ALTERNATE MEDICINE RECOMMENDATION SYSTEM

Project Report submitted in partial fulfillment of the requirements for the award of the degree of

BACHELOR OF TECHNOLOGY

IN

COMPUTER SCIENCE AND ENGINEERING (DATA SCIECNE)

By

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Geethanjali College of Engineering and Technology
(UGC Autonomous)
(Affiliated to J.N.T.U.H, Approved by AICTE, New Delhi)
Cheeryal (V), Keesara (M), Medchal.Dist.-501 301.

August -2024

Geethanjali College of Engineering and Technology

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Cheeryal (V), Keesara(M), Medchal Dist.-501 301.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (DATA SCIENCE)

CERTIFICATE

This is to certify that the Project Report entitled **"ALTERNATE MEDICINE RECOMMENDATION SYSTEM"** is a bonafide work done by **Teljuri Swathi Yadav 22R11A6737** in partial fulfillment of the requirements for the award of the degree of Bachelor of Technology in "**Computer Science and Engineering (Data Science)**" from Jawaharlal Nehru Technological University, Hyderabad during the year 2024-2025.

Internal Guide

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(UGC Autonomous)

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (DATA SCIENCE)

DECLARATION BY THE CANDIDATE

I, **Teljuri Swathi Yadav,** bearing Roll No. **22R11A6737** hereby declare that the Project Report entitled **"Alternate Medicine Recommendation System"** is submitted in partial fulfillment of the requirements for the award of the degree of **Bachelor of Technology** in **Computer Science and Engineering (Data Science)**.

This is a record of bonafide work carried out by me in <u>Cantilever</u> and the results embodied in this project report have not been reproduced or copied from any source. The resultsembodied in this project report have not been submitted to any other University or Institute forthe award of any other degree or diploma.

Teljuri Swathi Yadav,

22R11A6737,

CSE-DS,

GCET

ACKNOWLEDGEMENT

I would like to express my heartfelt gratitude to everyone who played a role in the successful completion of this project. My deepest thanks go to our Chairman, **Mr. G.R. Ravinder Reddy**, and our college Principal, **Dr. Uday Susarla**, for providing the essential resources and unwavering support for this endeavor. I am profoundly grateful to the Head of the Data Science Department,**Dr. L. Kiran Kumar Reddy**, for his invaluable guidance and encouragement throughout the project.

I would like to extend my heartfelt gratitude to our guide **Mr. T. Pandu Ranga Rao**, whose invaluable expertise and guidance were instrumental to our success. I am also sincerely appreciative of our Project Coordinator, **Dr. K. Ambedkar**, for the unwavering support and encouragement throughout this period. Additionally, I am deeply grateful to Cantilever for offering this incredible opportunity and providing continuous support. Thank you all for your significant contributions to my learning and growth.

Teljuri Swathi Yadav

22R11A6737

INTRODUCTION ABOUT THE PROJECT ORGANIZATION

Cantilever Labs is dedicated to bridging the gap between students aspirations and the demands of the corporate world. Their vision is to provide relevant training in core and non-core subjects, aptitude, and soft skills, ensuring students are fully prepared for their dream jobs. They offer a personalized learning experience, tailoring lesson plans and schedules to meet individual needs.

Their mission is to impact the lives of students and job-seekers by transforming their dreams into reality through comprehensive training and support. They focus on building confident personalities equipped with intellectual, quantitative, and verbal skills necessary for cracking entrance interviews.

Cantilever Labs is customer-centric, emphasizing overall personality development alongside technical and verbal skills. With a commitment to excellence and a customer-centric approach, they provide the tools and support necessary for success in top companies. At Cantilever Labs, they are not just preparing students for jobs; they are shaping the leaders of tomorrow.

PROJECT SCHEDULE

Weeks	Schedule
Week 1	• Introduction to Cantilever Labs and Internship Objectives. • Python Programming Basics with Advanced Training. • Hands-on Coding Exercises and an Introduction to Data Science Concepts.
Week 2	• Data Science Training and Visualization Techniques. • Practical Sessions on Data Handling with Python. • Introduction to AI/ML concepts, including key algorithms.
Week 3	• AI/ML Training and Practical Implementation of Models. • Project Initiation: Planning and transitioning to the development phase for the Calories Burnt Prediction project.
Week 4	• Continued Project Development, Implementation, and Testing. • Final Testing, Optimization, and Presentation. • Preparation of Project Documentation and Final Report.

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LIST OF SYMBOLS/ABBREVATIONS

- AI - Artificial Intelligence
- ML - Machine Learning
- UI/UX - User Interface/User Experience
- API - Application Programming Interface
- CSV - Comma-Separated Values
- DFD - Data Flow Diagram

ABSTRACT

The Alternate Medicine Recommendation System is an innovative web application designed using Streamlit to help users find alternative medicines to their prescribed drugs. The system provides a user-friendly interface where users can input a specific medicine name and receive recommendations for the top five alternative medicines. Each recommendation includes detailed descriptions, manufacturer information, and convenient links to purchase the medicines from online pharmacies like Med Plus, Pharm Easy, Apollo Pharmacy, and 1mg.

This project addresses the increasing demand for accessible, cost-effective, and convenient healthcare solutions. Patients often need alternatives to their prescribed medications due to cost, availability, or side effects. By leveraging data science and machine learning, the system bridges this gap by offering reliable and accurate alternative medicine recommendations. The backend is powered by a meticulously curated dataset stored in an Excel file, containing comprehensive information about various medicines. Additionally, a similarity matrix stored in a pickle file analyses and determines the most relevant alternatives based on user input. This matrix is derived from an advanced machine learning algorithm evaluating multiple medicine features to establish similarity.

When users input a medicine name, the system maps this input to its corresponding index in the dataset. The recommendation algorithm retrieves the most similar medicines based on pre-calculated similarity scores, ensuring accurate and relevant recommendations. The user interface features a search box and a recommendation button, providing quick and organized results. Direct purchase links enhance user convenience, streamlining the process of obtaining recommended medicines.

Development involved data collection, pre-processing, algorithm development, and user interface design using Streamlit. The system also includes error handling and feedback features, enhancing the overall user experience. By improving access to healthcare options and supporting informed decision-making, the Alternate Medicine Recommendation System has the potential to significantly impact healthcare positively.

1. INTRODUCTION

The Alternate Medicine Recommendation System is a crucial tool developed to help users make informed choices about alternative medicines. Built using Streamlit, a user-friendly web application framework, the system allows individuals to input specific medications and receive personalized alternative recommendations. Each suggestion includes detailed descriptions, manufacturer information, and direct purchase links from major online pharmacies such as Med Plus, Pharm Easy, Apollo Pharmacy, and 1mg.

This system addresses the growing demand for affordable and accessible healthcare solutions. Patients often look for alternatives to expensive or problematic prescribed medications. By leveraging data science and machine learning, the system provides reliable recommendations based on a thorough analysis of medicine attributes.

The core of the system is a carefully curated Excel dataset containing extensive information on various medicines. This dataset supports a similarity matrix, stored in a pickle file, which drives the recommendation engine. Using advanced machine learning techniques, including cosine similarity and collaborative filtering, the system assesses multiple factors to find and recommend similar medicines, ensuring accuracy and relevance to users' healthcare needs.

The development process included comprehensive data collection from reputable sources, meticulous data pre-processing to ensure quality, and iterative optimization of recommendation algorithms to enhance accuracy and performance.

2. RELATED WORKS/TECHNOLOGIES USED

2.1 Hardware/Software designing

The hardware and software requirements needed for the project and detailed explanation of the specifications

2.1.1 Hardware Requirements

A PC with Windows/Linux OS

Processor with 1.7-2.4gHz speed

Minimum of 8gb RAM

2gb Graphic card 3.2 Software Specification

2.1.2 Software Specification

Anaconda distribution package or google colab

Python libraries and pycharm editor

2.2 Software Requirements

2.2.1 Anaconda distribution:

Anaconda is a free and open-source distribution of the Python programming languages for scientific computing(data science, machine learning applications, large-scale data processing, predictive analytics, etc), that aims to simplify management system and deployment Package versions are managed by the   package management system Anaconda

2.2.2 Technologies Used

Streamlit

- Ideal for rapidly building and deploying interactive web applications with Python.
- Provides an intuitive interface for presenting and interacting with data-driven insights.

Pandas

- Essential for data manipulation, including cleaning, filtering, and organizing the dataset.
- Facilitates preparation of the dataset for analysis and recommendation generation.

Scikit-learn

- Used to implement recommendation algorithms and create the similarity matrix.
- Applies machine learning techniques like nearest neighbors and cosine similarity to evaluate medicine attributes.

NumPy

- Supports efficient numerical computations and mathematical operations for the recommendation system.
- Handles array-based operations and linear algebra routines necessary for similarity calculations.

Pickle

- Serializes and deserializes the similarity matrix for efficient storage and retrieval.
- Enhances performance by avoiding recalculation of similarities during user queries.

Excel

- Serves as the format for storing the comprehensive dataset of medicines.
- Facilitates data entry and maintenance, including detailed attributes of each medicine.

3. WORK DONE/OBSERVATION/DUTIES PERFORMED

Pycharm library requirements during functionality development:

✓ Streamlit

✓ pickle

✓ numpy

✓ pandas

✓ Scikit-learn

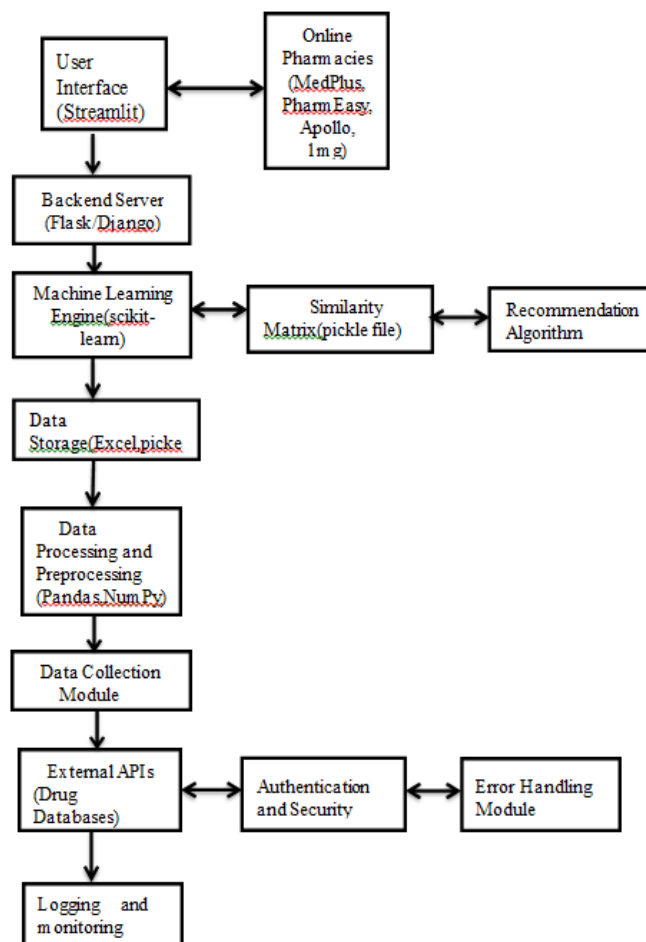## 3.1 System Architecture of Proposed System:

Fig 3.1 : Architecture of Proposed System

3.2 Data Flow

The process begins with the user inputting the name of a medicine into a user interface built using Streamlit, allowing them to interact seamlessly with the system. This input is then sent to a backend server responsible for fetching and processing the relevant data, likely involving database queries or external API calls. Once processed, the data is forwarded to a machine learning engine that evaluates similarities between the input medicine and others based on predefined criteria like chemical composition or therapeutic use. The resulting data is stored in a data storage system for future retrieval. When needed, this data is retrieved by the backend server and sent back to the user interface. Finally, the recommendations are displayed to the user, completing the process. This structured flow ensures that users receive personalized, data-driven medicine recommendations efficiently.
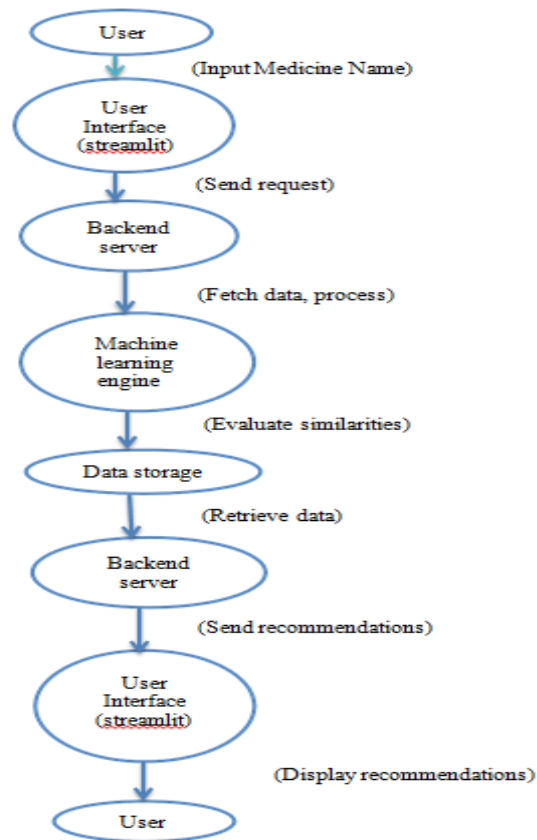

Fig 3.2 Data Flow Diagram

3.3 Data Sets

Comprehensive Dataset of Medicines

ID	Medicine Name	Reason	Description	Price (₹)	Manufacturer	Type
1	Paracetamol	Fever, Pain Relief	Treats mild to moderate pain and fever	20	ABC Pharma	Allopathic
2	Amoxicillin	Bacterial Infection	Antibiotic for bacterial infections	100	XYZ Pharma	Allopathic
3	Ibuprofen	Pain Relief	Reduces inflammation and treats pain	30	DEF Pharma	Allopathic
4	Metformin	Diabetes	Controls high blood sugar in type 2 diabetes	50	GHI Pharma	Allopathic
5	Glimet Tablet	Diabetes	Combination drug for type 2 diabetes	120	JKL Pharma	Allopathic
6	Avol Tablet	Pain Relief	Relieves pain and inflammation	60	MNO Pharma	Allopathic
7	Bondria Tablet	Osteoporosis	Prevents osteoporosis in postmenopausal women	200	PQR Pharma	Allopathic
8	Triosin Tablet	Thyroid Disorders	Treats hypothyroidism	80	STU Pharma	Allopathic

Fig 3.3.1 Medicine Dataset

Key Features Extracted for Similarity

Feature	Description
Medicine Name	The name of the medicine
Reason	The primary reason for the medicine's recommendation
Description	Detailed description of the medicine
Price (INR)	Cost of the medicine in Indian Rupees
Manufacturer	The company that produces the medicine
Type	The classification of the medicine (e.g., NSAID, Analgesic)

Fig 3.3.2 Similarity Data Set

3.4 Screens

3.4.1 Home page of the web application:
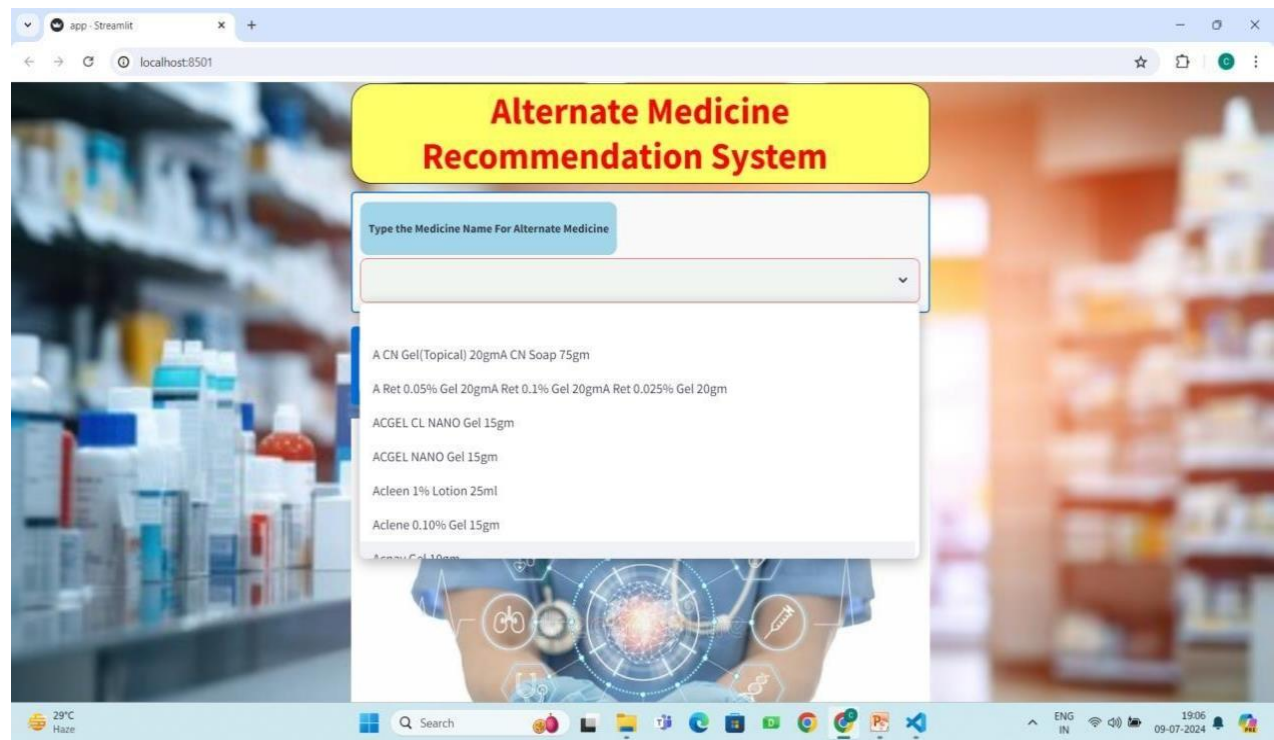

Fig 3.4.1 Home Page

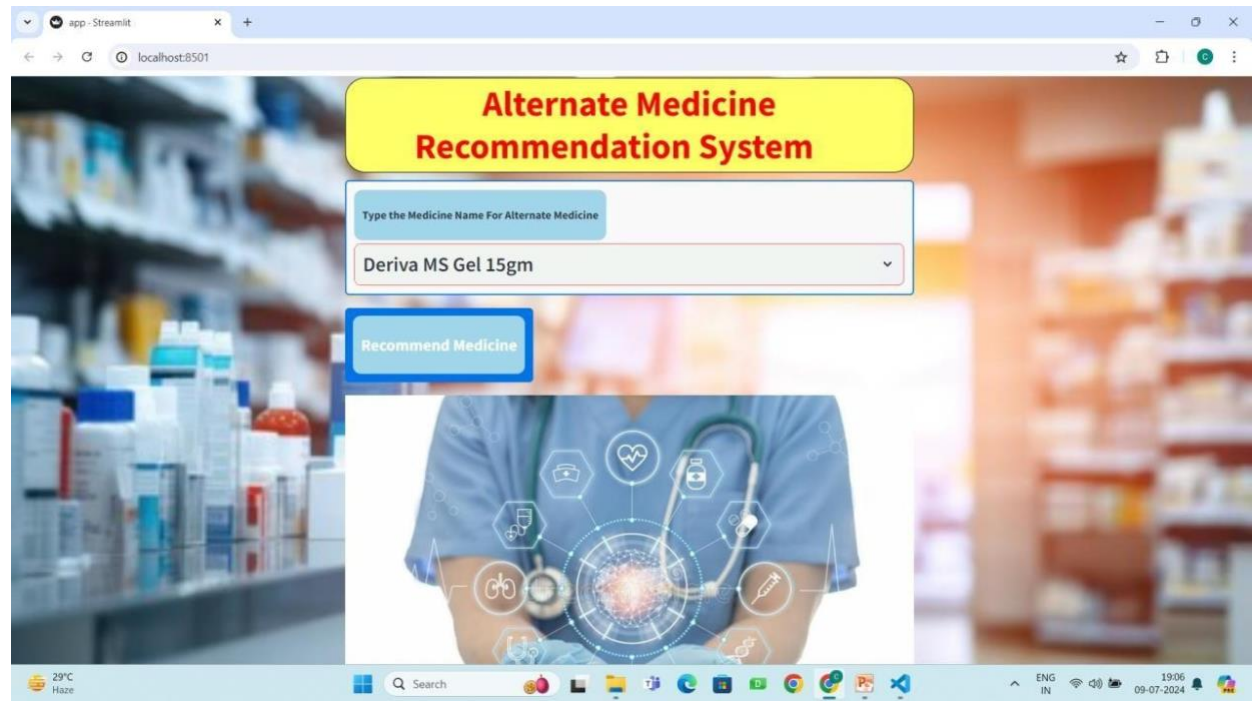### 3.4.2 Search Functionality Function:

Fig 3.4.2 Search Engine
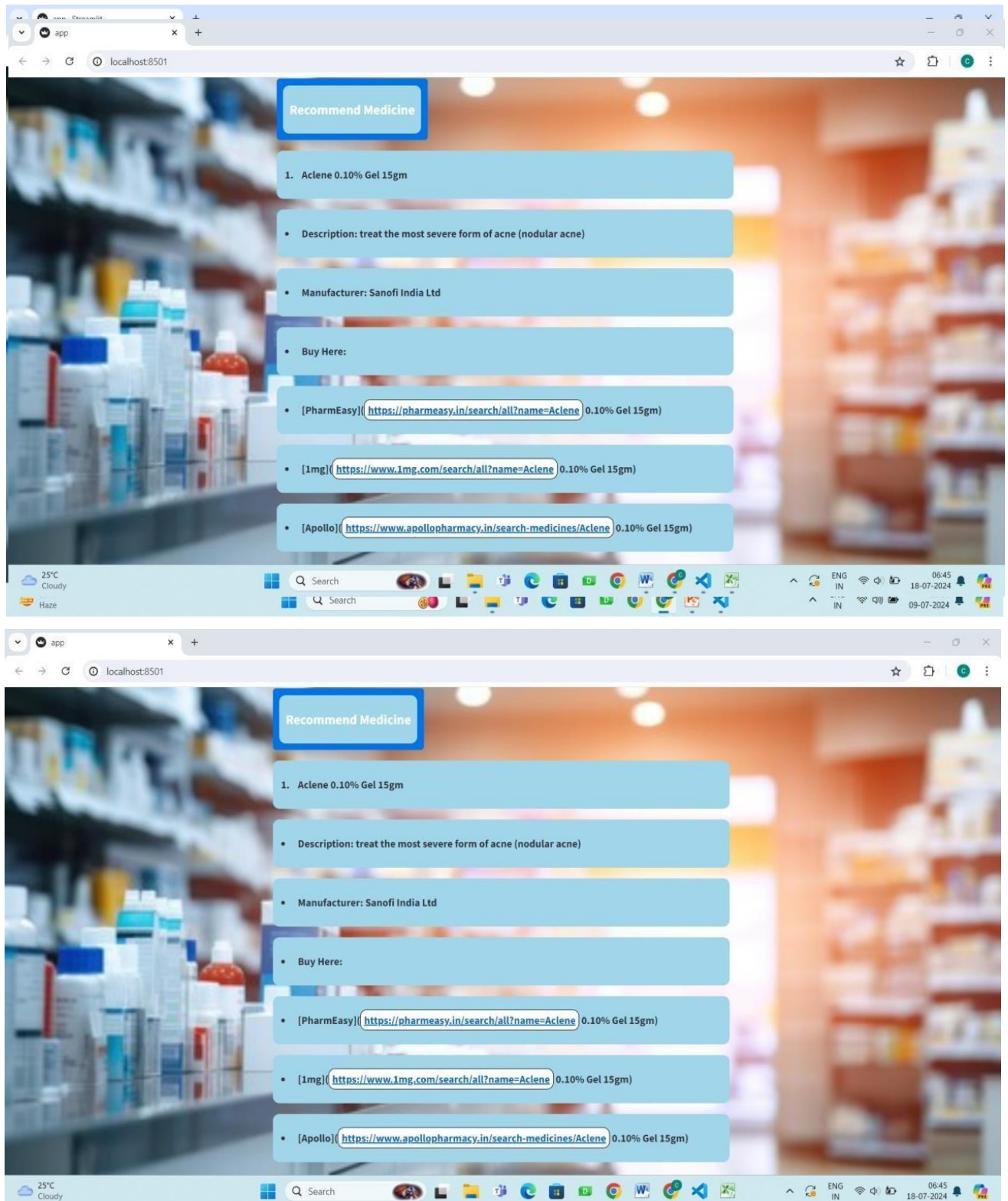
3.4.3 Fetching Recommendations

Fig 3.4.3 Recommending Page

4. LEARNING AFTER PROJECT

The development of the Alternate Medicine Recommendation System has been a transformative journey, enriching my skills and insights across multiple domains and reinforcing the practical application of theoretical knowledge in real-world scenarios.

Data Science Insights

The project immersed me in the fundamentals of data science, emphasizing the critical stages of data collection, pre-processing, and analysis. I gained first-hand experience in sourcing diverse datasets from reliable sources and applying rigorous techniques to ensure data accuracy and consistency. Techniques such as data cleaning to handle missing values, normalization for standardized comparisons, and feature engineering to enhance predictive models became integral to optimizing dataset readiness for machine learning algorithms. These experiences underscored the pivotal role of high-quality data in driving meaningful insights and informed decision-making.

Machine Learning Expertise

A cornerstone of the project was the development and optimization of machine learning algorithms to evaluate medicine similarities and recommend alternatives effectively. I deepened my understanding of various machine learning techniques, including cosine similarity, collaborative filtering, and nearest neighbours algorithms. Through iterative cycles of model evaluation, parameter tuning, and performance optimization, I honed my skills in translating theoretical concepts into practical solutions that deliver accurate and personalized recommendations. This iterative process underscored the importance of continuous learning and adaptation to achieve optimal algorithm performance in dynamic healthcare environments.

Web Development Proficiency

Creating a user-centric interface using Streamlit was pivotal in translating technical functionalities into an intuitive and accessible user experience. I learned to design responsive UI components that enhance usability, implementing interactive features such as search functionalities and recommendation buttons to streamline user navigation. Integrating design principles such as simplicity, responsiveness, and user feedback mechanisms enriched my proficiency in web development tailored for data-centric applications. These skills are crucial in effectively communicating complex technical information to diverse user groups while ensuring a seamless user journey.

Project Management Skills

Navigating the project lifecycle from initial planning to execution provided valuable insights into effective project management practices. I refined my skills in prioritizing tasks, allocating resources efficiently, and maintaining project timelines amidst evolving requirements. Collaborating with multidisciplinary teams, managing project dependencies, and mitigating challenges in real-time reinforced a proactive and adaptive approach to project management. These experiences highlighted the importance of communication, teamwork, and agile methodologies in driving project success and fostering continuous improvement.

5. SUMMARY/CONCLUSION

The Alternate Medicine Recommendation System stands as a transformative innovation in healthcare technology, aimed at empowering users to make informed decisions regarding alternative medicines. This project merges advanced data science and machine learning methodologies to deliver personalized recommendations based on a comprehensive dataset of medicines.

Project Overview and Methodology

From inception, the project prioritized tackling crucial healthcare challenges such as medication affordability, availability, and patient-centric care. The foundation of the system lies in meticulous data collection from reputable sources, ensuring a robust dataset comprising detailed information on medicines, including descriptions, manufacturers, and therapeutic uses. Rigorous pre-processing techniques were employed to cleanse and standardize the data, ensuring its accuracy and reliability for subsequent analyses.

Key milestones included the development and optimization of sophisticated machine learning algorithms. Techniques such as cosine similarity and collaborative filtering were implemented to evaluate medicine similarities and generate tailored recommendations.

User Interface and Accessibility

The user interface, developed using Streamlit, emphasizes user-friendliness and accessibility. Its intuitive design allows users to easily input specific medications and receive detailed recommendations promptly. The interface provides transparent insights into recommended alternatives, presenting comprehensive information about each medicine's attributes, potential benefits, and links to purchase from reputable online pharmacies. This functionality enhances user engagement and facilitates seamless access to alternative treatment options.

Impact on Healthcare and Future Directions

The implementation of the Alternate Medicine Recommendation System signifies a paradigm shift in healthcare accessibility and decision-making. By equipping users with comprehensive information and alternative treatment options, the system promotes informed healthcare choices and patient autonomy. Healthcare providers can leverage these insights to facilitate collaborative discussions with patients, tailoring treatment plans to meet individual needs effectively.

Looking ahead, the project lays the groundwork for future innovations in personalized medicine and healthcare analytics. Potential advancements include integrating predictive analytics to refine recommendation accuracy based on real-time health data and expanding the system's integration into broader healthcare ecosystems. Ethical considerations, such as data privacy and patient confidentiality, remain paramount in guiding the system's responsible deployment and ensuring trust among users and healthcare stakeholders.

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