A Mini Project Report on

Medicine Recommendation System

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For

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Academic Year 2023-2024

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CERTIFICATE

This is to certify that the requirements for the Mini project report entitled “Medicine Recommendation System ” have been successfully completed by the following students:

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Subject In-charge

Prof Shamika Mule

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Abstract

Healthcare is one of the most critical sectors in the broader landscape of big data because of its fundamental role in a productive, thriving society. AI in healthcare is an umbrella term to describe the application of machine learning (ML) algorithms and other cognitive technologies in medical settings. Medicines are a critical part of the treatment and making conscious decisions around it is essential and the cost takes up a huge portion. This abstract presents an overview of a Medicine Recommendation System (MRS) designed to assist healthcare professionals and patients in making informed decisions about medication prescriptions and usage. The primary objective of this MRS is to improve patient outcomes and reduce healthcare costs by ensuring that prescribed medications are not only effective but also safe and well-tolerated. MRS is built upon a robust knowledge base that encompasses a wide spectrum of alternative and complementary medicine practices, including herbal remedies, acupuncture, chiropractic care, meditation, aromatherapy, and more.

Chapter 1

Introduction

1.1 AI and ML in Healthcare

Artificial intelligence is a machine's ability to perform the cognitive functions we usually associate with human minds. Machine learning is a form of artificial intelligence based on algorithms trained on data. These algorithms can detect patterns and learn how to make predictions and recommendations by processing data and experiences, rather than by receiving explicit programming instruction.

Artificial Intelligence (AI) and Machine Learning (ML) have made significant contributions to the field of healthcare, transforming various aspects of patient care, diagnostics, drug discovery, and administrative processes. AI can assist doctors, nurses, and other healthcare workers in their daily work. AI in healthcare can enhance preventive care and quality of life, produce more accurate diagnoses and treatment plans, and improve patient outcomes.

1.2 Problem Statement

The existing healthcare system primarily focuses on conventional medicines that are widely used by practitioners, often overlooking the potential benefits of alternatives and complementary and the cost bearing on it. This neglect can lead to missed opportunities for more personalized, holistic healthcare solutions. There is a need to integrate alternative medicine recommendations seamlessly with conventional medical care to ensure that patients receive well-rounded healthcare plans. Patients often lack the knowledge and resources to actively participate in their healthcare decisions when it comes to alternative treatments. There is a need for educational tools and resources to empower patients.

1.3 Objectives

To address these challenges, the development of a comprehensive and user-friendly Medicine Recommendation System (MRS) is proposed. The MRS would incorporate the following key elements:

- Evidence-Based Guidelines: Integrate scientific research and clinical evidence to support recommended alternative medicines while factoring in cost-effectiveness.

- Educational Resources: Offer user-friendly educational materials to empower patients with knowledge about both the benefits and costs of alternative treatments.

- Verified and Reputable Sources: Only provide links to verified and reputable online pharmacies or authorized distributors to ensure the safety and authenticity of the medications.

- Cost Transparency: Display pricing information on the linked websites, allowing users to compare costs and make informed decisions.

1.4 Dataset

There are numerous medications on the market that are produced by various pharmaceutical companies, and many consumers are unaware that the medications all share a common formula. This project's dataset was obtained via the popular Kaggle site. Medicine_Description is an xlsx file that contains details about the name, indication for use, and description of the medication. The description and reasons columns are used by the machine learning algorithm to find suggestions for the alternatives. The xlsx dataset is transformed into a data frame and used for processing.

Dataset Link: https://www.kaggle.com/code/mpwolke/medicine-recommendation/data

Chapter 2

Methodology

2.1 Related Work

[1] Roshani R. Zamare, Shital P. Dhok, Sampada V. Babhulkar, Richa S. Singh, Jayshri G. Marbade, Nayan D. Bawane, Abhishek M. Shukla. Alternate Medicine Recommendation, International Journal of Advance Research, Ideas and Innovations in Technology, www.IJARIIT.com.

The project explores the application of data mining in the field of medical recommendation systems. The primary objectives are to recommend alternative medicines based on the content of a given medicine and to filter these recommendations based on user ratings and cost analysis.

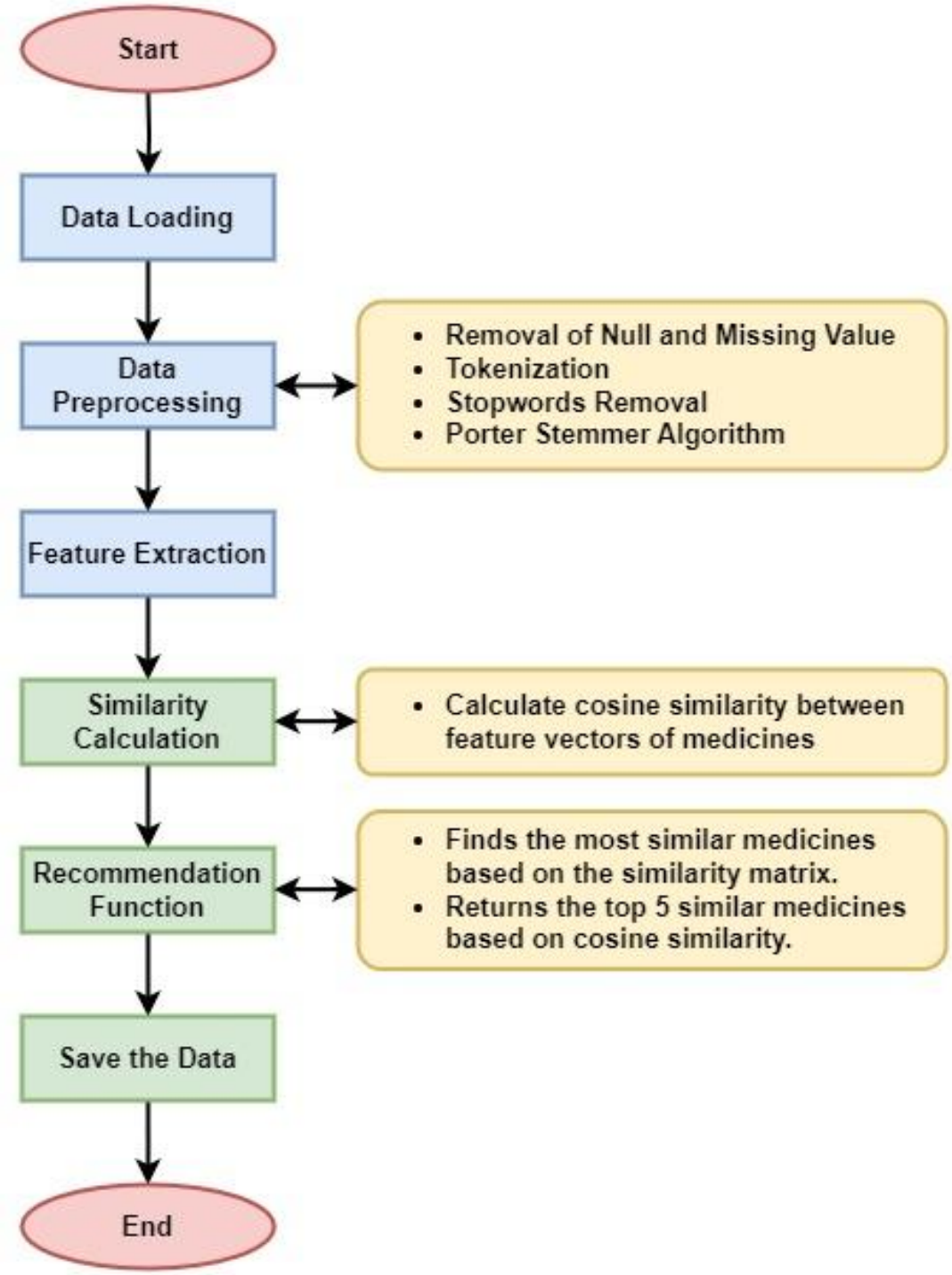
The project utilizes a dataset containing information about over 100 medicines from various companies and brands. This dataset serves as the foundation for generating recommendations.

Based on the experimentation conducted, the project claims that over 95% of the medicines have lower-cost alternatives available with higher user ratings. This suggests that users can potentially save money and still obtain highly-rated medicines.

The project also compares the performance of three different algorithms—k-NN, Decision Tree, and Random Forest—for the classification of medicines as alternatives. This comparison likely evaluates the effectiveness of these algorithms in recommending medicines.

In summary, this project focuses on developing a medical recommendation system that suggests alternative medicines based on content, user ratings, and cost analysis. It employs data mining techniques and machine learning algorithms, with the Random Forest algorithm being used for classification. The results suggest that the system can identify cost-effective and highly-rated alternatives for a significant percentage of medicines.

2.2 Block Diagram



2.3 Technique used

1. Data Preprocessing:

- After loading the dataset, preprocessing is carried out.
- Porter Stemmer Algorithm is used to find the root words of medicine names. This is helpful in normalizing medicine names and reducing them to their base forms.
- A "tag" column is generated in the dataset to store these root words. This column likely contains the normalized forms of medicine names.

2. Feature Extraction:

- CountVectorizer is used to convert the root words (tags) into feature vectors. CountVectorizer is a common technique used to represent text data as numerical features.
- Each root word (tag) is treated as a feature, and the feature vectors are constructed to represent the presence or frequency of these root words in medicine names.

3. Cosine Similarity:

- Cosine similarity is employed to find the similarity between medicines based on their feature vectors.
- The cosine similarity metric measures the cosine of the angle between two feature vectors. It is often used to assess the similarity between text documents or items in recommendation systems.

4. Recommendation:

- Based on the calculated cosine similarity values, medicines are ranked in descending order.
- Medicines with higher cosine similarity values are considered more similar to the input medicine.
- Medicines with the highest similarity values are displayed at the top of the recommendation list.

In essence, your recommendation system is utilizing text preprocessing techniques, stemming, and feature extraction (using **CountVectorizer**) to represent medicines as numerical feature vectors. Then, it calculates the cosine similarity between these feature vectors to provide recommendations based on similarity scores, with the most similar medicines ranked higher in the recommendation list.

This approach allows the system to recommend medicines that are textually similar to the input medicine, which can be valuable in helping users find alternatives or similar medications.

Chapter 3

Implementation

3.1 Tools Used

The code you provided for building a medicine recommendation system using Streamlit primarily relies on the following tools and libraries:

1. **Streamlit:** Streamlit is the core tool used to develop the web application for the medicine recommendation system. Streamlit simplifies the process of creating interactive web applications with Python.

2. **Pickle**: The code uses the `pickle` module to load preprocessed data from pickle files. Pickle is a Python module for serializing and deserializing Python objects, making it easy to save and load data structures.

3. **Pandas**: Pandas is a popular data manipulation library in Python. In this code, Pandas is used to handle and manipulate tabular data, particularly for loading and managing the medicine data stored in a DataFrame.

4. **NLTK** (Natural Language Toolkit): NLTK is a library for natural language processing in Python. While not explicitly mentioned in the provided code, NLTK is sometimes used for text preprocessing tasks, such as tokenization and stemming. However, the code snippet you provided does not include NLTK functions.

5. **Pillow (PIL)**: Pillow is a Python Imaging Library that is often used for image processing tasks. In your code, it's used to load and display an image related to recommended medicines.

These tools and libraries collectively help in creating a user-friendly web application for medicine recommendations, handling data, and providing a visually appealing interface. Additionally, other libraries and dependencies may be used based on the specific implementation details and requirements of the project.

3.2 Sample Code & Screenshots

CODE:

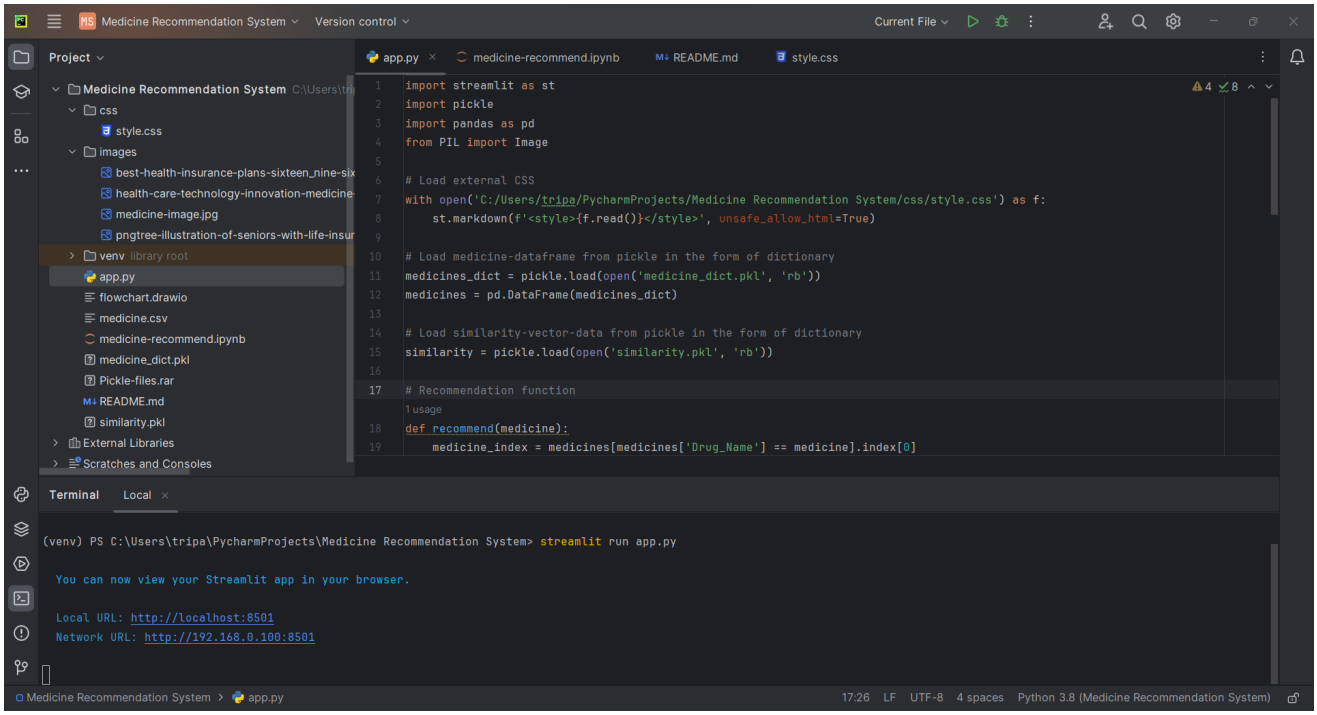
```
import streamlit as st
import pickle
import pandas as pd
from PIL import Image

# Load external CSS
with open('C:/Users/tripa/PycharmProjects/Medicine Recommendation System/css/style.css') as f:
    st.markdown(f'', unsafe_allow_html=True)

# Load medicine-dataframe from pickle in the form of dictionary
medicines_dict = pickle.load(open('medicine_dict.pkl', 'rb'))
medicines = pd.DataFrame(medicines_dict)

# Load similarity-vector-data from pickle in the form of dictionary
similarity = pickle.load(open('similarity.pkl', 'rb'))

# Recommendation function
def recommend(medicine):
    medicine_index = medicines[medicines['Drug_Name'] == medicine].index[0]
    distances = similarity[medicine_index]
    medicines_list = sorted(list(enumerate(distances)), reverse=True, key=lambda x: x[1])[1:6]
    recommended_medicines = [medicines.iloc[i[0]].Drug_Name for i in medicines_list]
    return recommended_medicines

# Streamlit app frontend
st.title('Medicine Recommender System')
# Sidebar for user input
st.sidebar.title('Select Medicine')
selected_medicine_name = st.sidebar.selectbox( 'Choose a medicine for recommendations here ',
medicines['Drug_Name'].values)

# Display recommendations
if st.sidebar.button('Recommend Medicine'):
    recommendations = recommend(selected_medicine_name)
    st.sidebar.title('Recommended Medicines')
    for idx, recommended_med in enumerate(recommendations, start=1):
        st.sidebar.write(f"{idx}. {recommended_med}")
        st.sidebar.markdown(f"[Purchase on
PharmEasy](https://pharmeasy.in/search/all?name={recommended_med})")

# Main content
st.subheader('About Medicine Recommender System')
st.write('Welcome to the Medicine Recommender System! Use the sidebar to select a medicine and
receive recommendations.')
st.write('Your Health, Our Recommendation: Discover the Right Medicines.')
```

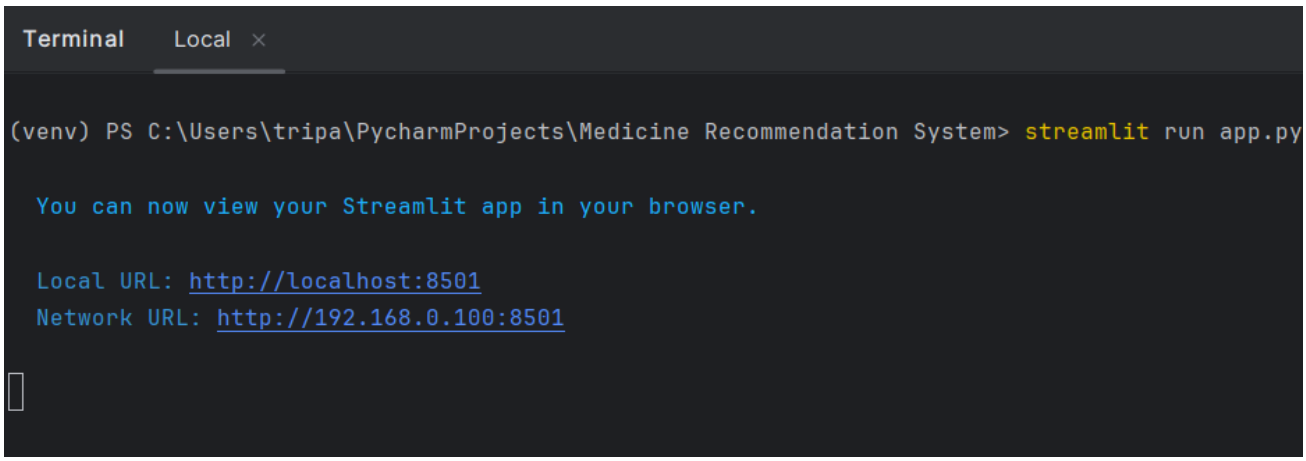
```
# Image
image = Image.open('images/best-health-insurance-plans-sixteen_nine-sixteen_nine.jpg')
st.image(image, caption='Recommended Medicines', use_column_width=True)
st.write('Made by:\n'
        '1) Megha Soni\n'
         '2) Himali Suroshi\n'
         '3) Pragya Tripathi')
```

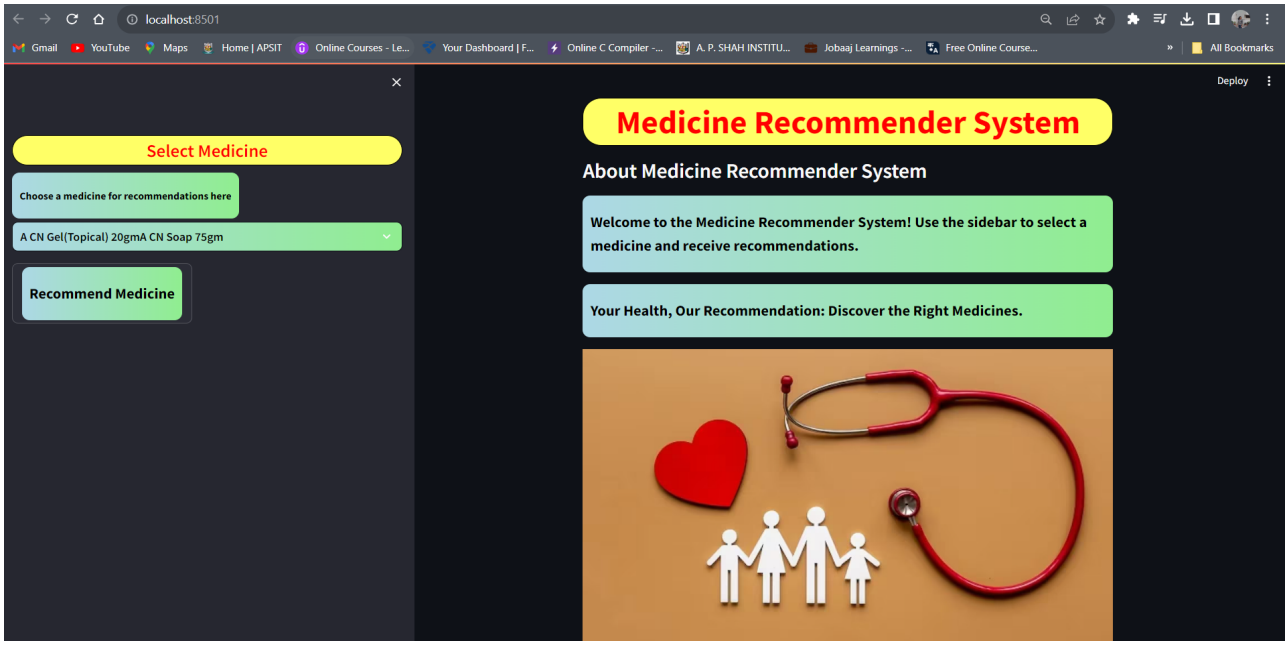
OUTPUT:

For Running this system:

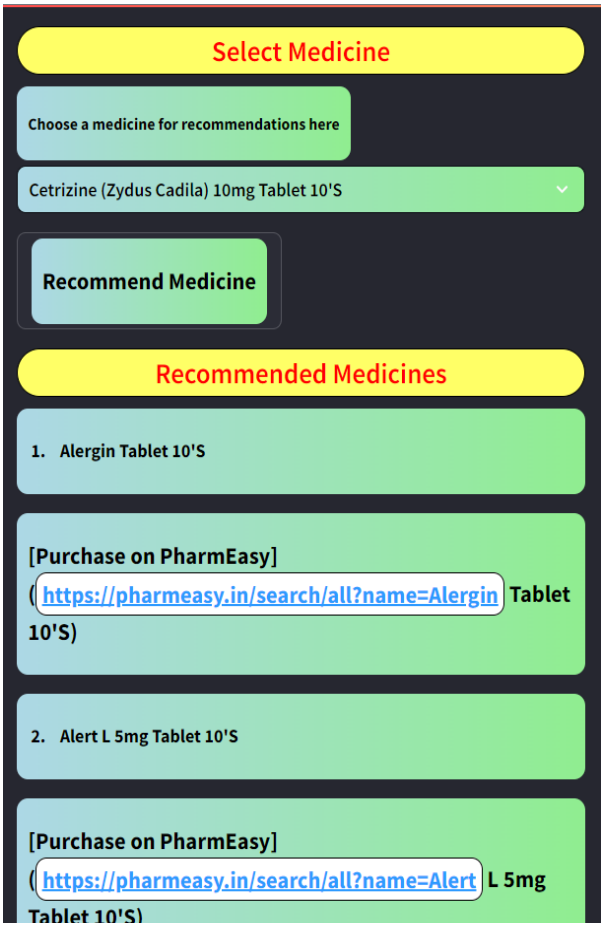
1. Open Terminal.
2. Type- "**streamlit run app.py**"

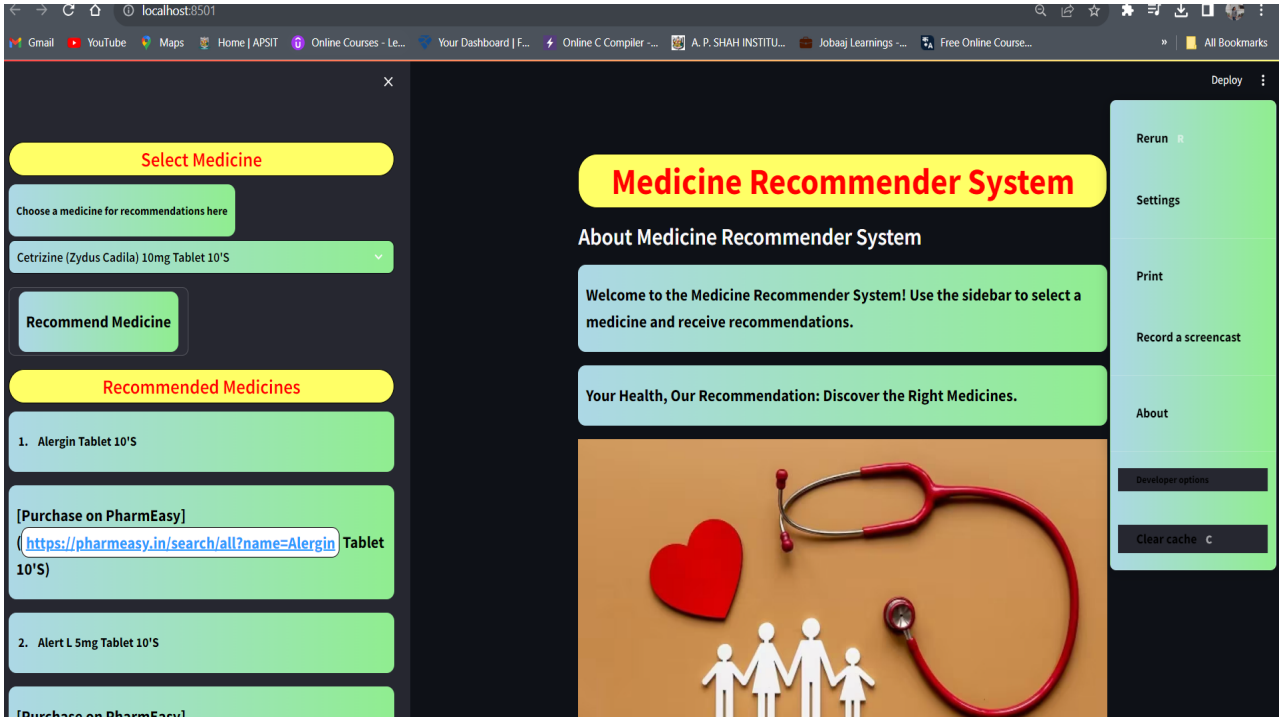






USER INTERFACE

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Recommended Medicines
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(https://pharmeasy.in/search/all?name=Alergin Tablet 10'S)
2. Alert L 5mg Tablet 10'S
Medicine Recommender System
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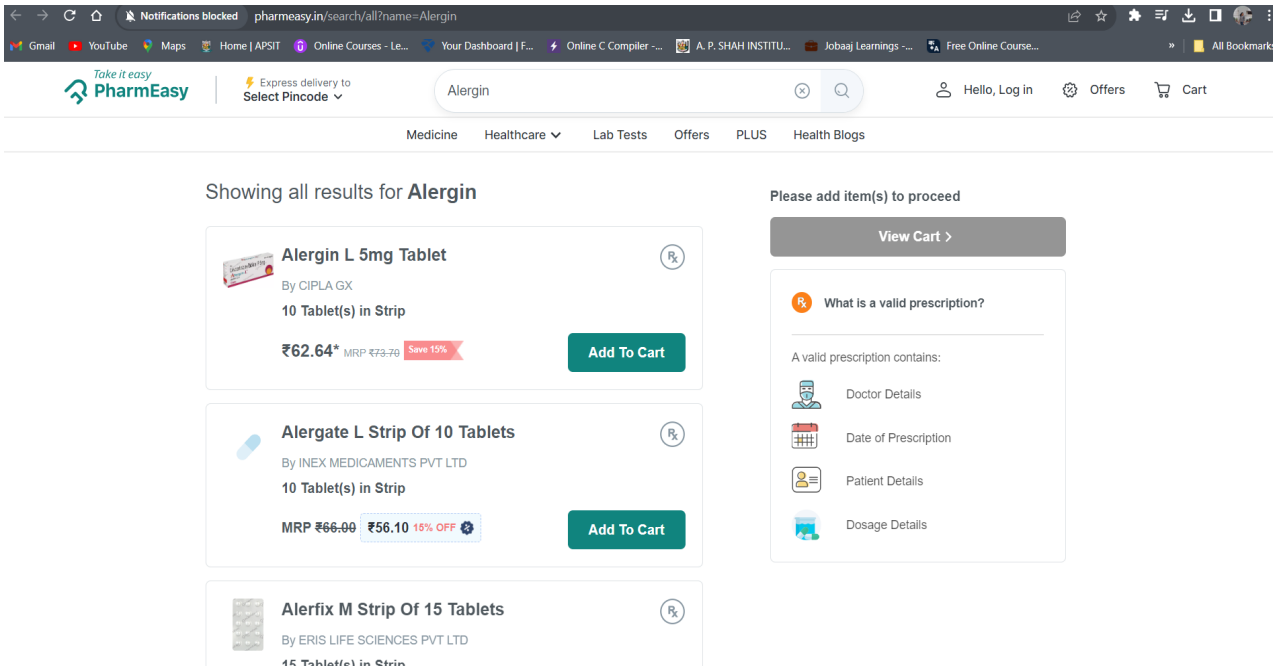
Welcome to the Medicine Recommender System! Use the sidebar to select a medicine and receive recommendations.
Your Health, Our Recommendation: Discover the Right Medicines.
Deploy
Rerun
Settings
Print
Record a screencast
About
Developer options
Clear cache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Cart
Medicine
Healthcare
Lab Tests
Offers
PLUS
Health Blogs
Showing all results for Alergin
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By CIPLA GX
10 Tablet(s) in Strip
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MRP ₹66.00 ₹56.10 15% OFF
Add To Cart
Alerfix M Strip Of 15 Tablets
By ERIS LIFE SCIENCES PVT LTD
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What is a valid prescription?
A valid prescription contains:
Doctor Details
Date of Prescription
Patient Details
Dosage Details

Chapter 4

Conclusion

In conclusion, an Alternative Medicine Recommendation System (AMRS) holds significant potential to enhance healthcare by providing individuals with personalized recommendations for alternative or complementary therapies. This type of system takes into account various factors, including a person's medical history, preferences, and health goals, to suggest alternative treatments that may complement conventional medicine. An effective AMRS has the potential to empower individuals with choices that align with their health needs and preferences. It can also foster collaboration between conventional and alternative medicine practitioners, contributing to a more holistic approach to healthcare. However, it's crucial to approach alternative medicine with caution, relying on evidence-based practices, and ensuring that recommendations prioritize patient safety and well-being.