

**AYURVEDIC REMEDY RECOMMENDER**

**A PROJECT REPORT**

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**PRESIDENCYUNIVERSITY**

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# **SCHOOL OF COMPUTER SCIENCE AND ENGINEERING**

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Further, the matter embodied in the project has not been submitted previously by anybody for the award of any Degree or Diploma to any other institution.

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## ABSTRACT

Ayurveda as the world's oldest medical system is based on enormous textual knowledge of ancient texts like Charaka Samhita, Sushruta Samhita, and Ashtanga Hridaya. But even then, it remains an issue to determine appropriate formulations for a particular disease since these texts are unstructured and Ayurvedic terminology is complex. This paper presents an artificial intelligence-driven Ayurvedic drug suggestion system that combines Natural Language Processing (NLP) and formal database to suggest accurate formulation. Taking advantage of advanced search algorithms, synonym mapping, and contraindication filtering, the system provides maximum accuracy in the selection of drugs based on symptoms and pharmacological characteristics. The system proposed is a stepwise one with data gathering, preprocessing, algorithm design, and implementation as an Android-based mobile application. Ayurvedic information are archived in XML and JSON data forms, thus easy to search and cross-look up. Symptom-based search engine is correlated to the traditional medicines against user input symptoms and suggestions are filtered for against patient details like Prakriti (constitution) and contraindications. The software, for ease of use, is multi-language capable, thus providing easy access to and receiving suggestion for practitioners, researchers, and students alike.

This study bridges the gap between Ayurvedic tradition and modern digital usage of healthcare by a smart, organized, and user-friendly system of drug suggestion. The platform may have the scope to improve clinical decision-making, standardization of Ayurveda medicines, and the validity in general of Ayurvedic medicine in current health care situations. Real-time updation in cloud integration, user interaction using a voice interface, and improvement in the database including more formulations and pharmacology-related information could be future modifications.

**Key words:** Ayurveda, symptom-based search, drug suggestion, e-healthcare

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# 1. INTRODUCTION

## 1.1. OVERVIEW OF THE PROJECT

### 1.1.1. Background:

Ayurveda, as an ancient medical system, is concerned with holistic healing through balancing the spirit, mind, and body. In contrast to modern medicine, which is mainly concerned with symptom treatment, Ayurveda attempts to find the causes of diseases and treat them. Ayurveda is based on established principles and natural medicine to ensure good health.

Ayurvedic management is founded on the assumption that the human organism is regulated by three doshas of Vata, Pitta, and Kapha that control physiological as well as psychological functions. Pathology results from derangements of the doshas, and Ayurvedic management seeks to re-establish them to normal through the application of herbal remedies, dietetics, and lifestyle modification. The employment of medicinal plants, mineral compounds, and purification procedures like Panchakarma increases the efficacy of Ayurveda in fighting disease.

### 1.1.2. Project Concept:

Traditional Ayurvedic treatment has been adequately recorded in ancient classics such as Charaka Samhita, Sushruta Samhita, and Ashtanga Hridaya. All these classics present adequate information regarding disease, causation, pathogenesis, and formulation for the purpose of therapy. However, these books are not readily available and are not easily understandable due to their intricacies, terminology, and professional expertise required for proper prescription.

## 1.2. OBJECTIVES OF THE PROJECT

### 1.2.1. Need for the Study:

Though Ayurveda is efficacious, its integration into mainstream healthcare is being hindered by a sequence of challenges:

- Unavailability of organized data – Ayurvedic information of bygone days are scattered across various texts, and information wanted at a rapid pace is not readily available.
- Limited availability on digital media – Ayurvedic classics are not found in organized digital forms.
- Lack of updating current studies – Progress achieved in Ayurvedic, and ongoing formulation is not included

in current digit

To fill these gaps, our project creates a smart Ayurvedic drug recommendation system that offers precise, patient-focused drug formulations from classical texts and current research.

## 1.3. SCOPE OF THE PROJECT

### 1.3.1. Standardization of Ayurvedic Knowledge:

One of the important problems in Ayurveda is not having a uniformity of treatment protocols and formulation. Our software:

- tDigitizes traditional texts – Translates old Ayurvedic literature into well-defined digital structures (e.g., XML, JSON databases).

- Categorizes formulations – Places formulations by Rasa (taste), Guna (quality), Virya (strength), and Vipaka (after-digestion effect) to support accurate suggestions.
- Contains cross-referencing integration – Cross-links conventional Ayurvedic treatments to up-to-date scientific studies and clinical trial evidence.

### **1.3.2. Accessibility and User Experience:**

The software improves accessibility for a wide array of users, including:

- Practitioners – Helps Ayurvedic physicians rapidly access appropriate formulations for treating patients.
- Students and researchers – Offer an organized database for educational learning and research in Ayurvedic medicine.

### **1.3.3. Addressing Potential Risks:**

Usage of Ayurvedic medicines needs a proper understanding of:

- Herbal properties – Avoiding any negative impact by plant-based treatments on existing conditions.
- Contraindications – Avoiding self-medication mistakes that might result in unfavorable health consequences.
- Dosage regulations – Suggest preparations with accurate dosage instructions to avoid toxicity or ineffectiveness.

## **1.4. EXPECTED OUTCOMES**

Its application is anticipated to:

- Increase accessibility – Provision of Ayurvedic knowledge on a global scale.
- Influence decision-making – Helping practitioners choose the best treatments.
- Facilitate standardization – Bringing traditional Ayurvedic teachings in line with contemporary healthcare practices.
- Prevent misinterpretation – Minimizing risks posed by self-medication and misuse of drugs.
- Facilitate research and innovation – Promoting scholarly study of Ayurvedic medicine in a structured database.

## **1.5. FUTURE PROSPECTS**

The project sets the stage for further innovations in Ayurvedic medicine, such as:

- Cloud-based networks of practitioners – Enabling Ayurvedic physicians to share and optimize suggestions.
- With integration into current medical databases – Facilitating the synthesis of Ayurveda and allopathic medicine.
- Expansion to telemedicine – Making possible remote consultations and customized Ayurvedic treatment regimens.

This is done by embracing technology to transform Ayurveda, retaining traditional wisdom in its original form as well as being relevant in the modern fast-paced world of medicine. As Ayurveda attracts a global following

and recognition, increasingly stricter standards for structuring knowledge in one location are on the increase. By transforming ancient text-based knowledge into an experience-based, smart platform, the project functions like a bridge connecting ancient medical thought with modern computer-based innovation. Ayurvedic medicine recommendation software is a novel effort to organize Ayurveda, make it more accessible, and make it more relevant to modern healthcare.

## 2. LITERATURE REVIEW

### 2.1. ENHANCING AYURVEDIC DIAGNOSIS USING MULTINOMIAL NAIVE BAYES AND K-MODES CLUSTERING: AN INVESTIGATION INTO PRAKRITI TYPES AND DOSHA OVERLAPPING

This study investigates enhancing Ayurvedic diagnosis with Multinomial Naïve Bayes (MNB) and K-modes clustering to analyse Prakriti types and intersecting Dosha. MNB classifier is applied in predicting an individual's Prakriti based on text and categorical health attributes on the probabilistic model basis. Meanwhile, K-modes clustering with categorical data identifies inherent patterns in Dosha mixtures, identifying overlapping trends among Vata, Pitta, and Kapha. Through combining these methods, the study aims to enhance Prakriti classification, unveil deeper insight into Dosha interaction, and enable enhanced decision-making towards personalized Ayurvedic therapy. The study shows how an integration of machine learning methods can enhance classical Ayurvedic diagnostics.

The MNB model succeeds in classifying Prakriti types based on textual descriptions and categorical symptom data, yielding a well-defined probabilistic diagnosis. K-modes clustering does, however, detect overlapping Dosha patterns, providing a more nuanced view of hybrid constitutions that may not be well documented in classical Ayurvedic literature. With the integration of these approaches, the study determines a more sophisticated and data-driven methodology for Ayurvedic diagnosis to be employed for enhanced accuracy in treatment planning. Additionally, the study investigates scalability of such models through experimentation with various datasets of Ayurvedic case studies and health records. According to the result, MNB as well as K-modes clustering not only increases diagnostic efficiency but also adaptive learning in the sense that it improves with larger data over time.

The research also points to the possibility of integrating these AI-based techniques into online health platforms to simplify and streamline Ayurvedic diagnosis. Further, the system can aid practitioners in identifying unusual or difficult Dosha presentations, thus rendering it more personalized and efficient as far as the treatment plan is concerned. The findings indicate that MNB-K-modes clustering synergy can refine the practice of Ayurvedic in a way that it can systematize it in addition to its being suitable for use in contemporary healthcare.

### 2.2. CHALLENGES AND OPPORTUNITIES IN NATURAL LANGUAGE PROCESSING FOR CLINICAL DATA

The article "Challenges and Opportunities in Natural Language Processing for Clinical Data" recognizes the great potential of NLP to tap valuable information from clinical unstructured data like electronic health records (EHRs), radiology reports, discharge summaries, and physician's notes. NLP would facilitate better patient care by automated clinical decision support, disease prediction, and individualized treatment advice. There are some key impediments to its general application, however. Security and data privacy demand robust de-identification and anonymization processes to comply with legislation such as HIPAA and GDPR. The technological challenge of medical domain-related jargon, abbreviations, and widespread use of non-standard terminologies in clinical documentation make the requirement for advanced NLP models capable of processing medical jargon and contextual imperatives more important. Insufficient high-quality, annotated datasets also impact the precision and performance of NLP solutions. In addition, linguistic nuances, polysemy (multiply meaning words), and context-dependent meaning are some of the complicating factors of generalizing NLP solutions to different healthcare settings. The article also mentions the

computational challenges of scaling large-scale NLP models into resource-scarce hospital environments, as well as integration into current electronic health systems. Despite the challenges, the article lists several important opportunities that are driving clinical NLP innovations.

The arrival of transformer models such as BERT, BioBERT, and ClinicalBERT has seen a noticeable improvement in comprehending very intricate medical text. Decentralized model training is attained through federated learning methods towards patient privacy by surmounting data-sharing issues. Uniform and standardized health terminologies like SNOMED CT, ICD-10, and UMLS facilitate more interoperability and data consistency, thereby facilitating more effective applications of NLP. Also, models like Fast Healthcare Interoperability Resources (FHIR) are facilitating the free flow of structured and unstructured health information between institutions.

### **2.3. INTEGRATION OF MACHINE LEARNING IN AYURVEDA: AN INDIAN TRADITIONAL HEALTH SCIENCE**

The use of machine learning (ML) in Ayurveda, India's ancient medicine science, is revolutionizing its therapeutic and diagnostic applications. ML techniques make it easier to classify huge Ayurvedic data sets to achieve more precise Prakriti (body constitution) analysis, disease prediction, and customized treatment recommendations. Through the progress in natural language processing (NLP), old Ayurvedic literature can be digitized and processed for better knowledge extraction. Furthermore, AI-based models help standardize and authenticate Ayurvedic preparations to provide evidence-based care in such a way that increases the acceptability of traditional medicine in the contemporary health system. Pattern recognition and correlation in Ayurvedic therapies are facilitated through machine learning algorithms, thus providing better herbal preparations as well as improved patient outcomes. The application of ML can further help with automated diagnosis by translating traditional Ayurvedic symptoms into contemporary medical disorders, enabling practitioners to take more precise decisions. AI chatbots and virtual assistants can offer preliminary consultations based on Ayurvedic concepts to make traditional health care mainstream for the masses. Hybridizing ancient wisdom with current computational strategies, ML is making Ayurveda accessible and relevant to the world at large.

Predictive analytics and deep-learning models can enhance Ayurvedic treatment methods by analyzing patients' information and historical records. Additionally, decision support systems based on ML can help Ayurvedic doctors diagnose complex diseases by combining patient symptoms, medical history, and principles of Ayurveda. Mobile devices and wearable technology with the support of AI can also enable real-time monitoring of a person's health based on Ayurvedic principles to enable more efficient personalized treatment. AI can also enable faster drug discovery by screening the pharmacological profiles of Ayurvedic herbs, enabling the faster identification of drugs with therapeutic activity against a range of diseases. ML can also assist in large-scale epidemiological research by interpreting data from heterogeneous populations and enhancing the knowledge of disease prevalence and cure effectiveness with Ayurveda. The collaboration of Ayurvedic specialists and data scientists can allow hybrid models of treatment that integrate the strengths of conventional medicine and Ayurveda, providing whole-person and evidence-based healthcare options. Furthermore, ML can enable global acceptance of Ayurveda by supplying standardized methods, clinical validation, and integration into conventional systems of healthcare, leading to greater data-based and integrative conceptualization of well-being. As AI and big data analysis are developed further, Ayurveda can become a progressively formalized, research-based, and accepted system of medicine in the global context.

## 2.4. ARTIFICIAL INTELLIGENCE IN THE SECTOR OF AYURVEDA: SCOPE AND CHALLENGES

Artificial Intelligence (AI) is revolutionizing Ayurveda with new paradigms for disease diagnosis, drug development, treatment planning, and personalized medicine. AI-powered algorithms improve Ayurvedic prakriti (body type) assessment, automate herbal preparation, and facilitate data harmonization for clinical trials. Machine Learning (ML) is the cornerstone of deciphering ancient texts, validating traditional knowledge, and mainstreaming Ayurveda in the healthcare system. Natural Language Processing (NLP) techniques can be used to translate and interpret Sanskrit literature, thereby enabling scholars in other countries to access ancient Ayurveda literature. AI can make predictive disease susceptibility analysis possible. AI-powered wearable devices with continuous monitoring feature can make preventive treatment a reality through personalized Ayurvedic direction by using health markers. Virtual assistants and chatbots using artificial intelligence can be beneficial to practitioners in their diagnostic recommendations, automating consultations with patients, and encouraging medication compliance. AI can be beneficial in recognizing patterns in patient data, confirming the effectiveness of Ayurvedic treatment, and facilitating evidence-based research. All that notwithstanding, there are some stumbling blocks which are impeding the application of AI in Ayurveda. Lack of proper annotated and structured datasets, heterogeneity of traditional knowledge, lack of large-scale digitalization of ancient texts, and absence of standardized regulatory practices are key challenges. Moreover, variability in Ayurvedic diagnosis by practitioner to practitioner, geographical diversity in treatment philosophies, and cultural nuances present challenges to train AI systems. Ethical concerns such as data privacy, disinformation, and potential for compromising Ayurvedic principles need to be considered with extreme caution as well.

Convergence of AI-Ayurveda would also need rigorous testing through clinical trials to ascertain accuracy and efficacy. Development of sound data standardization paradigms, interdisciplinarity research teams involving Ayurvedic practitioners, AI researchers, and policymakers, and policy regulatory guidelines are essential for filling these gaps. Investment in AI research related to Ayurveda, open-access digital archives, and machine learning algorithms for Ayurveda will also catalyse innovation. Good strategies can modernize Ayurveda with the help of AI and make it scientifically valid, accessible, and a part of modern healthcare without undermining its ancient philosophy.

## 2.5. MACHINE LEARNING MODELS USED FOR PRAKRITI IDENTIFICATION USING PRASNA PARIKSHA IN AYURVEDA – A REVIEW

The article "Machine Learning Models Used for Prakriti Identification Using Prasna Pariksha in Ayurveda – A Review" illustrates the capability of machine learning (ML) to facilitate automation of Prakriti testing, a major deciding factor of Ayurvedic treatment individualization. Prasna Pariksha, a standardized questionnaire-based diagnostic procedure conducted by Ayurveda practitioners, has been utilized to traditionally identify Prakriti. Subjective assessment, however, accompanies traditional assessment, and this makes standardization an issue. This article provides an overview of different ML methods, such as Support Vector Machines (SVM), K-Nearest Neighbors (KNN), Naive Bayes (NB) classifiers, Artificial Neural Networks (ANN), Decision Trees, and ensemble methods like AdaBoost, which have been applied to Prakriti classification. Studies have shown that Prakriti types (Vata, Pitta, Kapha, and their combinations) can be adequately modelled and predicted based on answers to structured data sets. The paper informs that clear feature selection and pre-processing of data sets are the prerequisites to boosting classification accuracy. The use of hybrid models on two or more ML approaches is also reflecting improved performance over isolated algorithms. Yet another stunning inference of the review is that by hyperparameter-tuning the AdaBoost



algorithm, the 97% accuracy has been obtained, and this is depicting the ability of ML in the diagnosis of Ayurvedic ailments. This again implies that Prakriti identification with ML could be scientifically viable and scalable evidence solution towards Ayurveda establishing, thus bringing evidence-based medicine in harmony with Ayurveda.

Issues such as data collection problems, greater and heterogeneous dataset requirements, interpretability of the ML models in a way such that they align with Ayurveda principles are some of the other issues discussed in the article. Besides, research suggests using natural language processing (NLP) and deep learning methods to text information from patient feedback, which may also enhance Prakriti accuracy. Future research should be engaged in creating standardized Ayurvedic datasets, investigating deep learning architectures, and integrating ML-based Prakriti analysis on e-health platforms. The results highlight the potential of ML to transform Ayurveda as a more accurate, reproducible, and accessible framework of personalized medicine.

## **2.6. AYURVEDA MEETS AI: HOW NLP IS SHAPING THE FUTURE OF HOLISTIC MEDICINE**

The intersection of Natural Language Processing (NLP) and Ayurveda is transforming the way ancient medical information is analysed, digitalized, and applied in modern healthcare. AI-powered NLP models enable researchers to extract, normalize, and interpret large volumes of Sanskrit texts, classical Ayurvedic texts, and clinical information with increased accuracy and efficiency. This allows correct classification of medical terms, enhanced disease diagnosis, and enhanced treatment plans. NLP-powered text mining makes prakriti (constitution of the body) assessment better, allowing individualized health care through the linkage of individual attributes with Ayurvedic doshas. AI-based semantic analysis also assists in demystifying intricate relationships between habits of living, eating habits, and disease pathogenesis, and thus improves preventive medicine. NLP makes the verification of ancient Ayurvedic therapies with evidence-based data possible, thereby making them potential players for evidence-based medicine. Apart from text processing, NLP is required to connect Ayurveda with the current digital health settings.

By organizing unstructured historical data, it enhances the interoperability of Ayurveda with modern healthcare systems and makes Ayurveda feasible to be interfaced with electronic health records (EHRs) and digital health platforms. NLP-powered AI models also facilitate real-time clinical decision support, allowing physicians to provide AI-supported, patient-specific treatment suggestions based on Ayurveda principles and contemporary diagnostic criteria. Additionally, NLP-facilitated knowledge graphs and chatbot-assisted virtual assistants can enhance patient participation by providing real-time, evidence-based Ayurvedic health recommendations. The technology also facilitates research through the curation of Ayurvedic pharmacological information, facilitating herbal drug development, and determining treatment effectiveness using big data. As NLP and AI improve, Ayurveda becomes more scalable, evidence-based, and globally accessible, thus its holistic healing methodologies remain impactful even in the age of medicine where everything is online.

## **2.7. SEMANTIC ANNOTATION AND QUERYING FRAMEWORK BASED ON SEMI-STRUCTURED**

A Semantic Annotation and Querying Framework for Semi-Structured Ayurvedic Texts proposes to transform access, retrieval, and computational processing of ancient medical wisdom using Natural Language Processing (NLP), ontology-based methodologies, and artificial intelligence (AI). Ayurveda, possessing a strong textual foundation of knowledge, is not sympathetic to the absence of structure and semi-structure

of its texts, sophisticated terminologies, and variation in contexts. This framework semantically tags Ayurvedic documents with model metadata, linking pivotal concepts like Prakriti (constitution), Doshas, herbs, treatment, disease, formulations, symptoms, diagnostic protocols, and healing practices to a given semantic ontology. With semantic search, extended querying capabilities, and knowledge graphs added, it enables researchers, practitioners, and AI systems to extract correct, context-aware conclusions from ancient writings. Such a formalized representation will make data interoperability possible and can be used to integrate Ayurveda knowledge with modern medical research, electronic health records (EHRs), and AI-driven diagnostic systems. The framework utilizes ML and deep learning models like Named Entity Recognition (NER), entity linking, relationship extraction, topic modelling, and sentiment analysis to automatically annotate and classify Ayurvedic texts.

Also, ontological reasoning and semantic inference methods facilitate the use of discovering the concealed relationship among various Ayurvedic terms to be applied in intelligent question-answering systems, personalized recommendations for medicine, and predictive analytics. The query mechanism employs SPARQL-based semantic querying, NLP-based question-answering models, and AI-based contextual search engines to produce effective and accurate retrieval of domain knowledge. The system is also cross-lingual NLP compatible, mending the English-computational models-Sanskrit-Hindi-regional Ayurvedic texts divide, thus ensuring multilingual access. Additionally, with graph databases and linked open data (LOD), scalability is guaranteed, rendering Ayurvedic knowledge interoperable with other healthcare ontologies like SNOMED CT, UMLS, and HL7 FHIR. Apart from clinical uses, the model becomes applicable for evidence-based verification of Ayurvedic therapies, facilitating comparison with allopathy along with the combined modes of healthcare. As furnishing organized information, the model becomes priceless in AI-facilitated clinical decision support, knowledge retrieval on autopilot, and computerized record keeping of Ayurveda literature. Machine learning training in standardization of data enables classifying text into disease states effectively, mapping disease-disease, and recommending treatment meaningfully. In addition, the system enables personalized medicine through the mapping of patient-specific Prakriti profiles to ideal Ayurvedic interventions, thus enabling precision Ayurveda. Integration with blockchain-based integrity mechanisms for data ensures authenticity and traceability of annotated Ayurvedic knowledge. By facilitating data standardization, semantic enrichment, and analysis-based-on AI, the platform helps in bridging the gap between antique knowledge systems and contemporary computational know-how, situating Ayurveda in the realm of computationally enabled, research-driven sphere.

## **2.8. PHARMACOGENOMICS, AYURGENOMICS, AND PERSONALIZED MEDICINE: A REVIEW**

This article discusses the concept of the application of pharmacogenomics and Ayurgenomics in personalized medicine. Put against the backdrop of Ayurveda's philosophy, it discusses how genetic heterogeneity can enhance the quality of care through directed and personalized therapy. The study indicates a vast potential of Ayurvedic typologies like Prakriti along with genetic information for a complex system in prognosis in disease diagnosis as well as side-effect-free medicines. It even foresees a time when integration medicine based on genomics harnesses the precision of genomics with the individualized therapeutic interventions of Ayurveda to render interventions effective, safe, and personalized. Ayurgenomic models themselves can be enriched further by introducing AI and machine learning approaches into them, thus making them more robust and more effective in practical clinical use. The utopian world that the study fantasizes about is one where the delicacy of Ayurveda would blend peacefully with the cutting edge of genetics, thus achieving maximum healthcare benefits with personalized therapy. This union of ancient knowledge and cutting-edge

genomics is the basis for a paradigm shift in medicine toward a patient-focused, holistic, science-based practice in healthcare.

## **2.9.THE INTERSECTION OF AYURVEDA AND GENOMICS: EXPLORING AYURGENOMICS FOR PERSONALIZED HEALTH SOLUTIONS**

Ayurgenomics is an emerging interdisciplinary science, uniting Ayurvedic philosophy and contemporary genomic science to offer customized healthcare interventions. Ancient Indian medical science, Ayurveda, categorizes human beings in their Prakriti (constitution) upon which they are concluded to have a specific physiological and psychological make-up. Advances in genomics in recent times have explained scientifically why genetic variation anything would have to do with such archaic classifications. This paper expounds on how Ayurveda and genomic research can be intertwined to enable a scientific paradigm to formulate customized treatment plans, increasing the efficacy of Ayurvedic treatments. Using the detection of genetic markers, which correspond with Prakriti, as a goal, Ayurgenomics seeks to validate and augment the age-old system of categorization and move towards improved patient outcomes by individualized therapeutic attention. To provide targeted treatment, this study investigates the potential convergence of genetics with Ayurvedic philosophy, i.e., Prakriti (constitution). This discusses how genomic studies may guide Ayurvedic categorization and deliver evidence-based individualized treatment regimens. This paper illustrates a method for integrating Ayurveda and contemporary medical science through research by studying genetic markers in the context of Prakriti. This is a threshold thinking in terms of expanding Ayurveda as global, universally acceptable medical practice in the world health delivery system with trends toward individually adapted treatment modalities, dietary advice, and disease prevention.

## **2.10. Need for Standardization of Ayurveda Formulations**

Standardization of Ayurvedic products is the need to render them safe, quality, and acceptable in general. Ayurveda based on traditional old concepts is severely challenged to attain authenticity and product consistency. Raw material is of unspecified quality. Quality control measures are not performed for all the products uniformly. Adulteration is an increasingly mounting threat. Therapeutic modifications based on the absence of properly defined pharmacopoeial standards diminish its purity in modern health practice. Strict methodical standardization is a prime concern for the present study through the adoption of stringent quality control practices, scientific testing methodologies, and regulation policies compliance. Institutional organizational drives by organizations such as the Ministry of AYUSH and the WHO play an important role in framing global standards for Ayurvedic drugs. Apart from that, application of Good Manufacturing Practices (GMP), state-of-the-art analytical instrumentation, and data standardization by means of AI can also ensure the reproducibility and authenticity of such formulations to a very high extent, resulting in greater confidence on the part of health practitioners and consumers alike. To bring Ayurveda to a still higher place in the health situation in the world, one must overcome the gap between the ancient and the modern scientific mind. This research puts forward the role of evidence-based approaches, including chromatographic, spectroscopic, and genomic techniques in the identification of medicinal plants and formulation purity. The convergence of artificial intelligence, machine learning, and bioinformatics can revolutionize Ayurvedic research through predictive analysis for drug efficacy, toxicity prediction, and practice of individualized medicine. Additionally, research collaborations by Ayurveda researchers, pharmacologists, and data scientists will drive innovation and further streamline the process of standardization. The study needs

ongoing innovation in methodology, regulatory systems, and technology-based solutions to further harmonize the authenticity of Ayurvedic medicine. Last but not the least, a methodical approach towards standardization would not only convert Ayurveda into a healthcare system worldwide but also pave the way to incorporate it into evidence-based medicine, as a part of prevention and cure healthcare globally.

### 3. RESEARCH GAPS OF EXISTING METHODS

#### 3.1. INTRODUCTION TO AYURVEDIC MEDICINE AND ITS CHALLENGES IN CONTEMPORARY DIGITAL HEALTHCARE

Ayurvedic medicine, the world's oldest holistic health system, has been practiced for more than 5,000 years. Ayurveda is rooted in the principles of ancient texts like the Charaka Samhita, Sushruta Samhita, and Ashtanga Hridaya, which give extensive instructions on the diagnosis of diseases, treatment, herbal preparations, and lifestyle routines. Ayurveda stresses individualized treatment based on individual Prakriti (body constitution), Dosha imbalances (Vata, Pitta, Kapha), diet, lifestyle, and environmental conditions. Although rich in history and efficacy, Ayurveda's incorporation into contemporary digital healthcare platforms is extremely limited. This absence of organized, standardized, and digitized information poses tremendous hurdles in automating and enhancing Ayurvedic drug recommendations.

##### 3.1.1. Limitations in Existing Ayurvedic Drug Recommendation Systems:

The current Ayurvedic recommendation systems, whether digital or software-based, are plagued by numerous limitations that detract from their accuracy, efficiency, and applicability in contemporary healthcare. Some of these challenges are:

- Relying on Ancient Texts Without Contemporary Adaptation:

Ayurvedic medication advice relies mainly on ancient texts that were composed in Sanskrit and ancient languages. Most of these texts are subjective symptom descriptions, which are hard to translate directly into contemporary digital healthcare frameworks. In contrast to allopathic medicine, where treatments are tested and proved through clinical trials and data-based research, Ayurveda has no systematic digitization and scientific standardization, resulting in discrepancies in medication advice.

- Lack of Structured Data and Digital Repositories:

In contemporary healthcare, organized datasets are critical to creating AI-based drug discovery models, predictive analytics, and clinical decision support systems. Ayurveda does not have a centralized, organized digital repository where formulations, treatment outcomes, patient information, and research results are systematically maintained. Therefore, Ayurvedic practitioners and researchers have to depend on disconnected sources, which makes it challenging to create a scalable and evidence-based recommendation system.

- Tendency to struggle to integrate Ayurveda into contemporary healthcare systems:

Contemporary healthcare uses Electronic Health Records (EHR), electronic prescriptions, and telemedicine services to make patient care more efficient. Ayurvedic treatment protocols are not standardized, however, and thus cannot be easily mapped onto current healthcare IT systems. If Ayurveda is not presented in a structured format, it cannot be incorporated into interoperable health databases directly, which restricts its adoption in hospitals, clinics, and international health policy.

##### 3.1.2. Technological Upsurge Needed in Ayurveda:

Under these limitations, a pressing need is felt for technological innovation and digitization to update Ayurvedic medicine prescriptions. The following are some of the most significant upgrades required:

- Organized Digital Repositories:

An ordered, systematized database of Ayurvedic information must be available to store treatment methods, compound recipes, clinical study data, and patient case history.

The systematic repository must be interoperable with modern health care IT platforms and support big data analytics for evidence-based treatment validation.

- **Enhancing Personalization and Accuracy of Ayurvedic Suggestion:**

Ayurvedic drug recommendation platforms must shift from rule-based systems to adaptive AI systems that continuously optimize recommendations with real-time patient feedback and data and adaptive feedback loops. Personalized treatment plans should consider age, sex, contraindications, seasonal variation, and multi-dosha imbalances.

- **Standardization and Regulatory Approval**

To gain global acceptance, Ayurveda needs standardized protocols for clinical validation, drug safety, and quality control in herbal products. Systematic clinical trials as mandated by regulatory clearance from organizations such as the World Health Organization (WHO), the U.S. Food and Drug Administration (FDA), and European Medicines Agency (EMA) are lacking in Ayurveda because there are no standardized datasets.

### **3.2 LACK OF STRUCTURED DIGITAL REPOSITORY**

One of the inherent limitations of existing Ayurvedic drug suggesting systems is the lack of a single centralized digital repository with structured Ayurvedic data. Ayurvedic information, transmitted over centuries, is intricately embedded in several ancient texts, which makes it challenging to extract, classify, and use efficiently. As compared to contemporary medicine, which derives advantage from structured databases like PubMed and electronic medical records, Ayurveda has no standardized database to store and manage herbal formulas, disease-treatment associations, and patient-level recommendations. This deficiency greatly undermines the potential for developing AI-driven, data-centered solutions for Ayurvedic health.

#### **3.2.1 Challenges in Data Collection:**

- a. **Scattered Sources of Information:**

Ayurvedic preparations and medicine are scattered in different ancient books, i.e., Charaka Samhita, Sushruta Samhita, and Ashtanga Hridaya. Retrieval of information is a slow manual process as there is no repository of reference. In addition, contemporary interpretations and geographical shifts render it challenging to gather data into a cohesive system.

- b. **Non-digitized Material:**

Most of Ayurvedic work exists in the form of hand-written manuscripts or hard copy books with no electronic versions. Unavailability of copies of these in electronic copies does not make them available for placement on AI-based systems for analysis and recommendation services. Even if texts are converted to digital form, they exist in unstructured forms like PDF or images that are inaccessible to search mechanisms or machines.

- c. **Absence of Standard Data Formats:**

Compared to the strict application of standardized data models such as Fast Healthcare Interoperability Resources (FHIR) or Systematized Nomenclature of Medicine - Clinical Terms (SNOMED CT) in Western medicine, Ayurveda doesn't have universally agreed-upon digital formats. This is a ginormous hurdle to integrating Ayurvedic data into contemporary healthcare systems, rendering them incompatible with contemporary medical informatics systems.

- d. **Difficulty in Obtaining Herbal Composition Information**

Ayurvedic formulations are typically made up of multiple herbs, minerals, and other nature products and are usually described in qualitative rather than in quantitative terms. The proportion and mixture of such products can be variable with method of preparation and regional practice and hence may not be possible to have systematic information for computational handling. Lack of standardization of dosage form and

specification of description of the formulation worsens things even further when considering AI-based processing.

e. No Collective Digital Initiatives:

There is no collective effort to develop a comprehensive digital Ayurvedic knowledge base. In contrast to modern medicine, which has its huge efforts towards the development and maintenance of medical databases, Ayurveda is marked by isolated individual and institutional efforts. This results in unequal access to standardized treatment protocols and no common representation of data.

f. Inconsistency in Translation:

Most Ayurvedic literature is written in Sanskrit and ancient Hindi, both of which are not easily translatable into modern languages. Different experts and institutions use different terminologies and meanings, which lead to uniformity problems with medical terms. All these differences create challenges in creating AI models that can understand Ayurvedic literature properly.

g. Challenges of Data Duplication

Different sources contain the same but somewhat varying information about Ayurvedic medicine and treatment protocols. Variations from ancient texts and home practices have led to the replica but unreliable data. Such inconsistencies render one authoritative version of fact nearly impossible to assemble.

h. Limited Standardized Terminologies

Western medicine's treatment and disease are based on standardized nomenclature systems such as the International Classification of Diseases (ICD) and Unified Medical Language System (UMLS). Ayurveda lacks an accepted terminology system, introducing inconsistency in naming treatment, symptoms, and disease across various sources. It does not allow interoperability between allopathic and Ayurveda healthcare systems.

i. Lack of Open Access Databases

As compared to modern health databases like PubMed that provide updated, peer-reviewed information, Ayurveda does not have open-access digital repositories that hold peer-reviewed data. Inability to have open-access digital repositories of Ayurvedic data discourages innovation, application of Ayurvedic knowledge towards the utilization of mainstream health care, and research. Isolated, proprietary, or outdated databases, if they exist, therefore, become restrictive to further usage in drug recommendation systems based on AI.

Lack of proper development of a systematized digital repository is the most serious issue in the design of the AI-based Ayurvedic drug recommender system. Resolving these issues is an issue of interdisciplinarity among

researchers, Ayurvedic experts, and technological pioneers to organize digitized, systematized, and standardized data sets. Convergence of machine learning and AI algorithms, access to open-access digital repositories, and development of interoperable data structures will become essential in supporting the integration of Ayurveda into modern healthcare solutions.

### **3.2.2. Consequences of a Non-Standardized Repository:**

a. Challenge in Research and Development:

Lack of organized and standardized repositories severely hampers early research and development (R&D) in Ayurveda. Modern-day clinical research requires immense well-documented dataset to conduct large-scale clinical trials and prove therapeutic claims. Lack of an organized database is a hindrance in comparing the efficacy of Ayurvedic medicines across different populations. Researchers are hindered by comparing formulations, ascertaining trends, and putting empirical proof on the side of Ayurvedic treatment, thus

hindering the innovation process in this field.

b. Limited Adoption in Global Healthcare

To become universal as a system of medicine, Ayurveda must be incorporated into world models of medicine. The absence of systematic, uniform data, however, prevents healthcare centers and policy makers from incorporating Ayurvedic interventions into therapy regimens. Harmonized data are not available to fill the gap between modern medicine and world levels of healthcare, and Ayurveda thus finds it difficult to gain increased acceptability in hospitals and clinical institutions across the world.

c. Regulatory Approval Issues:

Regulatory bodies such as the World Health Organization (WHO), the U.S. Food and Drug Administration (FDA), and the European Medicines Agency (EMA) require sophisticated scientific documentation to approve medical therapy and drugs. Since the evidence derived from Ayurvedic research is unstructured in form, most of the formulations fail the rigorous documentation norms laid down by these bodies. This prevents the commercialization of Ayurvedic drugs worldwide and limits their exportation to other countries, too, discouraging their use even further.

d. Poor Data Retrieval Strategy

In the absence of a common repository, Ayurveda practitioners and researchers have to sift through different sources of information—ranging from ancient manuscripts, fragmented online data, and isolated clinical studies—to glean treatment information. Back-breaking work equates to inefficiency, lost time, and higher chances of error or variability in making decisions. Quick access to accurate treatment information is critical in clinics, and the present unorganized state of Ayurvedic knowledge renders necessary healthcare procedures slow.

e. Decreased Confidence in Ayurvedic Systems:

Modern scientific communities demand evidence-based acceptance of any system of medicine. Lack of a centralized, standard repository lowers the scientists', physicians', and health agencies' credibility of Ayurveda. Ayurvedic treatments, without formal data, fall into anecdotal instead of established scientific status. This skepticism holds back the inclusion of Ayurveda in mainstream medicine and prevents inter-disciplinary coordination among practitioners of mainstream and traditional medicine practitioners.

f. Incompatibility with Contemporary Healthcare IT Infrastructure:

Electronic Health Records (EHR) and medical websites are a central component of the contemporary healthcare infrastructure where patient information are conveniently exchanged by hospitals, clinics, and health research institutions. In the absence of a codified database of Ayurveda, however, integrating the old remedy information into web platforms is impossible. The two systems are incompatible, and, as such, medical professionals cannot upload Ayurvedic and allopathic treatments at will. The inter-operability prevents the physicians from readily combining the treatments of allopathy and Ayurveda and restricts complete-fledged care solutions.

g. Treatment Difficulty Personalization:

Personalized medicine is becoming common in modern healthcare, the treatment being suited to individual genetic, lifestyle, and past health data. Ayurveda, which is individually oriented in terms of treatment strategies, finds it difficult to use this in IT-based healthcare systems since there are no formal patient history databases and treatment information. Without the presence of a standard database, AI-driven Ayurvedic suggestions are not reliable, and Ayurveda is therefore reduced to providing customized treatments in an IT-based healthcare system.

h. Digital Translations Lack Version Control:

Ancient era Ayurvedic literature has been translated and interpreted in many interpretations over the



centuries, resulting in inconsistencies when put in digital form. Without a master, standardized database, different digital platforms can create different, even contradictory, representations of the same treatment process. Such version control deficiency results in confusion among Ayurvedic practitioners, researchers, and developers utilizing Ayurvedic software products, leading to fractured and untrusted knowledge transfer.

i. Limited Big Data Use:

Restrictions in accessing well-organized Ayurvedic databases restrict the utilization of big data, which would otherwise provide insights into trends, correlations, and patterns in traditional medicine. Big data platforms have transformed modern healthcare with the supply of information about disease progression, response to treatment, and drug-drug interaction. Ayurveda lacks structured data at their disposal to provide them with access to advanced analytical tools, hence limiting large-scale evidence-based applications within the practice.

### **3.3. INACCURATE AND INCONSISTENT RECOMMENDATIONS**

Most current Ayurvedic drug recommendation systems are based on rule-based systems, which work on mapping pre-defined symptoms to treatments. Although such systems offer an elementary degree of automation, they are not flexible, personalized, or context aware. Ayurveda is founded on individualized treatments depending on a person's constitution (Prakriti), imbalances (Doshas), and environment, which are not integrated by these systems. Therefore, recommendations given by these systems are typically incorrect, unreliable, and inefficient for personalized health care.

#### **3.3.1. Lack of Personalization:**

One of the biggest failures of current Ayurvedic recommendation systems is the inability to customize treatments according to individual health profiles, lifestyle, and contemporaneous physiological fluctuations. Unlike modern-day AI-based health platforms that get updated based on patient-specific details, Ayurvedic recommendation systems are rigid and non-adaptive. The primary reasons for the absence of personalization are discussed below:

a. Dosha Consideration Problems:

Ayurveda categorizes individuals based on their body type (Vata, Pitta, Kapha) and patterns of Dosha imbalance (Prakriti). The condition of health, susceptibility to disease, and outcome of treatment for everyone is dependent on these factors. However, most present-day digital interventions do not take Dosha variations into account when giving advice. They rather provide universal treatment advice based on established symptom-disease relationships, which may be discordant to a specific individual's Ayurvedic constitution.

For instance, if two people develop acidity, but one of them has a Pitta imbalance (predominance of the fire element) and the other a Vata imbalance (predominance of the air element), the best treatments would be different. A one-size-fits-all policy can lead to ineffective treatment and sometimes hazardous outcomes.

b. Age and Contraindications Not Considered

In Ayurveda, therapy varies with age, gender, comorbidities, and contraindications. For example, a herb that works extremely well in a young person would be unsuitable in an elderly patient with poor digestion. Once more, some of the formulations could interact in an adverse way with pre-existing diseases (e.g., Ayurvedic herbs on blood glucose in diabetic patients).

Most of the tools that are available cannot analyze:

Age-specific preparations (e.g., mild treatment of children, more powerful drugs in adults).

Long-term disease-based contraindications (e.g., no use of herbs on hypertension patients).

Drugs interaction if Ayurvedic preparations are co-administered with allopathic drugs.

If these rules are not utilized, the value of online guidance decreases significantly.

c. Lack of Adaptive Learning Mechanisms

Most modern healthcare recommendation engines learn with time using adaptive learning models, whereby patient feedback, outcomes, and real-world effectiveness are continuously measured to refine recommendations. Ayurvedic software does not employ such learning models, leading to:

Repetitive, outdated treatment suggestions that remain unchanged with patient status.

No real-time modifications based on recent research in Ayurveda.

No refinement in recommendations based on user-reported effectiveness of previous treatments.

Without a mechanism for feedback, these systems remain static and can't improve recommendations over time.

d. Lack of Real-Time Patient Feedback:

Ayurvedic digital solutions generally don't have patient feedback gathering and processing provisions. In modern medicine, user feedback on the success of prescribed therapies improves recommendation systems' recommendations over time. In Ayurveda:

There is no systematic process to gather patient experience upon attempting a suggested herbal intervention or treatment.

The feedback is not used to refine future recommendations or dosages as per user reviews.

Monitoring of symptom progression does not exist, leading to stale treatment plans.

A real-time feedback system would allow Ayurvedic recommendation platforms to learn over time from user experience, making them far more effective.

e. Fixed Treatment Strategies

The majority of existing Ayurvedic recommendation systems are founded on static treatment plans, i.e., they do not adapt to:

Evolution of patient conditions (e.g., a disease's progress over time).

Long-term treatment regimens, where Ayurveda often consists of gradual modifications in herbs and lifestyle changes.

This rigidity leads to inefficient or stale treatment regimens, reducing the consistency of digital Ayurvedic remedies.

f. Failure to Consider Combination Therapy

Ayurveda is more than herbal medicine; it is an entire system that combines:

Herbal drugs

Dietary regimens

Lifestyle modifications (Dinacharya, Ritucharya)

Detoxification procedures (Panchakarma)

But most Ayurvedic prescription tools focus solely on herbal medication and ignore other essential complementary treatments that are necessary for healing. A good system must prescribe integrated treatment and not separate herbal drugs from other aspects of Ayurvedic healing.

g. Generalized Formulation Matching:

Most Ayurvedic instruments prescribe the same formula to all people with a specific condition without consideration of differences among people. This is a limitation because:

Ayurveda requires personalized treatment based on the patient's Dosha, history, and environmental factors.

Herbal preparations need to be adjusted based on the patient's metabolism, digestion, and constitution.

Generic tips may be of no use or even cause side effects in certain patients.

A more advanced system should provide dynamic and personalized formulations rather than broad advice.

h. Limited Attention to Seasonal Changes:

Treatment is seasonal according to Ritucharya (seasonal rules of healthcare) in Ayurveda. For example:

Cooling food and herbs should be consumed during summer to balance Pitta.

Warming treatments and food are used in winter to balance Vata.

Detox practice is advocated on seasonal transitions.

Most digital recommendation systems ignore seasonal variations, making them ineffective and failing to meet basic Ayurvedic principles.

i. Inability to Treat Quirky Diseases

Ayurveda treats most conditions as multi-factorial conditions, which usually consist of:

Multiple Dosha imbalances.

Interconnected symptoms affecting different organs.

A staged treatment need (detoxification, rejuvenation, maintenance).

## 4. METHODOLOGY

### 4.1. DATA COLLECTION AND PREPROCESSING

The source of this R&D is built upon the disciplined collection, categorization, and authentication of medical Ayurveda data. It must be assured through a robust process that the application is authentic, clinically validated, and has origins in rightful sources. Both primary and secondary sources are employed in collecting the data to ascertain an exhaustive data set. Major sources are:

#### 4.1.1. Classical Ayurvedic Texts:

These are the pillars of the knowledge base, providing tried-and-tested formulations and approaches that have been perfected over centuries. The major texts are:

##### A. Charaka Samhita:

- One of the most authoritative works on Ayurvedic medicine, dealing with Kaya Chikitsa (internal medicine).
- Discusses different diseases, their causes, symptoms, treatments, and lifestyle advice.
- Offers vast information on Rasa Shastra (pharmacology) and Dravyaguna (herbal properties).

##### B. Sushruta Samhita:

- Is an expert in Shalya Tantra (surgical procedures) and Shalakya Tantra (eye, ear, nose, and throat therapies).
- Provides detailed procedures for surgical procedures, such as plastic surgery and wound healing methods.

#### 4.1.2. Peer-Reviewed Journals and Research Papers:

To integrate modern scientific validation with traditional knowledge, information is gathered from authentic Ayurvedic research journals. This includes:

##### A. Clinical Trials on Ayurvedic Medicines:

- Scientific analysis of herbal combinations using randomized controlled trials.
- Safety and efficacy trials on various Ayurvedic drugs.

##### B. Published Research Articles in Indexed Journals:

- Journals such as AYU (An International Quarterly Journal of Research in Ayurveda) and Journal of Ayurveda and Integrative Medicine (JAIM).
- Meta-analyses of comparative efficacy of Ayurvedic treatments.

##### C. Pharmacokinetics and Pharmacodynamics Research of Medicinal Plants:

- Understanding ADME of Ayurvedic plant constituents.
- Comparison between Ayurveda medicines and allopathic treatments.

#### 4.1.3. Digital Databases and Pharmacopoeias:

##### A. Ayurveda Pharmacopoeia of India:

- National standards for Indian Ayurvedic medicines.
- Detailed description of preparation, composition, and standardization of various preparations.

##### B. WHO Monographs on Medicinal Plants:

- World reference for safety, use, and efficacy of herbal medicine.
- Provides an overview of the acceptability of Ayurvedic plants worldwide.

### C. Ayurvedic Digital Libraries and Open Access Repositories:

- Government and university-funded databases that provide access to ancient works and research papers.

#### 4.1.4. Expert Interviews and Consultations:

To provide practical applicability and clinical precision, firsthand experience from expert Ayurvedic practitioners is used in the body of knowledge. These are:

##### A. Consultation with Ayurvedic Practitioners:

- Real-world insights into the application of formulations.
- Variations in treatment approaches based on patient population, as per expert opinion.

##### B. Clinical Expert Feedback on Traditional and Contemporary Uses:

- Analysis of traditional remedies compared to contemporary therapeutic techniques.
- Success stories and case studies of treatments from Ayurvedic hospitals and clinics.

Through a combination of ancient wisdom, recent research, and clinical knowledge, the process of data collection maintains the Ayurvedic recommendation system both authentic as well as scientifically sound.

## 4.2. DATA STRUCTURING

For making the collected data easy to integrate into the application, the data is structured and formatted in an orderly manner for the sake of efficiency, precision, and quick accessibility.

### 4.2.1. Storage Formats:

- Information is stored in structured forms like XML (Extensible Markup Language) and JSON (JavaScript Object Notation) so that it can be easily retrieved, processed, and is platform independent.
- Hierarchical structuring is supported by these formats, and it is easy to store complex relationships between the diseases, symptoms, and formulations.
- XML is utilized to store structured data with rigid schema definitions, whereas JSON is utilized for light data exchanges, particularly on mobile devices.

### 4.2.2. Categorization

#### A. Formulations:

- Categorized by classical Ayurvedic types like Kashaya (decoctions), Arishta (fermented drugs), Churna (powders), Ghrita (medicated ghee), Avaleha (herbal jams), etc.
- Also categorized based on adaptations according to modern pharmacology to facilitate accessibility to non-Ayurvedic users.

#### B. Herbal Compositions:

- Breakdown of individual drugs with elaborate presentation of Ayurvedic properties (Rasa – Taste, Guna – Quality, Virya – Potency, Vipaka – Post-digestive effect).
- Botanical nomenclature, parts used, and medicinal actions are recorded.
- Herbs are classified according to their main therapeutic activities (Deepana, Pachana, Rasayana, Shothahara, etc.).

#### C. Contraindications:

- Safety precautions and special precautions for various patient populations (e.g., pregnant women, children, elderly, patients with comorbidities).
- Avoidable ingredients in particular conditions (e.g., alcohol-based products for diabetic patients).

- Cross-referenced drug interactions with allopathic drugs where necessary.

#### **4.2.3. Synonym Mapping:**

To enhance search precision and inclusivity, a strong synonym mapping system is applied:

##### **A. Alternative Names for Diseases and Symptoms**

- Standard Ayurvedic disease names are translated to their respective modern medical equivalents.
- Variations in symptoms (e.g., Kasa for cough, Shwasa for breathlessness) are provided for various contexts.

##### **B. Multilingual Support:**

- Entries contain Sanskrit, Hindi, and English terms to support easy searching.
- Phonetic matching allows users to search using close spellings of Sanskrit terms.

Through the systematic organization of data, the application facilitates effortless access, accuracy in suggestions, and ease of use for practitioners as well as common users.

### **4.3 .DATA VALIDATION**

Providing data accuracy is an important area of building a dependable Ayurvedic application.

#### **4.3.1. Cross-Referencing:**

For making sure that the Ayurvedic formulations that are offered within the application are authentic as well as effective, a careful cross-referencing process is undertaken.

- **Validation Against Multiple Ayurvedic Texts:** The formulations are verified by cross-checking with classical Ayurvedic texts including the Charaka Samhita, Sushruta Samhita, and Ashtanga Hridayam. These ancient manuscripts offer tried-tested medicine recipes, preparation methods, and indications for various conditions.
- **Comparison with Contemporary Research:** Apart from classical literature, formulations are cross-referenced with contemporary scientific research appearing in peer-reviewed journals. These studies offer perceptions regarding the pharmacological actions of Ayurvedic herbs and their acceptability as per current medical science.
- **Expert Revisions:** To ensure additional accuracy, Ayurvedic doctors and pharmacologists analyze the formulations and interpretations. Their knowledge ensures that the information is consistent with both traditional knowledge as well as contemporary medical practice.

### **4.4. CONTINUOUS UPDATES**

Since medical research is dynamic in nature, it is necessary to update the database from time to time. The following procedures ensure the system becomes current:

- **Constant Addition of New Research Data:** Whenever new research work in Ayurvedic products and herbal medicine comes out, the system incorporates these data to update its database. This aids in keeping traditional wisdom in sync with contemporary scientific developments.
- **Dynamic Updating of Contraindications According to Current Pharmacological Research:** Numerous Ayurvedic plants possess contraindications if consumed in association with contemporary medicines. To avoid any side effects, the system periodically updates contraindications and warnings according to the current pharmacological research.
- **Integration of User Feedback:** Input from users such as Ayurvedic practitioners as well as normal users is continually analyzed to identify inconsistency or enhancements within the presented formulas. This

maintains real-world relevance and validity.

#### **4.5. ALGORITHM DESIGN AND VALIDATION FOR SYMPTOM-BASED SEARCH SYSTEM**

The symptom-based search algorithm integrates Natural Language Processing (NLP) and rule-based reasoning to yield valid and contextually relevant output. The algorithm is developed with the following main components:

##### **4.5.1 Symptom Processing:**

Symptom processing is the first step during which the system extracts relevant information from user-entered symptoms. This comprises:

- **Keyword Extraction:** The algorithm uses NLP techniques to extract significant medical words from user descriptions and symptom sentences.
- **Database Mapping:** The keywords extracted are mapped onto a structured medical database of symptoms, diseases, and Ayurvedic formulations.
- **Context Awareness:** The algorithm also analyzes other context such as symptom duration, severity, and co-morbid conditions to further enhance search precision.

##### **4.5.2. Hierarchical Categorization:**

For increased accuracy, symptoms are categorized based on a structured framework:

- **Severity-Based Grouping:** Symptom prioritization by severity, where more severe conditions are addressed initially.
- **Organ System Mapping:** Symptoms mapped against related physiological systems such as digestive, respiratory, or musculoskeletal systems.
- **Ayurvedic Dosha Integration:** Ayurvedic doshas (Vata, Pitta, Kapha) are considered for providing suggestions in accordance with traditional Ayurvedic philosophy.

##### **4.5.3. Filtering Mechanism for Personalization:**

To personalize recommendations for various users, the system applies different filters:

- **User-Specific Factors:** Age, gender, prior illnesses, and allergies are considered during the selection.
- **Contraindication Screening:** The algorithm eliminates formulations that can be dangerous based on the user's history and current medications.
- **Adaptive Learning:** As time passes, the system increasingly accurately suggests by learning from past user usage and feedback.

#### **4.6. RANKING MECHANISM**

Once the system identifies relevant Ayurvedic formulations, they are ranked based on multiple weighted parameters, so the most suitable recommendations are listed first.

##### **4.6.1. Relevance Scoring:**

- **Symptom-Formulation Fit:** The extent to which the user-entered symptoms are addressed by an Ayurvedic formulation determines its rank.
- **Dosha Alignment:** Ayurvedic doctrine is employed in aligning formulations with the doshic constitution of the user for increased holistic treatment accuracy.

##### **4.6.2. Classical References and Scientific Backing:**

- Textual Verification: Ayurvedic formulations well documented in ancient works such as Charaka Samhita and Sushruta Samhita are scored higher.
- Empirical Evidence: Clinical trials and contemporary scientific research in support of Ayurvedic formulations is scored in their favor.

#### **4.6.3. Safety Considerations:**

- Contraindications: The mechanism eliminates formulations inappropriate for a specific population group (e.g., pregnant women, elderly people, or chronically ill individuals).
- Drug Interactions: Ayurvedic preparations are contrasted with popular medicines to research documented interactions between them and their effects on the consumers' health.

#### **4.6.4. User Preferences and Trends:**

- Personalization: User preference over dietary restrictions (vegan, alcohol-free preparations) influences rankings.
- Popularity Metrics: User- and expert-recommended preparations with good user ratings have higher rankings.

### **4.7. ALGORITHM VALIDATION**

The search algorithm is formally demonstrated to be efficient and correct. Phases include:

#### **4.7.1. Expert Review by Ayurvedic Practitioners:**

- Manual Verification: Veteran Ayurvedic specialists inspect and affirm suggestions for accuracy and validity.
- Continuous Feedback Loop: Specialists give on-going feedback for enhanced system reasoning and enabling formula picking.

#### **4.7.2. Test Dataset Evaluation:**

- Manual Verification: Veteran Ayurvedic specialists inspect and affirm suggestions for accuracy and validity.
- Continuous Feedback Loop: Specialists give on-going feedback for enhanced system reasoning and enabling formula picking.

#### **4.7.3. A/B Testing for Comparing Performance:**

- Version Testing: Multiple versions of the algorithm are released to compare live environment performance.
- User Response Analysis: User behavior, satisfaction, and retention metrics are utilized to determine the optimal performing version.

### **4.8. IMPLEMENTATION AND OPTIMIZATION**

The algorithm is continuously updated after deployment to be more efficient, scalable, and accurate.

#### **4.8.1. Performance Testing:**

- Handling Loads: Various loads are placed on the system to test its ability to sustain high search requests without any loss of performance.



- Optimization of Query Processing: Indexing optimization, cache systems, and database optimization reduce response time and improve the user interface.

#### **4.8.2. Refinement of Data:**

- Periodic Updates in Information: Symptom-formulation mapping database gets updated occasionally with new medical facts and novel Ayurvedic remedies that are discovered continuously.
- Feedback Incorporation: Test case inspection, user feedback, and expert feedback guide round-the-clock updates.

#### **4.8.3. Scalability Improvements:**

- Incorporation within the Cloud: The system effectively handles many search queries with cloud infrastructure.
- Machine Learning Integration: Machine learning algorithms process user behavior and improve search accuracy over time to provide improved recommendations.

### **4.9. ANDROID APPLICATION DEVELOPMENT**

#### **4.9.1. Technology Stack:**

Development Tools Used:

- Android Studio: Primary integrated development environment (IDE) used for developing and testing the mobile app, providing robust debugging and performance optimization features.
- Firebase Firestore: Cloud-based NoSQL database-as-a-service for storing and synchronizing real-time data, such as standard cloud-based updates and user authentication.

Programming Languages

- Java/Kotlin: Primary programming languages for backend app development, providing seamless execution of business logic, API processing, and Firebase and SQLite interactions.
- XML: Employed in user interface (UI) design to facilitate structured design of layout and styling elements towards a better user experience.

Database Implementation

- SQLite: Minimal, local data storage for storing data offline and making the application usable even offline.
- Firebase Firestore: Stores data in the cloud, facilitating real-time sync and updates over devices.

#### **4.9.2. Features of the Application:**

A.Symptom Input & Search:

- Entry of symptoms is possible by the users in the application.
- The application receives input and responds with appropriate suggestions based on AI-based algorithms.

B.Personalized Suggestions:

- The app offers user profile-based health recommendations based on medical history, age, and user interest.
- Machine learning algorithms can be used for accuracy suggestions.

C.Warning System:

- Reminds users of potential contraindications to prevent recommendations from going beyond

patient-specific health conditions.

- Shows drug interaction or current condition safety alerts.

#### D. Accessibility Features:

- Large Fonts: Offers easy readability for visually impaired users.
- Voice Input: Enables users to enter symptoms or provide voice commands to search through the app for convenient use.

## 4.10. USER EXPERIENCE AND TESTING

Making the application easy and smooth for the user to use is essential for its success. This is accomplished by subjecting the application to several phases of testing, depending on functionality, usability, and performance.

### 4.10.1. Phases of Testing:

Testing incorporates several phases to ensure that the application is robust and reliable:

#### A. Unit Testing:

- Inspects individual components and features to determine if they are functioning as expected.
- Tests critical functionalities such as searching, symptom analysis, and outputting recommendations.
- Automated scripts can be leveraged to enhance and accelerate validation.

#### B. Integration Testing:

- Tests interactions between different application modules, for example, user interface, database, and recommendation system.
- Ensures data retrieved is processed and displayed well in the interface.
- Checks API interactions and response handling for seamless execution.

#### C. User Acceptance Testing (UAT):

- Engages real users, such as practitioners and students, to check for usability and usability.
- Gathers information about ease of use, content relevance, and overall user experience.
- Applies iterative refinement with user feedback to make the application more usable.

### 4.10.2. Error Handling:

#### A. Exception Management:

- Detects areas where the application is likely to fail and takes preventive measures.
- Takes care of issues like missing or incorrect inputs to prevent crashes and system failure.
- Provides clear, intuitive error messages that include suggested correction procedures.

#### B. Data Consistency Checks:

- Implements validation mechanisms to ensure correctness and suitability of recommendations.
- Avoids conflicting or wrong recommendations by cross-verifying user input with established Ayurvedic principles.

## 4.11. DEPLOYMENT AND FUTURE IMPROVEMENTS

### 4.11.1. Deployment Strategy

#### A. Google Play Store Launch:

- The application is made available on the Google Play Store to facilitate widespread accessibility.
- Google Play Store policy and security regulations compliance is ensured.
- Frequent updates and bug patches are released as per user reviews.

**B. User Guide & Onboarding:**

- Onboarding guide and step-by-step tutorials will assist users through the application.
- In-app FAQs and tooltips assist users in learning features and functionalities for the first time in the system.
- A guided tour highlights major features like symptom search, Ayurvedic suggestions, and expert advice.

**4.11.2. Future Upgrades:**

A few advanced features are anticipated to be incorporated for future updates

**A. Cloud-Based Updates:**

- The system would include new Ayurvedic findings, remedies, and suggestions dynamically without the need for a complete app update.
- A cloud-based knowledge base guarantees that users get the most up-to-date verified information.

**B. Voice Input for Symptom Search:**

- Users can provide a description of their symptoms through voice commands, which increases accessibility for users who prefer hands-free interaction.
- Speech recognition technology captures input and cross-references it with appropriate Ayurvedic treatments.
- Multilingual support can be added to serve a multilingual user base.

**C. Expert Integration & Teleconsultation:**

- Facilitates direct connection of users with Ayurvedic practitioners for consultation.
- Video or chat-based communication enables personalized health advice.
- Scheduling of appointments and e-prescription can be added to provide an end-to-end healthcare solution.

**4.12. MEDICAL ACCURACY**

The system needs to ensure accurate and effective recommendations through ongoing interaction with Ayurvedic practitioners and evidence-based practice.

**Verification by Experts:**

- Employment of trained Ayurvedic researchers and professionals for validation and fine-tuning of suggestions.
- Frequent expert verification and auditing for truthfulness and congruence.
- Synchronizing proposals with classical Ayurvedic treatises, such as Charaka Samhita, Sushruta Samhita, and Ashtanga Hridayam, along with the input from current clinical research.
- Maintenance of the database in accordance with peer-reviewed study findings and pre-established formulations to make it more reliable.

## 5. OBJECTIVE

### 5.1. BASIC USER AUTHENTICATION:

A properly designed authentication scheme guarantees user satisfaction and retention because it offers secure access to personalized data. It facilitates easy saving and restoring of bookmarks and preferences by the users. The use of authentication also facilitates the reliability of the platform because the users are assured that their data is secure from breaches and unauthorized alteration.

### 5.2. BOOKMARK AND HISTORY FEATURE:

Bookmark & History feature is to enhance the usability of the web application by offering easy access to most queried diseases, Ayurvedic medicines, and procedures. Users will be able to bookmark information needed for easy use and easily keep a record of previous searches. The feature is convenient for practitioners, students, and researchers who need to refer some Ayurvedic facts repeatedly. The following are the purpose and benefits

- **Ease:** The ease being experienced by consumers is the fundamental benefit of this feature. Rather than having to go through the hassle of seeking the same info repeatedly, customers can save their most accessed disease, formulation, or cures in a dedicated section. It minimizes searching time to few and effective ones, especially where immediate access to original information makes the biggest difference in study or work settings.
- **Provide Simple Access** Through the bookmark option, the users can bookmark Ayurvedic medicines and disease data for simple access on frequent usage. For example, an Ayurvedic doctor treating numerous patients afflicted by the same illness can bookmark the medicines that are accessed often and use them easily without searching from long lists of results. Students and researchers of specific Ayurvedic principles will be able to index and easily locate their references.
- **Enhanced User Engagement & Retention:** Offering an easy bookmarking and search history feature enhances engagement and retention. It allows users to keep a record of their previous work on the site, and it is simple to monitor research patterns or trace individual study progress. The facility promotes frequent usage and cultivates the habit of returning to the site, thus resulting in a stronger association with the Ayurvedic system of information stored in the application.

### 5.3. DARK MODE FOR BETTER USER EXPERIENCE

Dark Mode is a secondary user interface (UI) theme that flips the app's color scheme from a standard light-colored background and dark text to lighter-colored text on a darker background. Dark Mode can be incredibly useful in lowering screen brightness and contrast, thus making digital interfaces easier to use under low light. Dark Mode is widely supported by most contemporary apps, including those used in research work, medical research, and written content. Main qualities as follows:

- **Reduces Eye Strain:** The main benefit of Dark Mode is to lessen eye strain. Ayurvedic professionals, students, and researchers utilize to study for long hours reading books, learning compounds, and referring. Viewing bright screens for long hours in dim lighting can cause computer eye strain with accompanying discomfort, dry eyes, and headaches. Dark Mode minimizes blue light coming from the screen to prevent such incidents and thus offers a smoother reading experience.

- **Battery Efficiency:** For users who are viewing the site on mobile phones with OLED or AMOLED displays, Dark Mode helps in realizing a lot of power savings. This is helpful in saving battery life so that users can go on with their Ayurvedic study without having to recharge frequently.

#### **5.4. OFFLINE ACCESS FOR COMMON AYURVEDIC FORMULATIONS:**

Ayurvedic practitioners practice in diverse environments, ranging from urban clinics to remote rural areas. Internet connectivity may be poor or nonexistent in most cases, and therefore offline access to commonly used Ayurvedic formulas is critical. Preloading commonly searched formulas locally on the Ayurvedic knowledge platform will enable practitioners, students, and researchers to have continuous access to critical information. This approach is beneficial in providing usability and functionality to the platform and is a value addition in real use. Major features as follows:

**Enabling Immediate Reference to Commonly Used Formulations:** The majority of Ayurvedic formulations need to diagnosis and treatment. Physicians tend to refer to classic literature or online databases for data on ingredients, dosage, and therapeutic use. Preloading commonly used formulations offline allows users to refer to such data instantly even without internet connectivity. Time is not only saved but clinical decision-making is also made easier.

**Consistent Performance in Poor Connectivity Locations:** Remote and rural locations have poor or zero internet connectivity. Ayurvedic practitioners at such locations should have definite-shot access to treatment recipes with no internet connectivity. Offline storage ensures they can continue to administer accurate treatments regardless of network connectivity.

#### **5.5. KNOWLEDGE EXTRACTION & STRUCTURING:**

There is a hidden harmony among the mind, body, and soul in Ayurveda which is needed to achieve health and happiness. There is a lot of disease information, how to treat the diseases, herbal remedy, and principles of life science in Ayurveda classical literature such as the Charaka Samhita, Sushruta Samhita, and Ashtanga Hridaya. The formalized data shall be as follows:

- **Diseases (Vyadhi):** Ayurvedic medicine categorizes diseases (Vyadhi) based on their symptoms, cause, and treatment. Each disease is studied in respect of Dosha imbalance (Vata, Pitta, Kapha), the impact of external factors, and an individual's constitution (Prakriti). Treatment is through dietary modification, lifestyle regimen, herbal medicines, and cleansing procedures (Panchakarma). Ayurveda aims to balance the system and not suppress the signs and symptoms, thus maintaining long-term health and wellness.
- **Doshas:** The three Doshas Vata, Pitta, and Kapha are the fundamental biological energies, which control the body functions. Vata controls movement, Pitta metabolism and Kapha stability and structure. These Doshas exhibit imbalances, which give rise to various diseases.

#### **5.6. USER-FRIENDLY INTERFACE & ACCESSIBILITY:**

By emphasizing an intuitive design, organized navigation, and accessibility optimizations, the platform can achieve optimum usability, interest, and effectiveness.

##### **5.6.1. Importance of a Simple-to-Use Interface:**

An easy-to-use interface ensures various categories of users can access and utilize Ayurvedic information easily without any technical hindrance. The features of interface design are:

- Easy and Natural Navigation: Easy menu settings, categorization, and searching for information easily so that the user can easily find what he or she desires.
- Minimalist Design: Simple design with maximum focus on text legibility without including extra distractions.
- Responsive Design: Makes sure compatibility across a range of devices, i.e., desktops, tablets, and smartphones.
- Dark Mode Feature: Offers a viewing alternative to alleviate eye strain, especially useful for prolonged use.

#### **5.6.2. Practitioner Accessibility:**

Ayurvedic practitioners require a quick and efficient means of access to treatment practices, formulations, and disease classifications. The website serves them by providing:

- Quick Lookup Feature: Provides easy access to Ayurvedic formulations, medicines, and treatment recommendations according to symptoms or diseases.
- Bookmark & History Feature: Practitioners can bookmark most frequently searched formulations and treatment protocols for ease of access.

#### **5.6.3. Researcher-Friendly Features:**

Research scholars working with Ayurvedic knowledge need an enriched platform for organizing and viewing information in an orderly manner. The platform lends its support with:

- Advanced Search & Filtering: Aids research scholars in screening information according to definite herbs, ingredients, or disease categories.
- Machine Learning & NLP-driven Knowledge Extraction: Intelligence via AI assists the researchers in making sense of textual information and searching for patterns of Ayurvedic medicine.
- Export & Citation Tools: Researchers may export data in organized form and cite research in academic work.

#### **5.6.4. Systematic Learning for Students:**

Students require a systematic and organized method of learning Ayurvedic concepts. The platform maximizes student learning by:

- Systematic Data: Content is hierarchically divided into categories such as Charaka Samhita, Sushruta Samhita, doshas, herbs, preparations, and treatment methods
- Interactive Learning Modules: Quizzes, flashcards, and case studies are included to encourage learning.
- Annotation and Note-Taking Features: Allows students to mark important information and take notes within the system itself for easy recall.
- Integration with Learning Management Systems (LMS): Smoothly integrates into Ayurvedic courses, assignments, and course materials.

#### **5.6.5. Increased Accessibility:**

Accessibility should be provided so that equal accessibility to disabled individuals or people who have very less technical knowledge should be facilitated. The site involves:

- Text-to-Speech and Screen Reader Conformance: Enabling visually disabled users by performing a

read-through of text material of text-oriented content.

- Adjusting Font Size and Contrast: Allows users to personalize the UI settings for better readability.

A comprehensive and user-friendly Ayurvedic Knowledge Platform is the crux of the democratization of knowledge on conventional medicine. With its ability to address personalized requirements of practitioners', students', and researchers', the platform makes retrieving knowledge efficiently, learning in a systematic manner, and conducting extensive research possible. The synergy of these capabilities guarantees effective storage of Ayurvedic wisdom, learning, and applying it in modern healthcare systems.

## 6. SYSTEM DESIGN & IMPLEMENTATION

### 6.1. MOBILE APPLICATION: FRONT-END INTERFACE

The user interface of the Ayurvedic Formulation Finder App is the main point of interaction. It is intuitive, simple to use, and responsive, providing ease of navigation. The design is in a way that it enables users to navigate through Ayurvedic formulations according to symptoms, bookmark required formulations and easily access information. The minimalist design within the design is preserved while keeping it accessible so that even the technology-aware and first-time mobile application users can navigate with ease.

#### 6.1.1. Key Screens & Features

- **Splash Screen:** The logo of the app is shown, and resources are preloaded before the user gets into the app. The screen creates a polished user experience by giving the users an initial impression of the brand for a moment and enabling crucial features to execute in the background before beginning to utilize the app.
- **Login & Sign-Up Screen:** Provides user authentication using email and password, protecting user data. Firebase Authentication is leveraged for ease and security in the process.
- **Home Screen:** Gives access to search option, stored formularies, and about page. It serves as the central point from which users can move on to other features.
- **Search Screen:** Enables input of symptoms and recommends Ayurvedic formulations. The search feature is keyword-search enabled for accurate delivery on ingredient categorization.
- **Details Screen:** Displays detailed information of selected Ayurvedic formulations, including ingredients, usage, contraindications, preparation methods, and classical references.
- **Saved Formulations Screen:** Enables saving and returning to favorite formulations. This enables users to create their own personal database of treatments most appropriate for them.
- **About Screen:** Provides information regarding Ayurvedic principles and the purpose of the application for better understanding of traditional healing procedures.

### 6.2. IMPORTANT FEATURES OF THE MOBILE APPLICATION

#### 6.2.1. User Authentication

- Secure sign-up and login feature with Firebase Authentication.
- Maintains session history and user preferences to ensure customized user experiences.
- Supports password recovery features and account security features.

#### 6.2.2. Search by Symptoms:

- Users can input symptoms like fever, cough, or headache.
- The system uses these inputs to recommend relevant Ayurvedic formulations.
- Sophisticated algorithms filter results according to prior user searches and feedback.

#### 6.2.3. Detailed Information Display:

- Formulation details consist of ingredient lists, preparation procedures, usage directions, and possible contraindications.
- The information is given in a systematic way, which is convenient for users to read and comprehend.



**6.2.4. Bookmark & Save Formulations:**

- Users can save favorite formulations for future access.
- Information is saved via the Room Database for offline access.
- Users can sort saved formulations into personalized categories for simpler retrieval.

**6.2.5. Offline Storage with Room Database:**

- Users can view saved formulations even offline.
- Data synchronizes when internet connection is back.
- The system automatically saves vital data to avoid loss.

**6.2.6. Exit Confirmation & Navigation Enhancements**

- Provides smooth screen-to-screen navigation and avoids accidental app closure.
- Enforces intuitive gestures and rapid navigation shortcuts.

**6.3. BACK-END SERVICES (API)****6.3.1.API Purpose**

- The API is the interface between the app and Ayurvedic formulation's centralized database.
- Processes user requests and retrieves corresponding information dynamically.
- Enables secure user authentication and user session management.

**6.3.2. Features of API Services**

- Retrieves Ayurvedic prescriptions based on signs and symptoms, ingredients, and user choices.
- Facilitates multiple query parameters to narrow down searches and generate more precise results.
- Handles user login authentication with secure login and protection of user information.
- Applies strong data validation controls to guarantee the accuracy and integrity of information shown.
- Facilitates integration with other medical research databases to support formulation suggestions with other clinical data.
- Supports organized RESTful API calls for smooth and effective communication between the app and back-end services.
- Includes caching mechanisms to minimize response time and enhance app performance.
- Offers real-time analytics and monitoring features to monitor user interactions and system efficiency.

**6.3.3Future Enhancements**

- Cloud-based API integration for real-time updates: The API will mature to incorporate cloud-hosted databases of Ayurvedic formulations so that users are always presented with the most recent information.
- Voice-based search: Users will be able to use NLP voice commands to search for formulations, enhancing accessibility and user-friendliness.
- Advanced security measures: Upcoming releases will feature OAuth-based authentication, encryption of data, and multi-factor authentication (MFA) for improved protection of user data.
- Scalability enhancements: The API will be tuned to support high user loads well by adopting microservices architecture.

## 6.4. ROOM DATABASE (LOCAL STORAGE)

The Room Database is a feature in Android apps that stores data locally in the app. It provides the Ayurvedic Formulation Finder App with the ability to work efficiently without an ongoing internet connection. This feature is very much helpful for individuals in rural areas or with weak internet connections. The app can store and retrieve Ayurvedic formulations offline using Room Database, and the user does not have to face interruptions in the process.

### 6.4.1. Facilitates Offline Storage and Retrieval:

- Enables users to view earlier viewed or saved Ayurvedic recipes even while offline.
- Guarantees that users can consult crucial remedies irrespective of internet connectivity.
- Increases dependability by offering uninterrupted access to vital health content.

### 6.4.2. Ensures Fast Local Access to Data:

- Unlike cloud-based databases, which involve network requests, Room Database saves data on the user's device directly.
- Reduces load times by a considerable margin and makes the app more responsive.
- Users can rapidly search, fetch, and see Ayurvedic formulations without lag.

### 6.4.3. Supports SQL-Like Queries for Efficient Data Management:

- Offers an abstraction layer on SQLite, enabling structured query language (SQL) commands.
- Efficiently manages complex searches, filters, and retrieval operations.
- Classifies Ayurvedic formulations accurately, enabling them to be easily searched and retrieved.

### 6.4.4. Reduces API Call Dependency and Improves App Performance:

- By keeping frequently used data locally, the app minimizes repeated API calls.
- Reduces data usage and accelerates app performance.
- Allows users to navigate through stored formulations without waiting for data to load from an online database.

## 6.5. LOCATION SERVICES

Assists users in finding Ayurvedic centers or pharmacies in the vicinity. Makes region-specific suggestions for Ayurvedic formulations.

### 6.5.1 Google Maps API Integration:

The application makes use of the Google Maps API in order to locate and display local Ayurvedic centers, pharmacies, and wellness stores. This helps users determine the best source of purchasing suggested medication. The application displays an interactive map where users can locate Ayurvedic centers through special icons so that users can easily distinguish between pharmacies, wellness centers, and clinics. There is also the option of sorting by distance, services, and ratings. Offline map mode can be included for users who are in low-connectivity zones in future updates.

### 6.5.2. Regional Availability-Based Formulation Recommendations:

There are certain Ayurvedic herbs and formulations easily accessible in particular regions. A suggestion based on regional availability of the herb has been given in the app via the geolocation feature. The app also considers regional and seasonal climate to recommend personalized Ayurvedic treatment suggestions. If

there is no locally available herb, the app recommends an alternative herb or a formula with the same benefit. This store is especially handy for the clients who require recently available and locally discovered Ayurvedic products that are locally available.

#### **6.5.3. Real-Time GPS Navigation:**

Users can switch on GPS navigation to receive turn-by-turn driving instructions to the nearest Ayurvedic shop. The estimated travel time to get there, the distance, and alternative route information is available as an added comfort feature. It even learns live traffic conditions for offering the best route. Users of public transportation and walking features have public transit and walking modes offered on the app as well. A future upgrade could involve integration with ride-hailing, where users can order a cab or bicycle directly from the app.

#### **6.5.4. Store Details and Reviews:**

Users can get more information on Ayurvedic centers, including the timings, reviews from users, available formulations prior to visiting. Each store has a specialized profile page on the app consisting of contact details, available Ayurvedic products, consultation services, and payment options. Users can go through ratings and reviews given by past visitors to select the optimum center. Business owners can also refresh product inventory and service availability in real-time for customers to have the right information. An upgrade in the future can add an online appointment scheduling system for consultation with Ayurvedic doctors.

#### **6.5.5. Emergency Locator Feature:**

Future Feature Upgrade: This shall give users the privilege of looking for the nearest Ayurvedic hospital or emergency treatment facility providing alternative medicine therapy in emergency situations. The app will find open 24/7, 7 days a week emergency response centers and provide phone numbers for direct help. An SOS button can be added for instant connect of users with the local emergency care facilities. The app can also be enabled to be compatible with Ayurvedic first aid practices for instant relief of general grievances until medical help is accessed. Another option can be ambulances coordination for faster response rates in the event of an emergency.

### **6.6. THIRD-PARTY APIS**

#### **6.6.1 Google API:**

The app would show nearby Ayurvedic pharmacies and centers from the user's location so that it is easy to access health facilities. GPS location tracking is applied for the app to identify closest centers and allow users to sort results based on distance, ratings, and services offered. Step-by-step directions in real time offer directions to chosen places for easier access. The app also has reviews and contact information so that the users can make the right choices. Adding location tracking accuracy, filtering capabilities, and real-time navigation, the app provides an enhanced experience for those looking for Ayurvedic healthcare services nearby.

#### **6.6.2. Firebase Authentication:**

It manages secure authentication of users to provide secure and personalized access to the app. It supports multiple types of authentications such as Google, email/password, phone number, and social logins. With token-based login, it provides secure login sessions while allowing multi-device synchronization, allowing

users to access information across devices. It offers user profile management where users can modify their name, email, and profile picture.

#### **6.6.3. Medical API (Optional Future Feature):**

It is an extensive source of information for the users who are looking for Ayurvedic advice by offering extensive health-related information. Users can search extensive information about herbal medicines, such as their dosage, side effects, and therapeutic applications. The system also provides personalized, symptom-based advice on Ayurvedic medicines to assist users in finding natural medicines suitable for their conditions. It also gives educated data on diet, lifestyle, and wellness habits based on Ayurvedic principles and leads to overall well-being. Future development could involve linking to state health databases so that updated, accurate, and verified medical data is present.

#### **6.6.4. Cloud Storage API:**

It provides a safe and secure platform to store user-written notes and Ayurvedic treatment possibilities. Users can easily save, edit, and access notes on suggested treatments and medicines in such a way that they possess a personal memory of their illness path. It also provides uploads of images through which users can maintain prescriptions, records of consultations, and other documents as convenient references. By means of secure encryption and access controls, it keeps data protection and confidentiality. Moreover, synchronization of devices end-to-end enables patients to view their medical records anywhere and at any time, which leads to convenience and continuity of care.

### **6.7 DETAILED WORKFLOW OF THE AYURVEDIC FORMULATION FINDER APPLICATION**

This part describes in detail the workflow and operation of Ayurvedic Formulation Finder App and the dependent steps involved responsible for providing an uninterrupted, effective, and user-friendly experience. The well-defined workflow of the app encourages smooth interaction among the user interface, backend database, and dependent APIs, thereby resulting in maximum performance, responsiveness, and usability.

From user login and retrieval of data to Ayurvedic formulation recommendations and individual health details, all help make the entire app operate in a smoother way. Secure login processes allow the users to log in with ease, and the database has mammoth volumes of Ayurvedic information, e.g., herbal medicines, dosages, and treatment plans.

In addition, cloud storage and real time synchronization allow the users to carry their health records, stored equations, and preferences in any device. Even more capable APIs such as medical data integration and speech recognition enable usage through voice commands easier which makes the hands-free search convenient and access to proper health information easy.

The application, by incorporating an expected workflow, outputs a smooth performance which is more reliable. There is adherence to the standards of error handling, optimization techniques, and user-oriented design to create an easy-to-use interface such that the users are able to use the application effortlessly. Lastly, with the invocation of these processes, the users are able to receive timely, correct, and appropriate Ayurvedic consultation, hence the application being an invaluable program to the users who desire to use other holistic alternative methods of healthcare.

#### **6.7.1. User Engagement:**

User interaction is the core feature of the Ayurvedic Formulation Finder App. The app provides an easy and

hassle-free user experience in the following manners:

- **Onboarding Experience:**  
New users are welcomed by an interactive onboarding walk-through aimed at bringing them up to speed with the app's most critical features and controls. The step-by-step guide of important capabilities, including searching for Ayurvedic remedies, bookmarking important remedies, and examining personalized recommendations, is made easy to understand. Interactive UI elements, such as tooltips and guided tips, guide usage and encourage exploration of the app effortlessly. With its seamless onboarding, the app promises its users to know how it operates in an instant, and Ayurvedic wisdom is innately integrated into users' wellbeing and healthcare experience.
- **Intuitive UI Design:**  
The application contains a minimalist style with an understandable interface, hence is easy to navigate and access. Large and easily identified buttons and a logically arranged layout enhance usability, and users can find the information quickly and easily. The application provides a wide range of user populations, with high-contrast themes and readability enhancements such that it reaches people with varied visual and intellectual abilities. In its highest pursuit of simplicity and ease, the design inspires a smooth experience that allows the users to access the app effortlessly in comfort as they manage their Ayurvedic health requirements.
- **Search Optimization:**  
The search input is equipped with auto-complete and live suggestions to enhance user ease and convenience and efficiency. There is a dropdown menu as one types, giving instant feedback in the form of suggested Ayurvedic remedies for quick choice without excessive typing. Advanced filtering is used to optimize results according to relevance to simplify finding appropriate remedies for the users. Smart searching is timesaving and improves access, making it easy for the user to access Ayurvedic remedies. By way of easy searching, the app enhances user experience by improving recovery speed and accuracy of vital health information.
- **Push Notifications:**  
Users are periodically reminded of new formula updates, health tips, and personalized advice, keeping the users active and updated. Reminders are reminders of saved formulas, keeping the users active with up-to-date Ayurvedic remedies. Such a system boosts user activity by keeping the users active throughout because of regular application usage. Notification options are also editable so that users can customize their experience to remove alerts based on their preference. With editable and customizable notifications, the app delivers a perfectly balanced user experience by sharing important information without overwhelming the user.
- **User Feedback & Ratings:**  
Users can also review formulations on how effectively they work and based on their own experience, providing other useful information. The feedback data play a crucial role in refining recommendation algorithms so that better and more relevant Ayurvedic recommendations are provided in the future. A help section is also present where users can report issues or flag incorrect information so that the app becomes reliable. By incorporating the feedback mechanisms and user reviews, the app forms a social community where users contribute to iterative enhancement, which yields a better, credible, and user-centric Ayurvedic health platform.

### 6.7.2. API Calls

To provide a seamless data retrieval and processing, the app makes use of API calls as described below:

- **Search Requests:**  
When symptoms are entered by users, an API pulls in appropriate Ayurvedic remedies with accurate suggestions. Backend processing fine-tunes the reply based on users' previous search histories to give users the most apt remedies quickly, making the app more precise, user-friendly, and personalized in its overall experience.
- **Formulation Details:**  
A rendering of the formulation opens it up for explicit data, such as lists of ingredients and preparation instructions. An API fetches such data in an optimized manner, guaranteeing precision. Caching commonly used formulations reduces load time and offers a better experience through quick and hassle-free access to core Ayurvedic knowledge.

### **6.7.3. Local Room Database (Offline Storage)**

The Room Database guarantees offline availability of stored formulations and user preferences.

#### **A. Schema Design:**

- Database structure has tables for formulations, user preferences, and saved bookmarks.
- Each table has relationships established to enhance data retrieval.

#### **B. Data Syncing:**

- When online, the database synchronizes with the cloud to retrieve the latest updates.
- Auto-sync mechanisms guarantee minimal data loss.

#### **C. Data Security:**

- Sensitive user data is locally encrypted.
- Unauthorized changes are blocked by role-based access.

#### **D. Performance Optimization:**

- Indexed queries enhance retrieval efficiency.
- Background execution of threads eliminates UI lag.

### **6.7.4. Third-Party API Integration**

To extend functionality, the application integrates with multiple third-party APIs.

- **Google Maps API:**  
Shows nearby Ayurvedic centers and pharmacies depending on the user's location. Users are provided with navigation help to the closest center.
- **Firebase Authentication:**  
Manages secure user authentication. Supports social login features such as Google and Facebook.
- **Medical API (Future Feature):**  
Gathers further health-related information for greater user support. Cross-references data for more accurate recommendations.
- **Voice Recognition API (Planned):**  
Facilitates voice-based searching for formulations. Improves accessibility for visually impaired users.
- **Cloud Storage API:**  
Facilitates safe storage of user-created notes and preferences. Users can back up and restore information when changing devices.

### 6.7.5. Data Analysis and Filtering

To give precise suggestions, the app employs sophisticated data filtering and analysis methods:

- **Keyword Matching Algorithm:**  
The app analyzes user-inputted symptoms through natural language processing (NLP) methods to determine applicable formulations. Semantic analysis assists in detecting synonyms and related terms.
- **Ranking & Prioritization:**  
Sorting of recommendations is done based on effectiveness, user ratings, and popularity.

### 6.7.6. Result Presentation

The application displays results in a structured and readable format:

- **Recycler View-Based UI:**  
Formulations are presented in an organized list/grid form. Smooth scrolling provides a smooth browsing experience.
- **Detailed Information Pages:**  
Every formula has a special page with usage, ingredients, and preparation instructions. Pictures and video tutorials give step-by-step preparation instructions.
- **Bookmarking & Sharing:**  
Users can save formulations to refer to at a later stage. Social sharing allows recommendations with friends and relatives.

### 6.7.7. System Feedback Loop

- **User Ratings & Reviews:**  
Formulations can be rated by users to fine-tune future suggestions. Users can leave feedback on the effectiveness, side effects, and usability of formulations. Reviews enable new users to make informed choices based on real-life experience. Popular formulations can be promoted or recommended more in searches.
- **Admin Review & Moderation:**  
Admins review feedback to eliminate ineffective or obsolete formulations. Constant monitoring guarantees misleading or obsolete formulations are updated from scientific studies and public feedback.
- **Error Reporting:**  
Users may report faulty formulations, which are updated and checked by administrators. Reports assist in correcting problems such as wrong dosage, omitted ingredients, or false claims to ensure reliability. A user-reporting system based on the community ensures that experienced users or validated Ayurvedic practitioners verify reported formulations.
- **Ensuring Database Accuracy:**  
User contributions based on community efforts enable the upkeep of a high-quality, reliable database. A reward system for contributing users who populate the database with regular updates might be included in future updates. Future updates can also feature an auto-cross-reference function that compares reported formulations with Ayurvedic scriptures.

## 7. TIMELINE FOR EXECUTION OF PROJECT

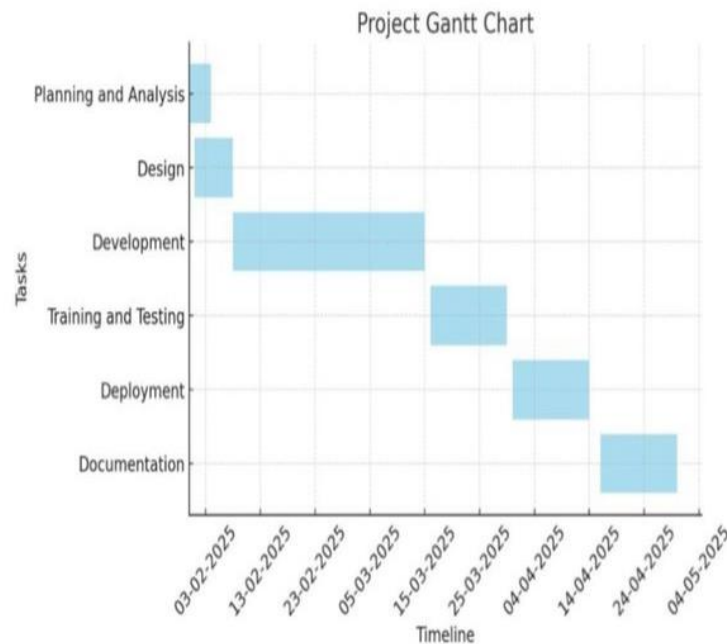


Fig.1.Gantt chart of the timeline

### Explanation of the Gantt Chart for the Ayurvedic Remedy Recommender

The above image depicts a Gantt chart, a graph representing a step-by-step timeline for the creation of the Ayurvedic Remedy Recommender. It shows the start and completion dates along with the weeks required for each phase of the project. The chart consists of six primary phases, starting with Project Planning and culminating in Deployment and Launch.

#### 7.1. PLANNING AND ANALYSIS PHASE:

Start Date: 03-03-2025

End Date: 12-03-2025

Duration: 10 days

##### A. Requirement Gathering:

- Gather in-depth project requirements from stakeholders, such as desired outcomes and system functionality.
- Analyze Ayurvedic texts and research documents to collect precise data for symptom recognition and drug suggestion.
- Consult Ayurvedic practitioners to confirm and enhance data accuracy.

##### B. Specification Identification:

- Establish both functional (user-facing features) and non-functional (performance, security) requirements.
- Identify key components such as symptom-based search, recommendation algorithms, and user interface features.
- Ensure compatibility with Android platforms and technical frameworks.

##### C. Scope Definition:



- Describe the project deliverables, such as the Ayurvedic drug recommendation system.
- Establish the boundaries of the system in terms of symptom analysis and delivering correct Ayurvedic remedies.
- Set limits, such as considerations for Ayurvedic treatment alone without the inclusion of modern medicine.

D. Feasibility Analysis:

- Analyse the technical feasibility of building the system using appropriate programming languages and frameworks (e.g., Java, Firebase).
- Judge resource availability, including technical skills and time limitations.
- Recognize possible risks, including misinterpretation of data or system performance problems, and develop mitigation strategies.

## 7.2. DESIGN STAGE:

Start Date: 13-03-2025

End Date: 22-03-2025

Duration: 10 days

A. System Architecture Design:

- Create a plan for the overall layout of the Ayurvedic drug recommendation system.
- Specify the front-end, back-end, and database component interaction.
- Implement a modular design for future scalability and system maintenance.

B. Database Structure Creation:

- Create a relational database for storing symptoms, Ayurvedic remedies, and user information.
- Optimize relationships between data to support quicker queries and correct symptom mapping.
- Support large datasets while ensuring performance with the database.

C. User Interface (UI) Design:

- Develop wireframes and prototypes of the app interface.
- Design an intuitive and user-friendly layout for symptom entry and recommendations.
- Make it responsive and compatible with Android devices.

D. System Workflow Definition:

- Trace the user flow from symptom entry to drug recommendation.
- Develop data flow diagrams (DFDs) to illustrate how information flows through the system.
- Make sure the workflow is consistent with Ayurvedic principles and recommendation accuracy.

E. Design Review and Validation:

- Discuss the system design with stakeholders and Ayurvedic specialists.
- Test the UI/UX for usability and accessibility.
- Add feedback for design enhancements prior to development.

## 7.3. DEVELOPMENT STAGE:

Start Date: 23-03-2025

End Date: 04-04-2025

Duration: 13 days

A. Symptom-Based Search Algorithm Implementation:

- Create an algorithm to compare user-input symptoms with Ayurvedic remedies.
- Develop a symptom-matching logic to give precedence to correct and appropriate drug suggestions.

- Tune the algorithm for efficiency and accuracy to provide real-time feedback.
- B. Android Application Development (Java and XML):
- Develop the front-end with XML to produce a clean and user-friendly interface.
  - Use Java in the back end for the basic system operations and database interactions.
  - Use modular coding techniques to enable easy maintenance and future extension of features.
- C. Symptom Mapping and Formulation Integration:
- Integrate the symptom-based search with the Ayurvedic drug database.
  - Map the symptoms to remedies as per rules pre-defined and certified by Ayurvedic specialists.
  - Make sure that the system has multi-symptom inputs for more tailored suggestions.
  - Integrate the database (e.g., Firebase) to hold and retrieve symptom and remedy data.
  - Provide efficient front-end-back-end communication for effective data flow.
  - Validate system output to deal with incomplete or vague symptom inputs.
- D. Basic Testing and Debugging:
- Unit testing of major modules to catch bugs early.
  - Check algorithm output against test cases for recommendation accuracy.
  - Ensure the system responds to errors in a gracious manner and gives user-friendly feedback.

#### **7.4. TRAINING AND TESTING PHASE:**

Start Date: 05-04-2025

End Date: 14-04-2025

Duration: 10 days

- A. System Testing for Performance and Accuracy:
- Perform functional testing to check that all the features, including symptom search and drug suggestions, function as intended.
  - Carry out performance testing to verify system speed, response, and stability under different circumstances.
  - Verify symptom-to-drug recommendation accuracy through comparison of algorithm output with predetermined Ayurvedic standards.
- B. Expert Validation:
- Partner with Ayurvedic practitioners to confirm the precision of the recommendations of the system.
  - Ensure that formulation recommendations are consistent with Ayurvedic principles and standard treatment protocols.
  - Obtain expert criticism regarding the system's decision-making process and refine to enhance precision.
- C. User Feedback Collection:
- User test with a pilot group to assess ease of use, navigation, and interface clarity.
  - Obtain feedback on the quality of recommendations, user satisfaction, and technical glitches experienced.
  - Determine areas for enhancement by examining user behavior and interaction patterns.
- D. System Optimization:
- Refine the symptom-matching algorithm using expert validation and user feedback.
  - Optimize data handling processes to deliver quicker responses and higher accuracy.
  - Fix any bugs, errors, or usability problems to improve the overall system.
- E. Final Quality Assurance (QA) Review:

- Perform a thorough review of the system to ensure that all issues found are fixed.
- Ensure that the system is technically compliant and meets project goals.
- Prepare the system for deployment by making it stable, accurate, and user-friendly.

## 7.5. DEPLOYMENT STAGE:

Start Date: 15-04-2025

End Date: 24-04-2025

Duration: 10 days

### A. App Preparation for Android Release:

- Package and prepare the Android app for release.
- Apply compatibility with various Android versions and device platforms (phones, tablets).
- Tune performance, e.g., app performance, battery usage, and data processing.
- Apply final user privacy checks, data security, and error control.

### B. Documentation and User Manual Creation:

- Create technical documentation including system architecture, algorithms, and database structure.
- Create a user manual with step-by-step guide to using the app, like inputting symptoms and seeing recommendations.
- Include a troubleshoot manual that addresses issues and solutions.
- Design the documentation to be easily modifiable for future maintenance and system updates.

### C. Performance Monitoring and Bug Detection:

- Track error logs to monitor and resolve any bugs that occur post-launch.
- Collect user feedback for further improvements and future updates.

### D. Post-Launch Support and Maintenance Strategy:

- Establish a support mechanism to manage user queries and technical support.
- Ensure regular updates to enhance functionality and improve the recommendation system.
- Ensure periodic system review to keep it continued accurate and reliable.

## 7.6. DOCUMENTATION STAGE:

Start Date: 25-04-2025

End Date: 04-05-2025

Duration: 10 days

### A. Technical Documentation Compilation:

- Describe code organization, such as class definitions, functions, and API integrations.
- Include installation guides and guidelines for maintaining and upgrading the system.
- Add descriptions about the symptom-based recommendation algorithm and its operating principles.

### B. User Guide Preparation:

- Prepare a user guide describing how to utilize the Ayurvedic drug recommendation system.
- Provide clear instructions on symptom input, app navigation, and result interpretation.
- Offer an FAQ section resolving common user concerns and troubleshooting queries.
- Create a step-by-step illustrated guide for better user knowledge and usability.

### C. Final Project Report Development:

- Assemble a comprehensive project report highlighting the entire life cycle of the project.
- Comprise important sections like project aims, methodology, development process, test results, and

deployment specifications.

- Highlight results and findings in terms of system performance, precision, and end-user feedback.
- Emphasize challenges encountered during the project and the strategies adopted to overcome them.

D. Future Enhancement Planning:

- Develop a maintenance plan to ensure regular system updates and data correctness.
- Prepare instructions for scaling the system, including performance improvement for larger user bases.

E. Documentation Review and Finalization:

- Perform a comprehensive check of all documentation for completeness, accuracy, and clarity.
- Make sure the documentation is aligned with the implementation of the system.
- Organize and format documents in an easily accessible manner, be it for technical staff or end-users.
- Complete and distribute the documentation to the concerned stakeholders for future use.

## 7.7. INSIGHT FROM THE GANTT CHART

- Overlapping Activities for Time Savings:

Development overlaps Training and Testing so that coding and quality assurance can progress in parallel. Parallel development reduces the duration of the entire project by allowing early detection and correction of bugs while developing the system. Overlaps enhance the utilization of resources and permit more than one team to work together at a time, making the project process more efficient

- Sequential Process for Systematic Flow:

The project is in a systematic, step-by-step format, where every phase hinges on the fulfillment of the last one. The Design phase, for example, is dependent on findings from Planning and Analysis, while Development employs results from the Design stage. This process approach guarantees that the project flows systematically, lessening confusion and eliminating rework. The output of each phase directly informs and influences the subsequent phase, promoting smooth transition from one stage to the next.

- Effective Time Management:

The Gantt chart explicitly sets task durations so that each project phase is properly allocated time. For example, the project allocates 21 days to development—the most time-consuming phase—while keeping the planning, testing, and deployment phases shorter but comprehensive. Fixed timelines for each phase make it easier to track milestones and allow the team to keep track of how things are progressing and adjust plans if they lag.

## 8. OUTCOMES

### 8.1. INTELLIGENT AYURVEDIC FORMULATION RECOMMENDATION SYSTEM

Ayurveda, being an ancient system of medicine, offers a wide repository of medicines for the treatment of diseases as per individual constitution (Prakriti), dosha imbalance, and natural constituents. Availability and effective utilization of the information remains a problem due to the intricacy, disjointed information, and varying vocabularies in classical literature.

#### 8.1.1 Structured Ayurvedic Knowledge Base:

For the sake of an all-encompassing and dependable reference system, the site digitizes and structures traditional Ayurvedic literature like Charaka Samhita, Sushruta Samhita, and Ashtanga Hridaya. These works are the pillars of Ayurveda, and their understanding is categorically structured within the database.

The organized knowledge base structures data on:

- Disease Classification (Vyadhi Nidan): Classified by Dosha involvement and correlated with contemporary diseases.
- Pharmacological Properties of Herbs: Classified by Rasa, Guna, Virya, Vipaka, and Prabhava.
- Ayurvedic Formulations: Cross-indexed by dosage, ingredients, indications, and contraindications for practical use.

This system will allow the Ayurvedic knowledge to be made available in an easily searchable and scientifically organized manner, accessible to both academic investigation and clinical utility.

#### 8.1.2 Personalized Recommendations:

Since Ayurveda is extremely individualistic, the system customizes based on Prakriti (constitution of body), age, sex, lifestyle, and pre-existing disease. Individualized selection of treatments ensures greater efficacy and patient-oriented outcomes.

For instance, a Pitta-dominant person suffering from acidity would be advised to take cooling and soothing herbs such as Amalaki (*Emblica officinalis*) and Yashtimadhu (*Glycyrrhiza glabra*), while a Kapha-dominant person suffering from acidity would be advised to take digestive stimulants such as Pippali (*Piper longum*) and Chitraka (*Plumbago zeylanica*).

Also, dosage is adjusted according to various age groups and conditions so that treatments are safe and effective for everyone.

### 8.2 Personalized and Secure User Experience

Ayurvedic Knowledge Platform is designed to deliver an integrated, effective, and easy facility for Ayurveda practitioners, researchers, and students. Users of Ayurveda are used to managing high amounts of information, such as classical books, disease constitution, properties of herbs, and treatment strategies. Availability in a well-structured and easy electronic format allows ease in searching information as well as the success of the research.

To give a hassle-free and smooth experience, the website uses main functionalities with focuses on usability, security, and personalization. They are:

### **8.2.1 Bookmark & History Feature: Proper Information Accessibility:**

The system also suggests a specific item based on past searches, thus making search a simple thing for an automated and trouble-free experience. Even the users themselves possess the feature to modify, rearrange or erase their search history, thus enjoying complete control over their data privacy and discretion. One of the most refined aspects of this feature is offline support, in that the bookmarked material is available for download on users' computers to be accessed even without connectivity. This is particularly convenient for practitioners stationed in rural or off-grid areas where uninterrupted internet connection may not be possible. With bookmarking, search tracking, and offline mode, the system assures effective knowledge management and better user interface to Ayurvedic scholars and practitioners alike.

### **8.2.2 Dark Mode UI: Minimizing Eye Strain & Improving User Interface:**

Ayurveda students and physicians like to spend hours studying old texts, working on equations, and scanning scientific publications. Prolonged hours spent staring at screens virtually guarantee eye strain, lethargy, and wasted time, rendering Dark Mode UI a flat-out requirement for the optimal research experience. Dark Mode reduces glare and emission of blue light, which decreases visual discomfort and enables researchers to focus without excessive strain.

Dark Mode enhances readability of text with increased contrast, and reading in dark environments becomes more convenient. It is especially helpful for night researchers or those who work in dark rooms. Dark Mode prevents headaches due to prolonged exposure to screen bright light. Dark Mode enhances reading, and readers can focus better when reading thick Ayurvedic content.

Besides ensuring optimal user comfort, Dark Mode is also power saving, particularly in OLED and AMOLED screen technology devices, as it saves energy by using less power when displaying black pixels. This gives devices longer battery life, which is an aspect that makes it perfect for people who need to do research while traveling without needing to recharge their devices often.

The site enables users to toggle between Light Mode and Dark Mode solely on a personal preference basis. The system retains the preference for future sessions once the user has made their choice so that the experience is individual and consistent. Dark Mode also benefits accessibility for visually impaired users or light-sensitive users, making the site more accessible and usable.

With various Dark Mode UI support, the platform offers users the Ayurvedic professional a calming, power-saving, and effortless learning experience to deliver utmost concentration with proper illumination care as well as optimal gadget performance.

## **8.3 Advanced Search Algorithm for Ayurvedic Data Retrieval**

The Advanced Search Algorithm for Ayurvedic Data Retrieval is utilized to improve search precision, relevance, and personalization for learners, researchers, and practitioners. Because Ayurvedic texts employ different terminologies and classifications, the algorithm bridges the differences by using synonym mapping, intelligent filtering, and ranking algorithms to deliver the end users with the most appropriate and contextually relevant suggestions based on their search as well as individual needs.

### **8.3.1 Synonym Mapping of Ayurvedic Terminologies:**

Ayurvedic texts use different terminologies to denote disease, doshas, and preparations that render information access difficult. For delivering consistent search outcomes, the Advanced Search Algorithm uses synonym mapping, cross-mapping different terminologies used in various texts and traditions. The algorithm maintains a standardized synonym store where disease names (Vyadhi) are mapped to their different

synonyms. For example, Jwara (Fever) is also referred to as Santapa, Shita Jwara, Vataja Jwara, and Pitta Jwara, and Diabetes (Prameha) as Madhumeha or Kshoudrameha. All this mapping is performed so that when someone searches for some condition, all the synonyms for the condition are considered so that important information is not lost. In addition to disease name, Dosha and Prakriti mapping also becomes a part of the system to enhance targeted search results. Since most diseases in Ayurveda are dosha-forms—i.e., Vataja Jwara, Pittaja Jwara—the algorithm maps such forms to provide a broader but specific search. Even user-initiated searches for Prakriti-based solutions (e.g., discovering what best formulation someone with a Pitta-dominant type of constitution should get) are also translated into suitable treatments and formulations.

### **8.3.2 Ranking Results for Relevance & Safety:**

The Relevance Score captures to what degree a result is related to the user query, including intent and synonyms. The Safety Score examines if a treatment is safe given the user's contraindications and medical conditions. The Popularity & Efficacy Score, finally, considers the user ratings, Ayurvedic literature, and clinical trials to show the most popular and successful treatments.

For example, when a 60-year-old patient with hypertension searches for "Best Ayurvedic medicine for arthritis pain," the system puts the safest and most effective among them first.

The first is Maharasnadi Kwath, which is most relevant, safe in geriatric patients, and most followed in Ayurveda.

The second is Yogaraja Guggulu, which is relevant but requires blood pressure management and therefore comes as an alternative. The third option, Dashmoolarishta, is while helpful as an alcoholic and not suitable for hypertension and therefore deprioritized. Doing this, prioritization by the algorithm places the best, safest, and user-specific options first, maximizing decision-making and opening Ayurvedic data to greater accessibility and personalization.

## **8.4 .USER-FRIENDLY INTERFACE & RESEARCH SUPPORT**

The User-Friendly Interface & Research Support of your Ayurvedic knowledge platform is intended to improve accessibility, learning, and research effectiveness. It supports students, researchers, and practitioners with structured content, interactive tools.

### **8.4.1 Systematic Student Learning:**

Ayurveda students tend to get disjointed information from various sources. Your site resolves this by offering:

- Organized Content for Systematic Study: Ayurvedic concepts (Tridosha theory, Sapta Dhatu, Mala, Agni, etc.) are organized in categories for convenient navigation. Ayurvedic preparations (Churna, Kwatha, Ghrita, etc.) are arranged based on disease classification, therapeutic action, and ingredients. Contemporary scientific findings (comparative pharmacology, clinical evidence) are presented alongside classical knowledge.
- Quizzes for Self-Assessment: MCQs, Case-Based Questions, and Flashcards facilitate reinforcement learning. Adaptive learning methods: The level of difficulty of quizzes adapts depending on past performance. Gamification components: Leaderboard, badges, and rewards enhance motivation.
- Interactive Learning Modules Flowcharts and Mind Maps: Pathophysiology and treatment visualizing. Simulation-Based Learning: Walking through case studies where students are required

to diagnose and recommend treatment based on Ayurvedic theories. Voice-Based Learning: Facility to listen to content briefs and important points on the go.

#### **8.4.2 Researcher-Friendly Features:**

Researchers need access to good-quality, well-structured data and sophisticated tools for analysis. Your platform has:

- Advanced Filtering for Targeted Research Search by disease, herb, formulation, rasa, guna, virya, and prabhava for exact data extraction.
  - Filters for Clinical Trials and Modern Studies: Binds PubMed/Google Scholar data where available.
  - Comparison Feature: Enables researchers to compare Ayurvedic formulations as per traditional texts and modern studies.
- NLP-Based Knowledge Extraction
  - Text Mining for Ayurvedic Literature: Pulls out structured data from texts such as Charaka Samhita, Sushruta Samhita, Bhavaprakasha, and contemporary research articles.
  - Automated Summary & Keyword Extraction: Translates complex Sanskrit and classical texts into simplified, structured outputs for easy research.
- Citation Tools for Academic Writing
  - Auto-Generated Citations in APA/MLA/Vancouver Styles: Timesaving when authoring papers.
  - Integration of Reference Management: Support for Zotero, Mendeley, and EndNote.
  - Plagiarism Checker: Checks for originality of research work.

#### **8.4.3 Practitioner Accessibility for Quick Decision-Making:**

Practitioner Accessibility for Rapid Decision-Making offers quick and efficient access to Ayurvedic knowledge in clinical settings.

- Rapid Lookups: Symptom-based search, dosha-based treatment suggestions, and an emergency guide reference with instant access to key information.
- Voice Search: Speech-to-text searching and audio summaries by hands-free voice queries for easy clinical utilization.

This blending enhances clinical effectiveness, allowing practitioners to make quicker, more informed decisions.



## 9. RESULTS AND DISCUSSION

### 9.1. DEVELOPMENT OF AYURVEDIC DATABASE

The project entailed developing an exhaustive and systematic Ayurvedic database through step-by-step accumulation of information from primary classical Ayurvedic works—Charaka Samhita, Sushruta Samhita, and Ashtanga Hridaya. The intention was to systematically organize this rich body of data in digital form, enabling easy storage, retrieval, and analysis for research, clinical use, and teaching purposes.

#### 9.1.1. Source Compilation and Extraction of Data:

The initial step entailed a thorough examination of the three ancient Ayurvedic texts:

- Charaka Samhita – Emphasizes the art of internal medicine (Kaya Chikitsa) and offers extensive details about physiology, pathology, pharmacology, and therapeutic guidelines.
- Sushruta Samhita – Deals with surgical methods and includes pharmacology, anatomy, and wound and fracture management.
- Ashtanga Hridaya – Combines both medical and surgical knowledge in a compact manner, making the teachings of Sushruta and Charaka easy to understand. From these sources, major Ayurvedic principles and therapeutic paradigms were derived and grouped systematically. This was done by translating and organizing information under specified parameters to ensure accuracy and consistency.

#### 9.1.2. Classification According to Ayurvedic Principles:

Information was arranged based on fundamental Ayurvedic principles, which are important for comprehending properties and activities of substances. Main classification parameters were:

- Rasa (Taste) – Explains the six basic tastes (sweet, sour, salty, bitter, pungent, astringent) that have an impact on physiological responses and therapeutic effects.
- Guna (Qualities) – Symbolizes inherent characteristics of a substance (e.g., heavy, light, oily, dry) that influence its pharmacodynamic action.
- Virya (Potency) – Refers to the strength or potency of the substance, either heating (Ushna) or cooling (Shita), that affects metabolic reactions.
- Vipaka (post-digestive effect) – This is a description of how a substance changes after digestion and affects long-term effects in the body (e.g., sweet, sour, pungent).

Every medicinal plant, preparation, or therapeutic regimen was classified under these rubrics, giving it a multidimensional perspective of its properties and action.

#### 9.1.3. Symptom-to-Formulation Mapping:

One of the central features of the database is mapping symptoms to Ayurvedic preparations. This includes:

- Symptom Tagging: All the symptoms from the ancient texts are tagged and referenced to related diseases and treatments.
- Formulation Linking: Ayurvedic formulations (such as Churnas, Kashayas, Asavas) are correlated to conditions through the properties of Rasa, Guna, Virya, and Vipaka.
- Search and Retrieval: The XML structure allows queries to effectively find the most appropriate formulation from the symptom profile.

### 9.2. ACCURACY AND VALIDATION

**9.2.1. Strict Unit Testing:**

The application was extensively unit tested where the system is divided into sub-components and analyzed separately. All this was meant to ensure each feature worked in the expected way under different situations. The prime areas of consideration were:

- Symptom Identification: Verifying the system's correctness in interpreting user-input symptoms and identifying corresponding Ayurvedic formulations.
- Contraindication Detection: Confirming the app properly detects and marks potential interactions between prescribed formulations and patient-specific conditions (e.g., pregnancy, chronic illnesses).
- Algorithm Performance: Evaluating the accuracy, responsiveness, and consistency of the search algorithm with various symptom profiles and user inputs.

Every module was evaluated under simulated conditions using a large dataset of symptoms and Ayurvedic preparations. Discrepancies or errors thus found were resolved in a timely manner by means of iterative development and retesting.

**9.2.2. Expert Verification by Ayurvedic Doctors:**

Aside from technical testing, the app was tested by skilled Ayurvedic professionals to check compatibility with genuine Ayurvedic principles and clinical techniques. This check included:

- Cross-Referencing Classical Works: Ayurvedic preparations and symptom correlations were cross-checked against reliable classical Ayurvedic texts (e.g., Charaka Samhita, Sushruta Samhita) for accuracy.
- Clinical Expertise Feedback: Providers evaluated to what extent the app recommendations aligned with actual diagnostic and treatment practices.
- Continuous Improvement: Feedback loops were used to improve the system. The areas where practitioners pointed out errors or recommended improvements in mappings were revised accordingly.

Practitioners highlighted the app's ability to provide context-specific recommendations and appreciated how it integrated modern technology with traditional knowledge.

**9.2.3. Improved Patient Safety through Contraindication Detection:**

One of the major features of the app was its contraindication detection mechanism, which detects possible risks in combining certain formulations or prescribing them to patients with specific health conditions. The mechanism was validated with:

- Scenario-Based Testing: Enabling real patient profile simulations (e.g., diabetics, hypertensive, pregnant women) to confirm the app flagged unsafe formulations.
- Risk Mitigation: Making sure that the app warns users and practitioners of possible negative effects, with explicit instructions on safer alternatives.
- Accuracy Validation: Flagged contraindications were double-checked against established Ayurvedic standards and contemporary safety procedures by expert reviewers.

Practitioners especially appreciated this aspect, as it made patients safer by minimizing the chance of adverse interactions or inappropriately recommended medicines.

**9.2.4. Search Algorithm Fine-Tuning:**

The search algorithm for the app was continuously improved according to real-life testing environments. This process included:

- User Query Analysis: Measuring the extent to which the algorithm correctly interpreted user inputs, particularly with ambiguous or complicated description of symptoms.
- Relevance Scoring: Modifying the algorithm to emphasize the most clinically relevant formulations based on principles of Ayurvedic diagnosis (e.g., Dosha imbalances).
- Performance Metrics: Tracking major performance metrics (KPIs) like search accuracy (how frequently the top hit is correct) and recall (how many correct formulations are returned).

With these optimizations, the app reached increased accuracy and speed of response, enhancing clinical utility and user trust.

### **9.3 .USER EXPERIENCE FEEDBACK**

Users said that the interface is user-friendly, with simple categorization and easy navigation. The addition of multi-language support (Sanskrit, Hindi, and English) enhanced usability. Practitioners appreciated cross-referencing with contemporary medical terminologies for clinical practice and research.

#### **9.3.1. Intuitive interface with clear categorization and easy navigation:**

Users preferred the interface to be intuitive, that is, designed in such a manner that comes naturally and seems easy to grasp without extensive explanation. Clear categorization of information makes it easy for users to rapidly access specific content by dividing material into clear, well-defined sections. The logical organization reduces confusion and increases the overall experience of the user.

Smooth navigation is also part of this excellent experience as it makes it easy for users to glide from one section to another. Whether looking for certain words, browsing medical topics, or cross-referencing information, users can find what they need with ease without encountering unnecessary complications. Smooth navigation is particularly important to medical professionals under time pressure who need to gain quick access to correct information.

#### **9.3.2. Practical Utility for Clinical Application and Research:**

This convergence enables informed decision-making, enhances patient care, and enables practitioners to investigate alternative approaches to treatment. For researchers, the site is an important source for researching how ancient and modern medical knowledge interrelate. The facility for cross-referencing terminologies aids in a more critical and meticulous analysis, making possible high-level research and the continuous advancement of medical science.

### **9.4. ADDRESSING EXISTING METHOD DRAWBACKS**

The system developed is vastly superior to the shortcomings of available Ayurvedic software by incorporating cutting-edge features and forward-thinking capabilities. The major improvements are:

#### **9.4.1. Real-Time Updates:**

Conventional Ayurvedic software tends to be dependent on static databases that need manual intervention for updates. This can result in outdated data, particularly with new research results and formulations. The system developed overcomes this drawback by being able to update dynamically. This aspect enables the application to incorporate the latest developments in research and clinical guidelines in real time, keeping practitioners and users up to date and informed with the latest and most accurate Ayurvedic knowledge. Subsequent releases will increasingly simplify the process with automated content delivery systems.

#### **9.4.2. Individualized Diagnosis:**

Current Ayurvedic software generally follows generalized diagnostic frameworks that fail to consider individual diversity. The indiscriminate application could miss patient-specific factors essential in correct diagnosis and treatment. The system developed makes diagnosis more precise by using parameters like a patient's Prakriti (Ayurvedic body type), prevailing health problems, and lifestyles. Using such personalized inputs, the system delivers customized recommendations most closely matching the patient's personal physiological and psychological makeup.

#### **9.4.3. Cloud Integration:**

Most of the present Ayurvedic uses are limited to local storage systems, which restricts data accessibility and collaborative features. The first release of the developed system employs local XML storage for offline use and quick data retrieval. Future versions will, however, include Firebase Firestore, a scalable and secure cloud database, to provide real-time synchronization among multiple devices. This cloud integration will provide smooth data sharing, remote access, and real-time information updates while ensuring user privacy and data security.

#### **9.4.4. Reducing Misinterpretation:**

Misinterpretation of Ayurvedic advice is an important risk when complicated formulations and contraindications are required. The resultant system avoids such a problem with clear contraindication signals and comprehensive referencing. Every piece of advice includes contextual information as well as direct quotes from important Ayurvedic texts. It not only augments user perception but also eliminates the possibility of diagnostic or planning errors. Furthermore, the interface of the system is organized for readability, with intuitive navigation and informative cues to lead users through the process of making decisions.

#### **9.4.5. Expert Consultation:**

Though most Ayurvedic software does not have in-built mechanisms for professional consultation, the system developed is modularly constructed to allow future teleconsultation capabilities. Though direct practitioner consultation is still not supported in the current release, future updates will include real-time communication with certified Ayurvedic professionals. This will enable patients to get expert advice, remove doubts, and seek second opinions, leading to improved overall care quality and patient outcomes.

### **9.5. CULTURAL PRESERVATION**

#### **9.5.1. Safeguarding Traditional Wisdom:**

These books provide comprehensive information about medicinal plants, treatment procedures, dietary rules, and integrated health practices. Most of these manuscripts are delicate, being written on palm leaves or paper that decays with time. By transforming the old texts into digital form, the project makes sure that such wisdom is safeguarded in an impenetrable and long-lasting manner. This saves the loss of valuable information through deterioration or disappearance of oral traditions. Through systematic documentation, the project can record not only the formulations but also the cultural background, approaches, and the philosophical theories that form the basis of Ayurveda.

#### **9.5.2. Organizing Knowledge for Accessibility:**

Mere digitization of the texts will not do; it must be organized systematically to render this massive amount

of knowledge easily accessible and comprehensible. The project can organize information under topics like:

- Herbal Formulas: Recording the ingredients, preparation, and curative application of individual remedies.
- Disease Management Protocols: Organizing treatments for various conditions like digestive issues, respiratory ailments, and mental wellness.
- Philosophical Principles: Maintaining fundamental Ayurvedic principles such as the three doshas (Vata, Pitta, Kapha), Panchakarma treatments, and seasonal regimens.

Applying contemporary digital resources such as databases, search engines, and index systems facilitates practitioners, researchers, and the public to access and interpret this knowledge more conveniently.

#### **9.5.3. Encouraging Cross-Cultural Exchange:**

By making Ayurvedic knowledge accessible in various languages and through digital platforms, the project enables this ancient wisdom to be shared globally. This promotes cross-cultural exchange where individuals from various regions of the world can learn and embrace Ayurvedic practices. Additionally, the process of digitization makes it possible to compare Ayurveda with other classical medical systems (e.g., Traditional Chinese Medicine or Unani) as well as contemporary medical science. By this multidisciplinary approach, new drugs could be discovered, and holistic medical solutions could be encouraged globally.

#### **9.5.4. Educational and Research Avenues:**

The virtual repository is an asset to scholars, medical doctors, and students of Ayurveda. With properly indexed digital records, scholars can:

- Make comparative studies of traditional and contemporary medicine.
- Investigate clinical effectiveness through evidence-based research on Ayurvedic drugs.
- Create innovative applications without compromising on the traditional approach.

In addition, web portals can offer virtual libraries, interactive tutorials, and study resources that provide access to learning Ayurveda from anywhere and everywhere.

#### **9.5.5. Reviving Traditional Practices:**

Besides maintaining historical data, the project stimulates the renewal of ancient healing practices by linking contemporary society with ancient wisdom. Digitalized documents can:

- Promote local practitioners in preserving true Ayurvedic practices.
- Encourage small-scale manufacturers of Ayurvedic products to carry on their activity.
- Support communities to regain their cultural identity by protecting indigenous healing arts.

#### **9.5.6. Securing Sustainable Innovation:**

By recording classical Ayurvedic preparations, the project creates a basis for future developments without disregarding traditional processes. This blend of conservation and innovation can:

- Promote sustainable harvesting of medicinal plants.
- Encourage moral business practices that both producers and consumers can gain from.
- Inspire product innovation based on Ayurvedic knowledge, promoting well-being across the world.

### **9.6. LIMITATIONS AND FUTURE WORK**

Although the existing system presents vast improvements in the integration of Ayurvedic wisdom and

contemporary technology, there are inbuilt limitations which must be resolved for future enhancement. It is important to identify such limitations to further fine-tune the application in terms of its accuracy, availability, and feasibility.

#### **9.6.1. Limited Dataset:**

Ayurveda is, however, an expansive and ever-changing domain with ongoing research and new developments. The dataset might not reflect developing trends, region-specific treatments, or newly proved Ayurvedic therapies. In future, there will be expansion of the dataset by adding recent peer-reviewed publications, clinical trials, and expert opinions.

#### **9.6.2. User Diversity:**

The app has been tested in limited controlled environments to ensure proper functionality and user experience across a limited demographic population. Nonetheless, Ayurvedic practices tend to be based on individualized health evaluations that may differ among different populations owing to genetic, cultural, and life differences. There is a need for expanded testing across diverse groups of users with differences in age, gender, location, and health status to provide a generalization of the app's effectiveness. Subsequent versions will focus on mass user testing and ongoing feedback gathering to detect and rectify possible biases, making the platform more reliable and inclusive.

## 11.CONCLUSION

Software created is a paradigm shift in digital conversion of Ayurveda information. By creating a single, easy-to-use, and logically designed platform, it dramatically enhances the use and availability of ancient medical knowledge from texts such as Charaka Samhita, Sushruta Samhita, and Ashtanga Hridaya. Through meticulous digitization and organized classification, the app preserves valuable Ayurvedic wisdom, ensuring their preservation as well as usability in an era of technocracy where solution-oriented data and technology grow more dominant.

This is not just a database; it is an intelligent decision-support system. Users—ranging from curious laymen to skilled practitioners—can navigate symptom-related treatments and therapies easily. Advanced search parameters, contraindication mapping, and cross-referenced medicinal values make precise and targeted recommendations, thereby boosting clinical accuracy and safety. Incorporating personalization factors such as age, constitution (Prakriti), and health status further refines the recommendations, encouraging individualized care according to classical Ayurvedic principles.

Apart from its utility in practical clinical practice, the software has significant contributions to Ayurvedic research and education. With well-referenced, organized content, it enhances pedagogy and research at academic levels. Students and researchers can easily refer to information, which was scattered before, making comparative studies, evidence-based research, and cross-disciplinary study possible. Facilities like dosage suggestion, formulation reference, Sanskrit-English translation, and pharmacological mappings are in-built and serve to enhance understanding of theoretical and applied Ayurveda.

In addition, the software facilitates the modernization and internationalization of Ayurveda without compromising its fundamental philosophies. It is a demonstration of how knowledge systems of the past can coexist in harmony in the interface of new technology with prudence and cultural sensitivity. Through the interface that mediates between ancient texts and actual needs of medical practice, the app establishes a high benchmark for new digital health technology based on indigenous and integrated medical systems.

In essence, the project resurrects Ayurveda's position in modern health care by giving new life to ancient knowledge as a living, dynamic document and web-based source. It supports evidence-based practice, inter-professional education, and cultural continuity. As a pioneering project, not only does it preserve tradition, but it actively encourages tradition proactively spearheading new realms in research, innovation, and health care integration on a worldwide scale.

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## APPENDIX-A

### PSUEDOCODE

#### 1. About Activity:

On Activity Create: - Set layout to activity\_about.xml

#### 2. DetailsActivity:

On Activity Create: - Set layout to activity\_details.xml - Initialize TextViews and Button - Get "FORMULATION\_NAME" from intent

If formulationName exists:

- Set text to formulation name
- Get details using getMockDetails() and display
- On Save Button Click:
  - If formulation already in favorites:
    - Show Toast "Already in favorites!"
  - Else:
    - Add to favorites
    - Show Toast "Saved to favorites!"

Else:

- Show default text "No Name" and "No details"
- Disable Save Button

Function getMockDetails(remedyName): - Return predefined string based on remedy name - If name not found, return default message

#### 3. FavoritesManager:

Class manages a Set of favorite remedies

Functions: addFavorite(remedy): - Add remedy to favorites set

isFavorite(remedy):

- Return true if remedy in favorites

getFavorites():

- Return copy of current favorites set

removeFavorite(remedy):

- Remove remedy and return success/failure

#### 4.HomeActivity:

On Activity Create: - Set layout to activity\_home.xml - Initialize 4 buttons: Search, About, Saved, Exit

On Search Button Click:

- Open SearchActivity

On About Button Click:

- Open AboutActivity

On Saved Button Click:

- Try to open SavedFormulationsActivity
- If error occurs, show Toast

On Exit Button Click:

- Show Toast "Exiting App..."
- Close all activities using finishAffinity()

5.LoginActivity:

On Activity Create: - Set layout to activity\_login.xml - Initialize EditTexts and Buttons

On Login Button Click:

- Go to HomeActivity

On Sign Up Text Click:

- Go to SignUpActivity

6.SavedFormulationsActivity:

On Activity Create: - Set layout to activity\_saved\_formulations.xml - Get list of saved favorites - Populate ListView using adapter

On List Item Click:

- Get selected remedy
- Open DetailsActivity with remedy name

On List Item Long Click:

- Remove selected remedy from favorites
- Update adapter and show Toast accordingly

7.SearchActivity:

On Activity Create: - Set layout to activity\_search.xml - Initialize EditText, Button, and ListView

On Search Button Click:

- Get symptom input from EditText
- If empty, show Toast

- Else:
  - Search remedies using mockSearchRemedies()
  - If no results, show default message
  - Display results in ListView

On List Item Click:

- If result is not "No remedies...", open DetailsActivity with remedy name

Function mockSearchRemedies(symptom): - Check symptom keyword - Add matching remedies to result list - Return list

## 8. SignUpActivity:

On Activity Create: - Set layout to activity\_sign\_up.xml - Initialize EditTexts, Button, and TextView

On Sign Up Button Click:

- Get all input values
- Validate fields:
  - If any empty: show Toast
  - If passwords don't match: show Toast
  - Else: show success Toast and go to HomeActivity

On Login Text Click:

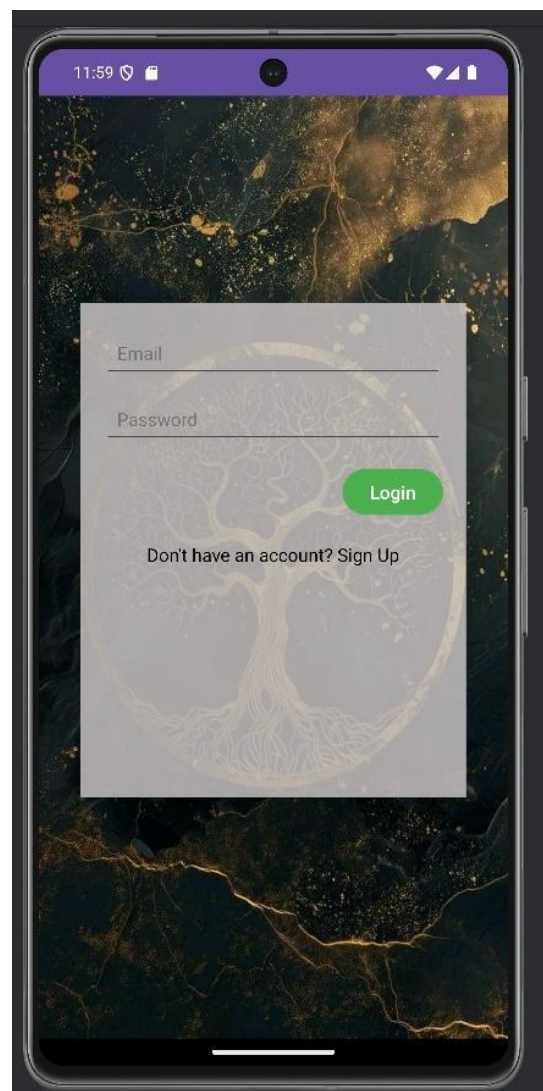
- Go to LoginActivity

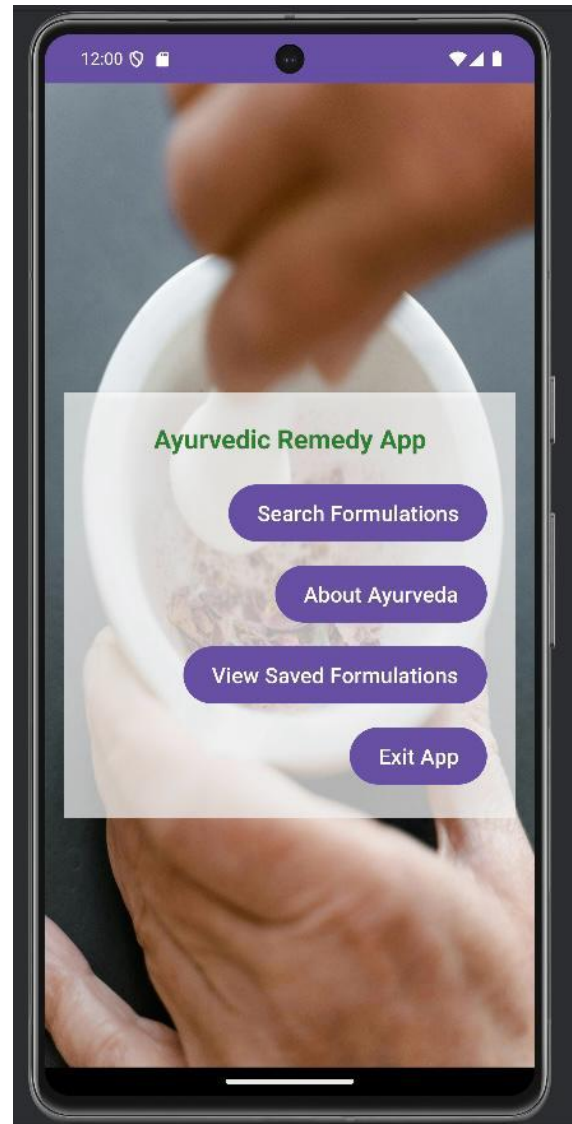
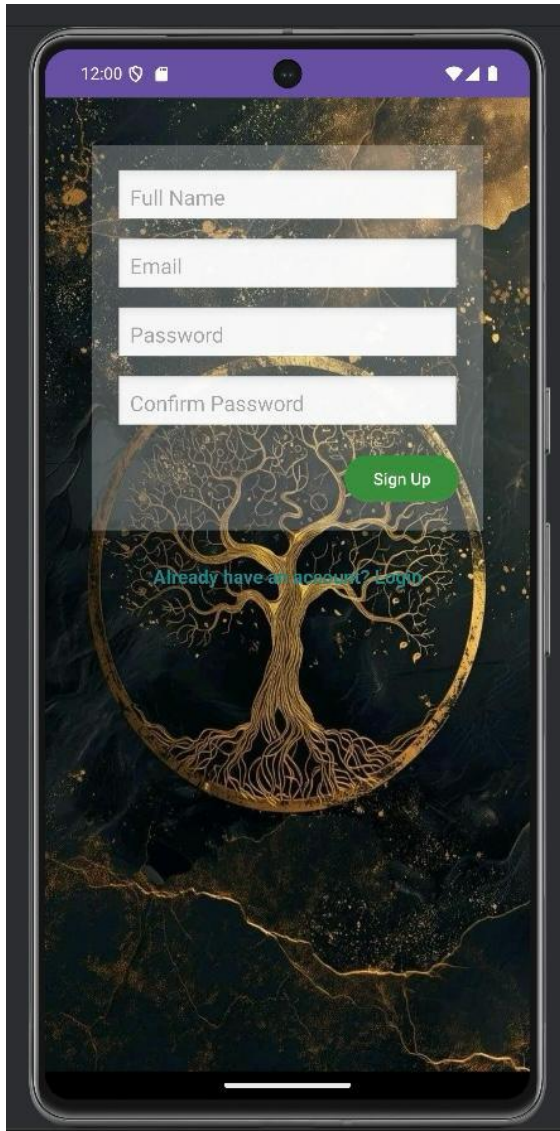
## 9.splash (SplashActivity):

On Activity Create: - Set layout to activity\_splash.xml - Wait for 3 seconds using Handler - After delay, start LoginActivity and finish splash screen

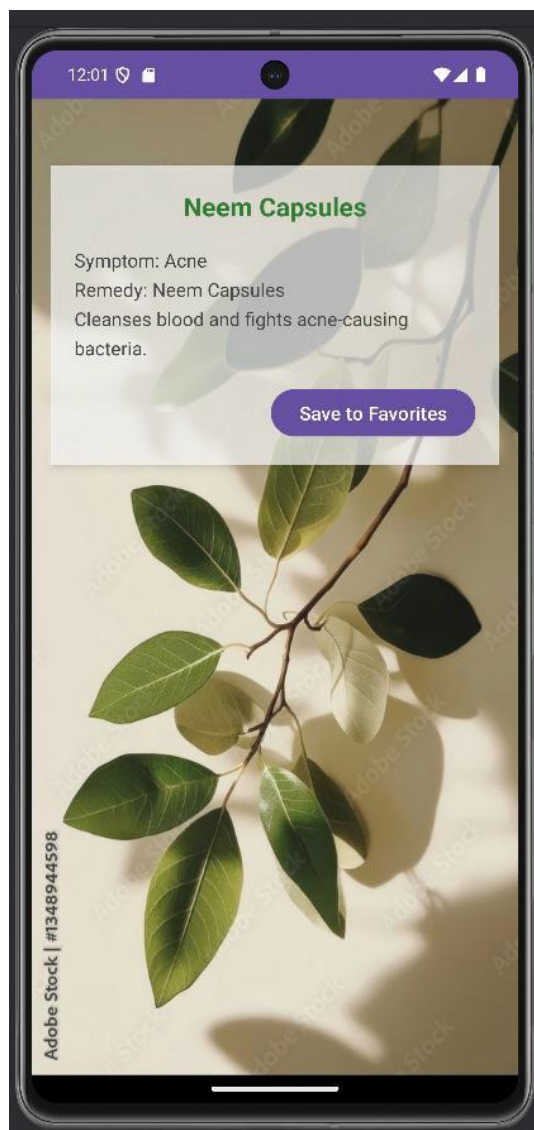
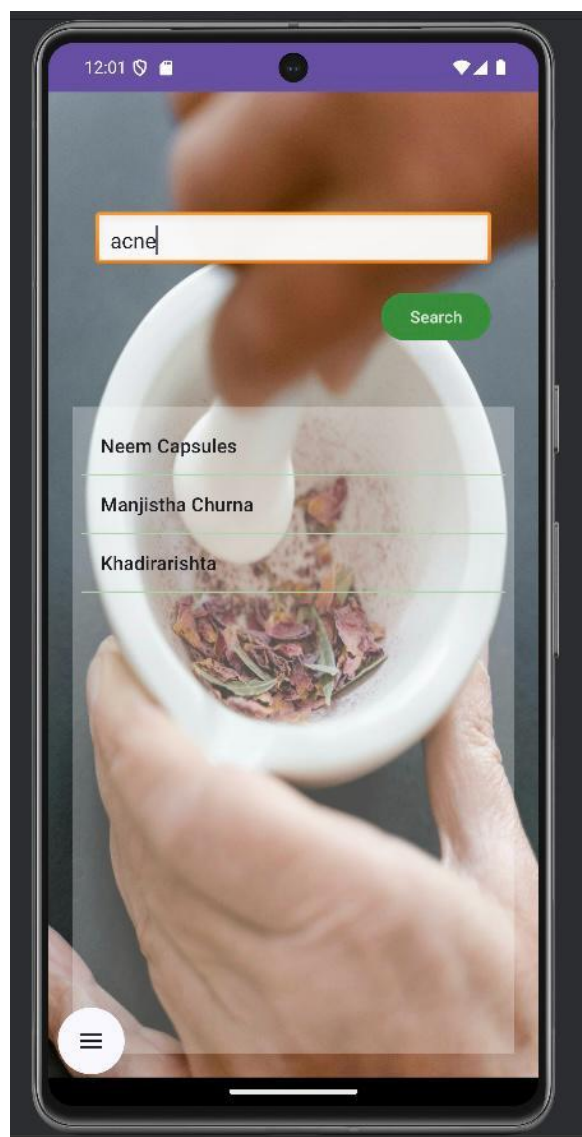
## APPENDIX-B

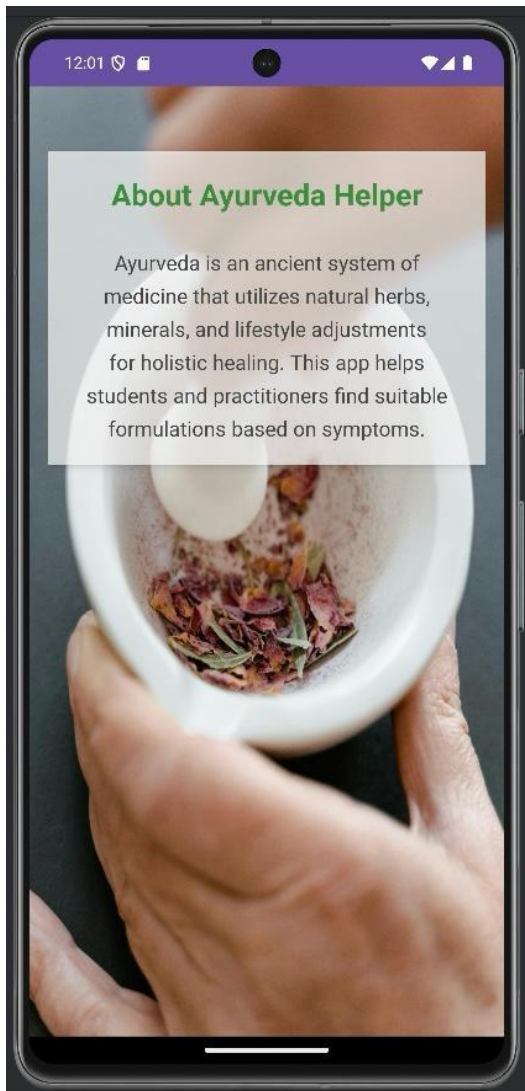
### SCREENSHOTS













## APPENDIX-C ENCLOSURES

### Acceptance letters



The banner for the 14th International Conference on Innovations in Education and E-Learning (ICRCET-2025) features logos for IFERP Academy, ICR CET, Scopus, and CPD. It specifies the dates as 27th-28th March 2025 in Bangalore, India, and mentions it is a hybrid conference. The organizing institution is Yenepoya University, Yenepoya City.

Ref No : 75847  
Date : 25/03/2025  
Conference Secretariat – Chennai, India

**Letter of Acceptance**

**Abstract ID :** [ICRCET-2025\\_BAN\\_0836](#)

**Paper Title :** [Bridging Ayurveda and AI: Data Standardization for Improved Machine Learning Application](#)

**Author Name :** [Dr.Sudha.P.](#)

**Co-Author Name :** [Sanjana.B.K.](#), [Akash.K.A.](#), [Thejaswini.G.K.](#), [Chanchal.K](#)

**Institution :** [Presidency University](#)

Dear Dr.Sudha.P,  
Congratulations!

The scientific reviewing committee is pleased to inform your article “Bridging Ayurveda and AI: Data Standardization for Improved Machine Learning Application” is accepted for Oral/Poster Presentation at **14th International Conference on Recent Challenges In Engineering And Technology (ICRCET-2025)** on 26th & 27th April 2025 at Bangalore, India which is organized by IFERP Academy. The Paper has been accepted after our double-blind peer review process and plagiarism check.

Your presentation is scheduled for the {Session}. This session promises a dynamic exploration of “**Sustainable Technologies: Shaping the Future of Engineering**”, bringing together diverse perspectives and cutting-edge research

**14th International Conference on Recent Challenges In Engineering And Technology (ICRCET-2025)** on will be submitted to the Web of Science Book Citation Index (BkCI) and to SCOPUS for evaluation and indexing



ICMACOSCMA-25

International Conference on Mathematical ,Computational Sciences and Management (ICMACOSCMA-25)

27th April 2025  
Mangalore - India

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**Acceptance Letter**

Date of Issue: 25th March 2025

Paper ID: NIER\_19427

Article Title: **Bridging Ayurveda and AI: Data Standardization for Improved Machine Learning Application**

Authors: Dr Sudha P, Sanjana B K, Akash K A, Thejaswini G K, Chanchal K

We are pleased to inform you that your paper has been accepted by the review committee for Oral Presentation at the International Conference on Mathematical ,Computational Sciences and Management (ICMACOSCMA-25)

This conference will be held in **Mangalore - India** on **27th April 2025**

Please register as soon as possible in order to secure your participation:  
<https://nier.in/conf/registration.php?id=3334657>

You are requested to release the payment and mail us the screen of successful payment release with your name and title of paper to confirm your registration.

Sincerely,



**Dr. Tara Srivastava**  
Director  
National Institute For Engineering And Research (NIER)

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## **Aligning the Project with the Sustainable Development Goals (SDGs)**

The conventional medicine is placed on prescription by a new framework of Ayurvedic medicine advice and prescription along some of the Sustainable Development Goals (SDGs). Specifically, SDG 3: Good Health and Well-being is addressed since traditional wisdom finds its way to physicians and patients in a safer and pure traditional drug manner. Sophisticated search computer programs and traditional texts place traditional medicine on the prescription scene and make holistic medicine the order of the day as well as chemical-based drug use inconsequential.

Apart from that, the project aligns with SDG 12: Responsible Consumption and Production since it supports the consumption of herbal, natural medicine instead of chemical medicines. Ayurveda is eco-friendly since it conserves herbs and minerals in such a way as not to support eco-destruction. Through its support of ecological practice of medicine and consumer education on proper utilization of natural resources, the project supports sustainable health and conservation of biodiversity.

The project also makes SDG 4: Quality Education possible in the way that it is an effective tool for practitioners, researchers, and students. By translating Ayurvedic knowledge into computerized format and making it available, the software supports more learning and evidence-based practice.