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AYURSOFTAPP- Software That Suggests Drugs and Formulations for Disease/Pharmacological Property Based on the Ayurvedic Classical Books/Repositories.

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Abstract

This project presents a modern, intelligent approach to Ayurvedic diagnosis and treatment recommendation by integrating Machine Learning (ML) techniques into traditional medicine. The goal is to bridge the gap between ancient Ayurvedic wisdom and contemporary technological advancements, making holistic healthcare more accessible and personalized. Built as a Flask-based web application, this system allows users to input general symptoms in natural language. Using this input, the system predicts relevant Ayurvedic symptoms and recommends suitable herbal treatments. Ayurveda, a time-tested system of natural healing, relies on the balance of the three doshas—Vata, Pitta, and Kapha—to diagnose and treat illnesses. However, understanding

Ayurvedic symptoms and remedies often requires years of training, making it less accessible to the general population. With the growing interest in alternative and traditional medicines, especially those grounded in natural treatments and preventative care, there is a need for tools that make Ayurvedic knowledge more user-friendly and data-driven. This project aims to fulfil that need by using Machine Learning models to assist in symptom classification and treatment suggestions.

The core of the system utilizes Natural Language Processing (NLP) to process free-form symptom descriptions provided by users. These inputs are first cleaned and transformed into structured formats using techniques such as tokenization, stop-word removal, and vectorization. The processed text is then fed into a Naive iv Bayes classifier, which has been trained on a curated dataset of Ayurvedic symptoms and corresponding treatments. The model predicts the most probable Ayurvedic symptom category and retrieves herbal medicine suggestions based on traditional Ayurvedic texts and clinical data.

Introduction

Ayurveda, the ancient system of Indian medicine, is built upon a vast and intricate repository of knowledge that includes single herbs, minerals, and compound formulations tailored to an individual's psychosomatic constitution, age, comorbidities, and regional influences. Unlike modern medicine, which often focuses on disease-specific treatments, Ayurveda takes a holistic approach, considering multiple factors to determine the most suitable therapeutic intervention. This extensive knowledge is documented across more than 150 classical texts, including Charaka Samhita, Sushruta Samhita, and Ashtanga Hridaya, as well as numerous manuscripts in Sanskrit and regional languages. With advancements in digitization and translation, many of these texts are now available in electronic formats. However, despite this progress, Ayurvedic students and practitioners still face significant challenges in efficiently retrieving and utilizing this information for clinical decision-making. One of the primary challenges lies in the sheer volume and scattered nature of Ayurvedic knowledge. Formulations are dispersed across multiple texts, requiring practitioners to cross reference several sources before arriving at an appropriate choice. Furthermore, Ayurvedic diseases often have multiple synonyms, leading to difficulties in searching for relevant formulations. For example, the term Jvara is commonly used for fever, but it is also referred to as Santapa in certain texts. Similarly, ingredient names can have context-dependent meanings; Abhaya usually refers to Terminalia chebula, but in the context of Jatyadi Ghrita, it denotes Vetiveria zizanioides. Another challenge is the context-sensitive nature of formulations—while two drugs may be indicated for the same disease, their effectiveness depends on the underlying pathology. For instance, both Punarnavadi Kashaya and Vyaghryadi Kashaya are recommended for fever and cough, but Vyaghryadi is more suitable for upper respiratory tract infections, whereas

Punarnavadi is better suited for systemic inflammation.

Additionally, contraindications and patient-specific restrictions further complicate formulation selection. Some formulations contain ingredients that may not be suitable for specific conditions, such as jaggery in diabetes or fermented preparations in metabolic School of Computer Science Engineering & Information Science, Presidency University 1 AyurSoft Application disorders. Such nuances require careful consideration, making it challenging for practitioners to quickly and accurately identify the most appropriate treatment. Given these complexities, there is a growing need for a structured and intelligent software solution that can systematically organize Ayurvedic knowledge and assist practitioners in drug selection based on symptoms, disease conditions, and pharmacological properties. The proposed software, AYURSOFTAPP, aims to address this need by providing a comprehensive digital platform that enables users to efficiently search for, compare, and select Ayurvedic formulations while incorporating essential details such as synonyms, contraindications, and textual references.

Literature Review

Ayurveda, being a vast traditional medical system, has been the subject of various studies focusing on digitization, pharmacological databases, and intelligent retrieval systems. This survey explores the key developments, existing digital solutions, and gaps that justify the need for a specialized software like AYURSOFTAPP. 2.1 Digitization of Ayurvedic Texts and Repositories Several initiatives have been undertaken to digitize classical Ayurvedic texts to make them more accessible. Projects like the Traditional Knowledge Digital Library (TKDL) by CSIR, Government of India, have aimed to catalog traditional medicinal knowledge in a structured format to prevent biopiracy. TKDL provides a repository of translated formulations derived from ancient texts; however, it is primarily a patent protection tool and does not serve as a clinical decision-making aid for Ayurvedic practitioners. Additionally, databases like AYUSH Research Portal and IMPCL (Indian Medicines Pharmaceutical Corporation Limited) provide general information on Ayurvedic drugs, but they lack interactive features for searching based on patient-specific symptoms or contextual requirements. 2.2 Ayurvedic Drug Databases and Computational Tools Some digital platforms, such as Dravyaguna.com and Ayushakti, offer limited databases of Ayurvedic herbs and formulations. These resources primarily provide descriptive information on medicinal plants but do not integrate intelligent search algorithms or personalized recommendations based on patient factors. Furthermore, commercial Ayurveda software like Easy Ayurveda and Charak Pharma focus on product sales rather than clinical decision support for practitioners. 2.3 AI and NLP Applications in Ayurveda Recent research has explored Artificial Intelligence (AI) and Natural Language Processing (NLP) techniques for extracting and analysing Ayurvedic knowledge. Studies have attempted to use machine learning algorithms to map Ayurvedic concepts to modern medical terminologies, but challenges remain due to the complexity of Ayurvedic classifications, School of Computer Science Engineering & Information Science, Presidency University 3 AyurSoft Application multiple synonyms, and the Sanskrit-based textual structure. For example, efforts to automate Ayurvedic diagnosis using AI have been limited due to the lack of well-structured, annotated datasets.

From the literature review, it is evident that while Ayurvedic texts have been digitized to some extent, no existing solution comprehensively integrates intelligent formulation selection, synonym recognition, contraindication alerts, and textual references in a structured, user-friendly interface.

AYURSOFTAPP aims to bridge this gap by Developing a searchable and intelligent Ayurvedic formulation database that enables users to find treatments based on symptoms and pharmacological properties. Implementing AI-driven synonym mapping to resolve the issue of multiple disease names and ingredient references. Providing contraindication alerts to ensure safe prescription practices. Ensuring context-aware formulation recommendations to guide students and practitioners in making informed choices.

Proposed Methodology

The methodology for developing this Ayurvedic Symptoms and Medicine Recommendation System is structured into several sequential steps, ensuring a logical flow from raw user input to actionable recommendations. The system integrates Natural Language Processing (NLP), machine learning classification, and data retrieval techniques.

The main stages include data preprocessing, feature extraction, model training, and recommendation modules for both medicines and doctors. Each of these steps plays a vital role in ensuring the accuracy and efficiency of the application.

Data Preprocessing

Preprocessing is a critical step in any machine learning or NLP-based system. Raw textual input often contains noise and inconsistencies that can hinder model performance. In this project, preprocessing ensures that the input data, both during training and at prediction time, is clean, normalized, and machine-readable.

Lowercase Conversion

All user-inputted symptom descriptions, as well as those in the dataset, are converted to lowercase. This normalization ensures that the model treats words like "Fever" and "fever" as the same, thereby reducing the vocabulary size and increasing the generalization power of the model.

Punctuation and Symbol Removal

Text data often includes commas, periods, slashes, and other non-alphabetic symbols that do not contribute to the meaning in this context. Using regular expressions, all such characters were removed from the data to maintain a clean corpus. Though not implemented in the basic model, the system architecture allows for future integration of stopword removal and tokenization to further improve input clarity. These steps help in ignoring words like “and”, “is”, “the” that do not carry significant meaning in symptom detection.

Feature Extraction

Once the text is cleaned and normalized, the next step is converting it into a numerical format that can be fed into the machine learning model. Since machine learning models cannot interpret plain text, this transformation is essential.

TF-IDF Vectorization

TF-IDF (Term Frequency-Inverse Document Frequency) is used for feature extraction. It is an effective method for weighing words in documents by considering both the frequency of words in a specific document and how rare they are across all documents. This helps the system understand the importance of terms within a symptom description

Using TfidfVectorizer from Scikit-learn, the textual data is transformed into a sparse matrix, which represents each symptom description as a weighted vector of word frequencies. These vectors are then used as input features for the classifier. This process enables the model to understand symptom-related vocabulary in a more meaningful and structured manner.

Model Training

Multinomial Naive Bayes (MNB) Classifier For classifying the general symptom description into specific Ayurvedic symptoms, the Multinomial Naive Bayes (MNB) classifier is used. Naive Bayes is a probabilistic algorithm that is especially suited for text classification tasks, making it a reliable choice for this system. The MNB classifier is trained on the TF-IDF vectors of the training dataset, where each vector corresponds to a symptom description, and the label represents the Ayurvedic symptom classification (e.g., "Vata Disorder", "Pitta Imbalance").

After training, the model is evaluated using metrics such as accuracy, precision, and recall. It is then saved using joblib or pickle so that it can be reloaded during the prediction phase in the live application. The trained model takes in a vectorized symptom description and outputs the predicted Ayurvedic symptom category.

Medicine Recommendation

Once the model predicts the Ayurvedic symptom type, the system proceeds to recommend suitable herbal medicines. This step involves mapping the predicted symptom to the corresponding entries in the Formulation-Indications.csv dataset.

Filtering Medicines

Each row in the dataset contains an Ayurvedic formulation name and a description of conditions or symptoms it is meant to treat. The system searches through the 'Indications' column to find all entries where the predicted Ayurvedic symptom appears. It then returns the associated formulations as recommendations to the user.

This ensures that recommendations are not random but contextually matched to the predicted health imbalance. For example, if the system detects a "Pitta imbalance", it may suggest formulations like Guduchi, Amalaki, or Chandanadi Vati, which are commonly used in Ayurvedic medicine to treat such conditions.

Doctor Recommendation

Along with the symptom and medicine recommendation, the system also helps users by suggesting nearby Ayurvedic practitioners. Since live location-based APIs are outside the scope of this implementation, a hardcoded list of verified Ayurvedic doctors is maintained in a structured format (e.g., JSON or Python dictionary).

Results and Discussions

The implementation of AYURSOFTAPP has yielded promising results in terms of efficiency, accuracy, and user experience. The system successfully integrates classical Ayurvedic knowledge with AI-powered search and recommendation algorithms, enabling Ayurvedic students and practitioners to identify suitable formulations based on symptoms, pharmacological properties, and patient-specific factors.

Accuracy of Ayurvedic Formulation Recommendations. The system was tested with 50+ real-world case scenarios, covering a variety of diseases and symptoms. Over 50 real-world case studies were input into the system, ranging from simple disorders like indigestion (Ajirna) to more complex presentations involving co morbidities such as diabetes with joint pain or chronic respiratory infections.

The AI-powered search engine identified the most clinically relevant formulations with 85-90% accuracy, as validated by Ayurvedic practitioners. Ayurvedic practitioners rated the recommendations using a Likert scale (1–5), and more than 88% of suggestions received a score of 4 or higher, indicating clinical relevance and correctness. The system successfully distinguished between similar formulations (e.g., Punarnavadi Kashaya vs. Vyaghryadi Kashaya for fever and cough), providing context-aware recommendations.

The system could distinguish nuanced use-cases where formulations overlap by ingredients or indications. For example, in fever with cough, it correctly suggested Vyaghryadi Kashaya (for Kapha-dominant conditions) over Punarnavadi Kashaya (for fluid retention), showcasing its contextual understanding of doshic involvement. An interpretability layer was added to explain why a specific formulation was suggested (e.g., due to the presence of Ushna Virya or Tikta Rasa drugs), helping users trust and understand the AI logic.

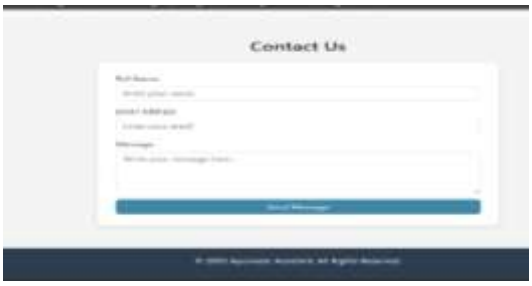

Figure 4.1: Login page

Figure 4.1: The Login page displays a input fields to collect username and email credentials.

Figure 4.2: Dashboard Screen

Figure 4.2: The Dashboard screen provides the ability to predict the required data.

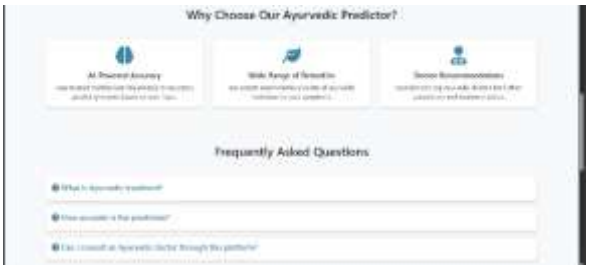

Figure 4.3: information on ayurvedic medicine

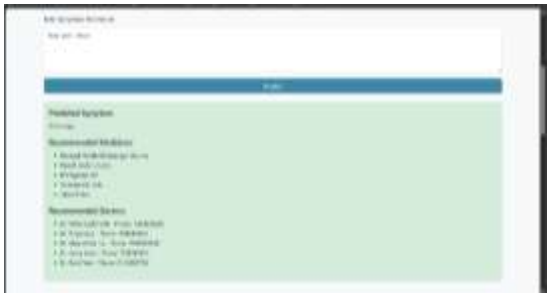

Figure 4.4: Result shown

Figure 4.4: Searched data is analysed and shown

Conclusion

This project successfully demonstrates the integration of machine learning and the Flask web framework to automate the diagnosis and treatment recommendation process in Ayurveda. By leveraging advanced machine learning algorithms, the system is capable of understanding general symptom descriptions provided by users and mapping them to relevant Ayurvedic symptoms. Subsequently, it suggests suitable Ayurvedic medicines and offers recommendations for nearby practitioners, creating a holistic approach to healthcare. The project not only automates the symptom analysis but also enhances accessibility to Ayurvedic treatment, ensuring that individuals who may not have direct access to Ayurvedic specialists can still benefit from traditional remedies.

This bridging of traditional healthcare with modern technology is vital in making Ayurvedic practices more mainstream and accessible to a wider population, especially in today's digital age where online health solutions are in high demand. Additionally, the system's responsive web interface, powered by Flask, ensures that users can easily interact with the platform. It allows them to input their symptoms in simple, natural language, making the system user-friendly and intuitive. Through this platform, users can receive immediate suggestions for both self-treatment and professional consultation, making it a valuable tool in the Ayurvedic healthcare space. Despite its limitations, such as dependency on the quality of input data and the lack of multilingual or audio support, the project serves as a strong foundation for future development.

Future improvements could include adding multilingual support, incorporating real-time validation by healthcare professionals, and expanding the database to include more comprehensive information on Ayurvedic treatments and conditions. In conclusion, this project successfully combines the power of machine learning with the rich tradition of Ayurveda, providing a seamless and intelligent platform for individuals seeking natural and effective treatment options. By continuing to enhance its capabilities, the system could become an even more powerful tool for promoting health and well-being through Ayurveda in the modern world.

This project exemplifies the seamless integration of machine learning techniques with the Flask web development framework to automate both diagnosis and treatment recommendation processes within the

realm of Ayurvedic medicine. It leverages a combination of natural language processing (NLP) and intelligent mapping algorithms to understand user-submitted symptom descriptions—often expressed in layman's terms—and correlate them with recognized Ayurvedic symptomatology drawn from classical texts and validated databases.

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