A Major Project Proposal Report on

Smart Pharma Demand Forecasting

Submitted in Partial Fulfillment of the Requirements for
the Degree of Bachelor of Engineering in **Software Engineering**
under Pokhara University

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Abstract

The Pharmacy Management System with Demand Forecasting is a software application designed to streamline operations in a pharmacy and improve customer service, and reduce production costs. The system includes various functionalities such as inventory management, prescription management, sales management, customer management, reporting and analytics, and demand forecasting. The demand forecasting feature helps pharmacies to predict future demand for specific medications, enabling them to optimize inventory levels, avoid shortages, and reduce waste. By automating various tasks and analyzing historical data, the system can improve efficiency, reduce costs, and ultimately enhance customer services. It also includes a feature that allows customers to order medicine by providing their prescription through the app. This feature offers a convenient and secure way for customers to order their medications without having to visit the pharmacy physically. Once the customer uploads their prescription through the app, the system automatically processes the request and verifies the prescription details. The pharmacy can then fill the order and either deliver the medication directly to the customer. Overall, the Pharmacy Management System with Demand Forecasting is a valuable tool for pharmacies and pharmaceutical companies looking to enhance their operations, reduce costs, and improve patient care.

Keywords: Pharmacy, Forecasting, Streamline, Inventory, Prescription, Analytics, Medications, Pharmacies, Pharmaceuticals

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1. Problem statement

Previously, retail pharmacies used to order drugs through phone calls and the supplier noted the order on paper, which increased the chance of mistakes and was time-consuming process. Moreover, the need for customers to physically visit the pharmacy to get their prescribed medicines can be inconvenient, time-consuming, and may pose health risks in some cases. This can lead to a decrease in customer satisfaction and potentially lost revenue for the pharmacy. The inability of companies to deliver the right quantity of products on time to their suppliers can be a major problem in the pharmaceutical industry. Foremost reason being, that these companies failed to identify the rapid changes in the quantity of demand and were unaware of the other competitor's demand in the supply chain management.

2. Project Objectives

The objectives of the Smart Pharma Demand Forecasting project are as follows:

1. The system provides a convenient online ordering platform for retail pharmacies to order medicines through the app, reducing the chances of errors and delays associated with traditional phone call and paper-based ordering systems.

2. The system automatically processes the orders and generates a list of ordered medicines that is sent to the supplier.

3. End-users can order medicine by providing their prescription through the app, reducing the need to physically visit the pharmacy, saving time, and enhancing convenience.

4. The system uses advanced algorithms to accurately forecast demand for various products based on historical sales data, competitor analysis, and market trends, helping pharmaceuticals companies to deliver the right quantity of products on time to the suppliers.

5. By accurately forecasting demand, the system can optimize inventory levels, reducing overproduction of medicines and avoiding shortages of products.

3. Significance of the study

The Smart Pharma Demand Forecasting project is significant for the pharmaceutical industry as it can address several challenges faced by the industry, improve efficiency and convenience for customers, and enhance the overall profitability and competitiveness of pharmaceutical companies. The study is also significant as it provides an opportunity to explore the benefits and drawbacks of similar systems in use and contribute to the development of innovative solutions in the pharmaceutical industry.

4. Scope and Limitation

4.1 Scope:

The system's scope includes features such as online ordering, automated order processing, prescription ordering, demand forecasting, inventory optimization, and advanced technologies to provide a competitive advantage. The system is designed to be scalable and adaptable to meet the needs of various stakeholders in the pharmaceutical supply chain.

4.2 Limitation:

1. The accuracy of demand forecasting relies heavily on the availability of accurate historical data, which may not always be available or reliable.
2. The system may still be prone to errors caused by human factors, such as input errors or misinterpretation of data.
3. The system fails to detect fraud prescription.
4. The system requires a robust and reliable IT infrastructure, including servers, internet connectivity, and hardware devices.

5. Literature Study/Review

In context of Nepal, NepMeds app provides a variety of health-related services such as connecting users with doctors, booking diagnostic tests, and ordering medicines and wellness products. The app also offers a wide range of categories for different types of medicines and healthcare products.

However, it seems that the app does not have the feature of demand forecasting, which is essential for pharmaceutical companies to optimize their inventory levels and improve supply chain management. Additionally, retail pharmacies are unable to order medicines in bulk, which may limit their ability to save costs and improve their efficiency.

Therefore, there is still a need for a Pharmacy Management System with Demand Forecasting in Nepal that can address these limitations and provide pharmaceutical companies and retail pharmacies with the necessary tools to improve their operations. So, we have come up with this idea to resolve the limitation of existing system.

6. Proposed Methodology/ Technical description of the Project

6.1 Model Development:

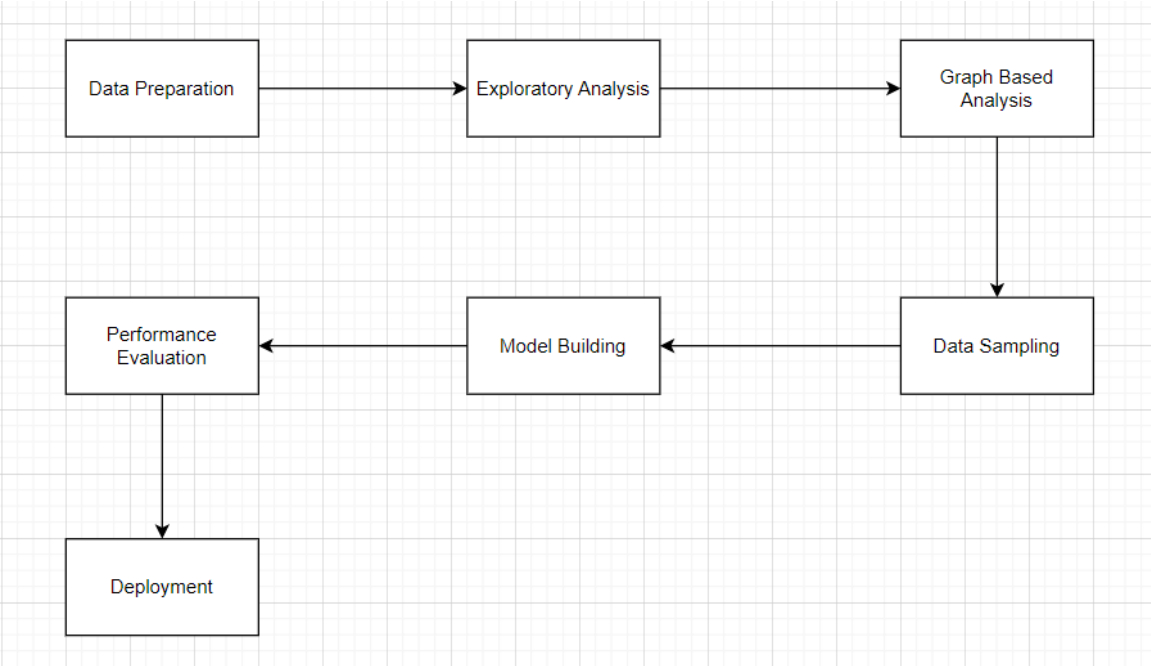

Figure 1: Model Development

6.2 Process model:

The framework we followed in developing this project is incremental model, which is a use of linear sequential model in an iterative manner. New functionalities will be added as each increment was developed. Linear sequential model will be applied to develop each increment. The phases of the linear sequential model are: Analysis, Design, Coding and Testing. The software repeatedly passes through these phases in iteration and an increment is delivered with progressive changes.

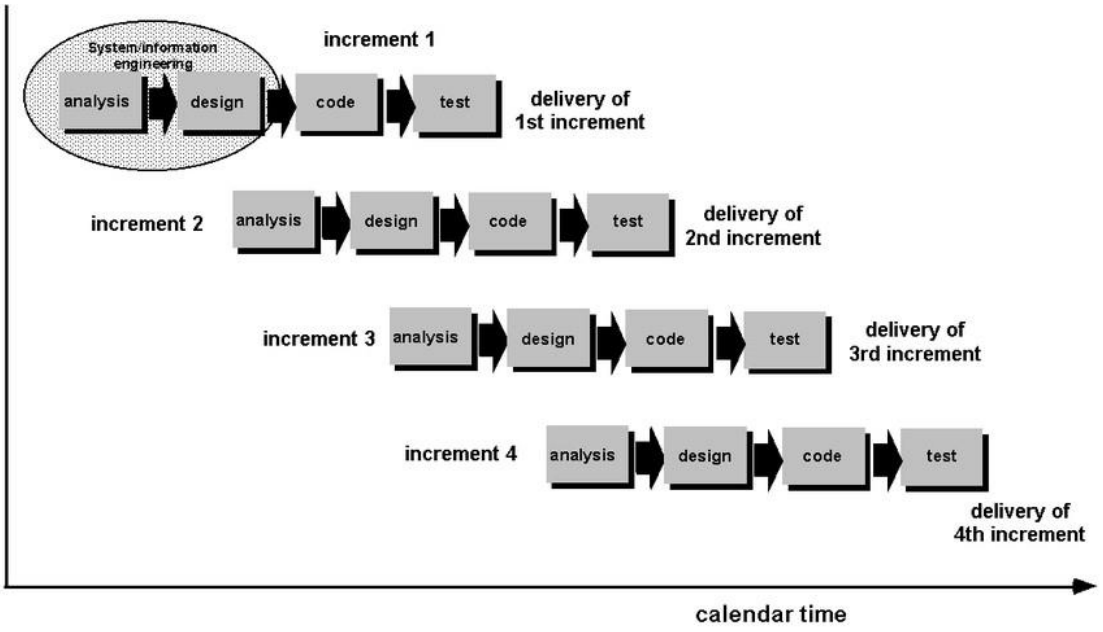

Figure 2: Incremental Order

6.2.1 Analysis Phase:

In this phase, analysis will be done in order to find out the requirements of the system. The outcome of this phase is an SRS which is an acronym for “System Requirement Specifications”.

6.2.2 Design Phase:

In this phase the SRS will be translated into the system’s design. Context Diagram, DFD, ER-Diagram, Use Case Diagram and Class Diagram will be developed.

6.2.3 Coding Phase:

In this phase coding will done according to the design and a working system will be developed by the end of this process.

6.2.4 Testing Phase:

In this phase, the system will be tested. With each testing a list of changes to the system will be developed, suggested and the changes will be applied to the software and the software will be delivered as a successive increment until a satisfying system will be achieved.

6.3 System Design

A use case diagram at its simplest is a representation of a user's interaction with the system that shows the relationship between the user and the different use cases in which the user is involved. The actors for our system are: User, Admin, Company, Pharmacy, Supplier, Pharmacist, Delivery boy. The simplified and graphical representation of what our system must actually do is represented below:

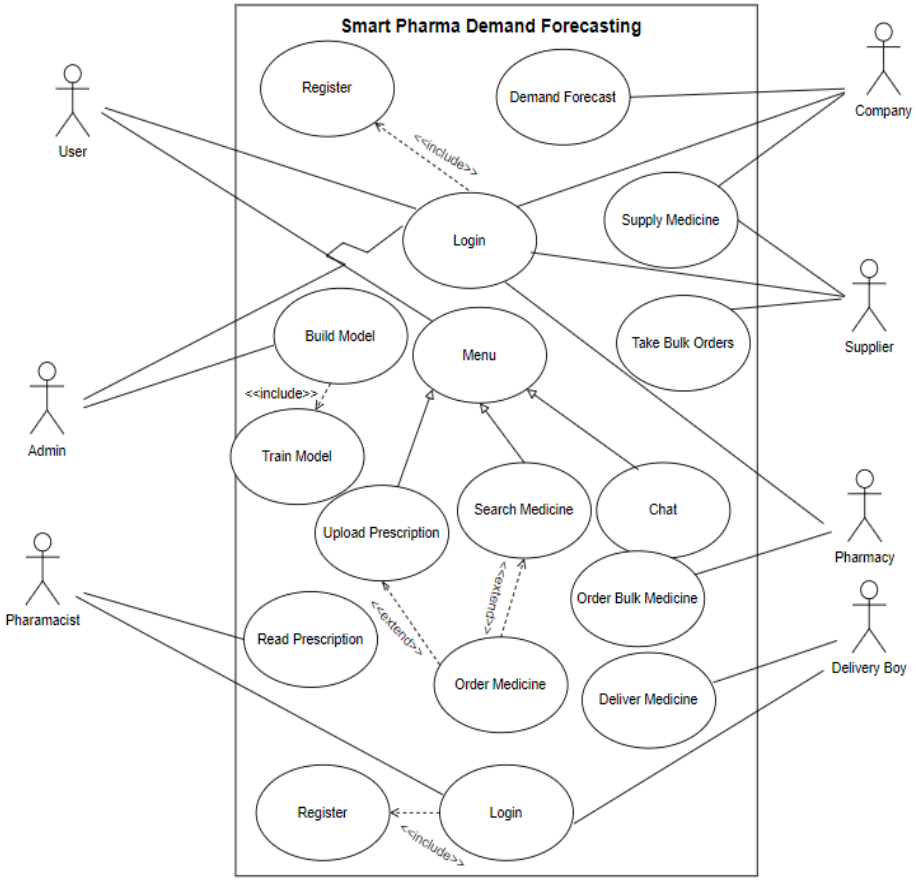

Figure 3: Use Case Diagram

6.4 Programming Language and Other Tools

6.4.1 Programming Language

We have decided to use Java and Python as the programming language for the development of Smart Pharma Demand Prediction.

Programming Language	Application
Frontend	HTML, CSS, JavaScript
Backend	Java, Python

Table 1: Programming languages

6.4.2 Database

MySQL is an open-source relational database management system that uses SQL (Structured Query Language) to manage and manipulate data stored in a database.

6.4.3 Framework to Be Used

Below are the major framework we have decided to use in the development of our project

Framework	Application
Spring	Spring Framework is an open-source, lightweight, modular framework for building enterprise-grade Java applications.
Bootstrap	Bootstrap is a free and open-source front-end framework for building responsive web applications.
TesnsorFlow	TensorFlow is an open-source machine learning platform developed by Google.

Table 2: Framework

6.4.4 Tools to Be Used

Tools used in design, development and testing of software are mentioned in the table below:

Tools	Application
IDE (Eclipse, Visual Studio)	To write code.
Git and GitHub	To manage the project's source code and versions locally and remotely respectively.
EdrawMax	To design components.
MySQL Workbench	To manage databases.

Table 3: Tools

7. Proposed Performance Analysis Methodology and Validation Scheme

To evaluate the performance of the Smart Pharma with Demand Forecasting, the following methodology and validation scheme are proposed:

1. Usability Testing: Conduct usability testing with potential users to assess the user interface's ease of use and navigation.
2. Functionality Testing: Perform testing on the system to ensure that all features work as expected, such as ordering, prescription upload, and demand forecasting.
3. Load Testing: Conduct load testing to ensure that the system can handle a large number of concurrent users and orders without performance degradation.
4. Security Testing: Perform security testing to ensure that the system is secure against common security threats, such as SQL injection attacks and cross-site scripting.
5. Validation Scheme: Validate the system's performance by comparing the results with the system's objectives. Compare the actual system performance with the

expected performance metrics, such as order fulfillment time, accuracy of demand forecasting, and user satisfaction.

8. Proposed Deliverable/Output

The project is delivered in the form of web application. The final project has following features:

1. A web application with a user-friendly interface.
2. Registration and login functionality for users, pharmaceutical companies, suppliers, pharmacies, admins, and delivery boys.
3. Retail Pharmacies can place orders for medicine through the app.
4. The system includes a demand forecasting feature for pharmaceutical companies.
5. Users can order the prescribed medicine by uploading their prescription through the app.
6. Suppliers can receive orders from respective pharmacies and deliver medicines accordingly.
7. An admin panel to manage the application with the ability to control all actors in the system.

9. Project task and Time schedule

9.1 Project Task

The project schedule has been designed as per requirements and constraints involved. This project is scheduled to be completed in about 3 months. Requirement analysis has been given more emphasis. Research and database management is to be done first and well documented. Debugging and Testing is to be done prior to the completion of the project.

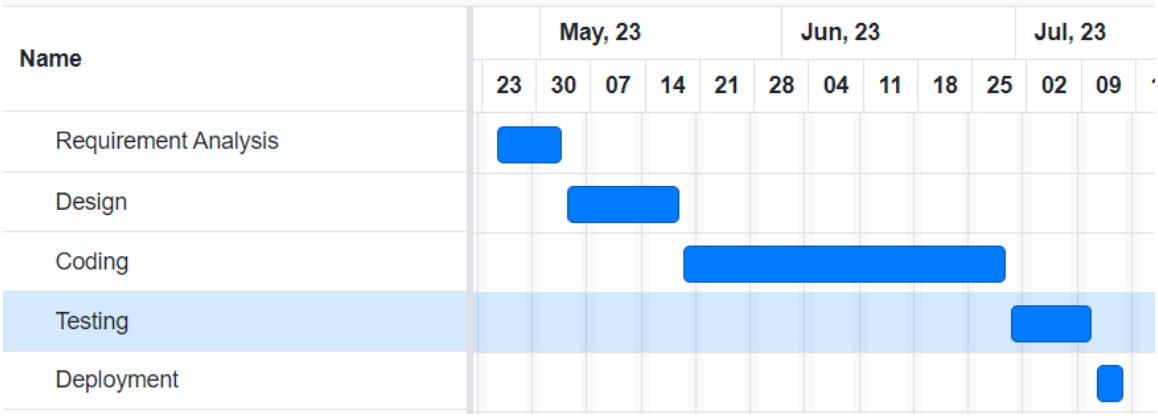

Figure 4: Project Task

9.2 Time Schedule

Time Period	Start	Finish	Duration
Requirement Analysis	25/04/2023	04/05/2023	11
Design	05/05/2023	20/05/2023	15
Coding	21/05/2023	30/06/2023	39
Testing	01/07/2023	11/07/2023	10
Documentation	23/07/2023	28/07/2023	5
Total			80

Table 4: Time Schedule

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