoring tools to track app usage, identify issues, and improve user experience.

4.5 Test Cases

This phase verifies that each function of this application has no errors. According to do that unit testing, integration testing, system testing, and user acceptance testing will be done. Furthermore, in this phase will focus on increasing the quality of the software.

1. Unit Testing

    • In this step, each function will check individually and verify that each function has no errors. In this phase, more focus on analyzing the source code. This type of testing is called white box testing.

2. Integration Testing

    • In this phase, integrate the collection of sub-modules and verify the interaction and how it works. After integrating individual components, there may be some failures that would happen. In this phase, fine-tune those failures.

3. System Testing

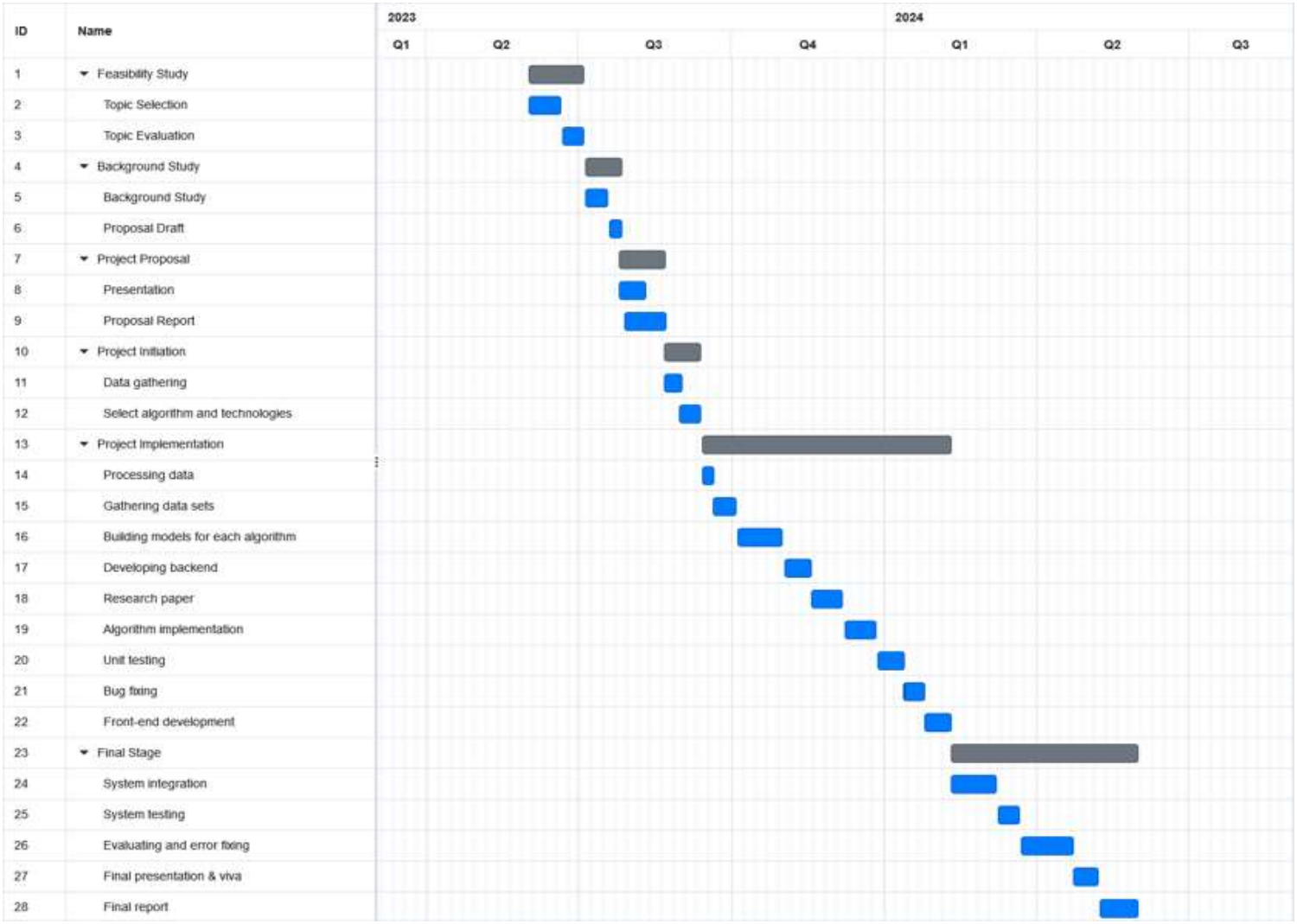
    • The purpose of this phase is to test the fully integrated application. This testing is done after the entire system is fully assembled.

4. User Acceptance Testing

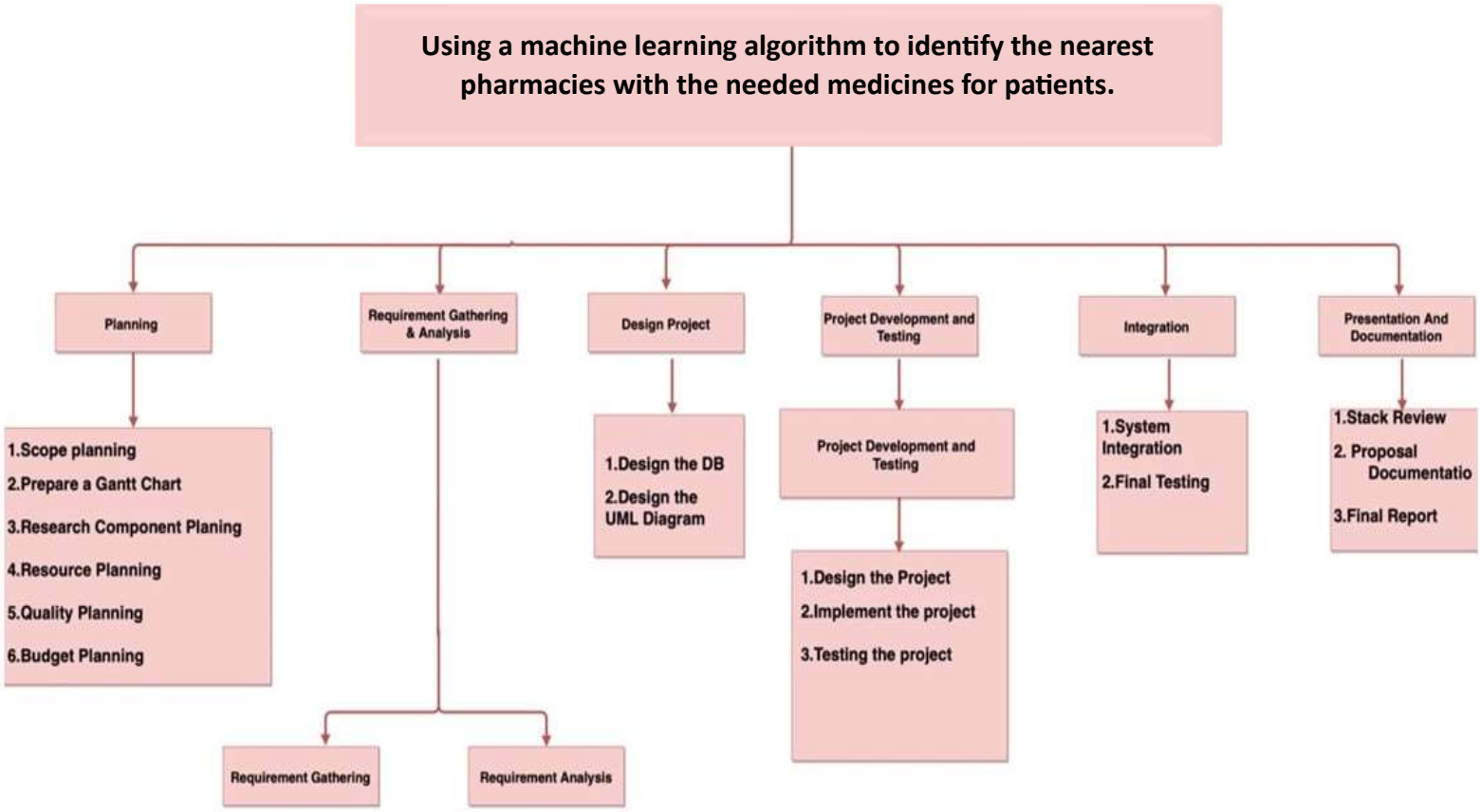
    • In this phase comparing this developed application with initial requirements. This task will be performed by heart patients.

05. Evaluation Criteria

5.1 Gantt Chart



5.2 Work Breakdown Structure



06. Budget

The budget outlined above is based on the need for resources and expenses required to conduct the research and develop the Android and Machine Learning healthcare application as described in the component. Each expense has been justified in terms of its importance to the successful completion of the project. It's essential to allocate sufficient funds to ensure the project's quality, accuracy, and timely completion.

Activities	Amount (Rs.)
App registration	9000.00
Software and Hardware	9500.00
Data cost	8000.00
Other expenses	4700.00
Total	31,200.00

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