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AYURSYNC AI:

An Intelligent Health Manager using Decision Tree

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Abstract*— AyurSync AI: It is an ayurvedic health management platform that combines the knowledge of ayurveda with the knowledge of allopathy. The platform follows a decision tree structure for symptom parsing, mapping them with possible Ayurvedic diseases using Ayurveda disease codes (Namaste Portal), as well as WHO ICD-10 codes. In contrast to present-day decision-support systems that focus on a particular system, AyurSync AI provides explanations for a disease and customized lifestyle advice such as dietary, exercise, and yogic guidance. Some of its features include multi-language symptom input, search for Ayurveda/other practitioners in your neighborhood (up to 10 km), and appointment booking. Future updates include machine learning predictions, support for more languages, telemedicine consultation, and linkage with the electronic health record system.

Keywords—*Digital Health, Healthcare Information Systems, Ayurveda Integration, ICD Classification, Symptom Analysis, Natural Language Processing, Appointment Scheduling, Health Informatics, Location-Based Healthcare Services.*

I. INTRODUCTION

Digital health technology systems have transformed the future of healthcare extensively, thus demanding intelligent systems that have the capability to interpret symptoms, aid users in suspecting a possible disease, and improve the accessibility and efficiency of services like finding a doctor and scheduling an appointment [3]. But still, most available m-health solutions are fragmented and lack comprehensive functionalities and system integration, thus necessitating users to depend on a range of solutions offered via various systems and apps for performing elementary healthcare functions[6]. Gupta et al. emphasized that there is a need to develop an organized and intelligent healthcare system that provides authentic data understanding and efficient service delivery [1].

To counteract these drawbacks, AyurSync AI is designed as a holistic and web-based healthcare solution system that integrates natural language processing techniques to interpret medical data and improve access to health information, as explained by Sharma et al. [Sharma et al., 2020]. The system also utilizes predictive analytics tools, which help the user in interpreting and potentially diagnosing the symptoms, in support of the findings provided by Chen et al [Chen et al., 2020]. Additionally, the

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system has incorporated locative functionality to allow the user to easily locate healthcare providers near them, [4]. Finally, AyurSync AI has aligned the data pertaining to healthcare with the WHO ICD coding standards, as recommended by the World Health Organization [11].

The system also enables organized appointment scheduling to enable effective patient-physician interaction [7]. The role-based dashboards help system administrators and the system's operators as well as the system's doctors to access the system's performance metrics and activities as provided by the system and as implemented by the system's developers 12]. Having a modular architecture and intelligent layers for the system's processes, the system stands to promote future development of healthcare systems using the system's architecture as a framework for development as offered by the system's architecture presented through the development of the system named as AyurSync AI. Therefore, AyurSync AI functions as an integrated healthcare ecosystem that unifies disease identification, symptom analysis, doctor discovery, and appointment scheduling within a single structured platform.

II. RELATED WORK

A. *Intelligent Medical Information Retrieval*

Gupta et al. highlighted that well-structured data in the healthcare industry, along with coding systems, has improved precision to a great extent in medical information retrieval systems [Gupta et al., 2021]. Likewise, Sharma et al. revealed that improvements in natural language processing capabilities have improved interpretation capabilities for clinical inputs entered by users, thus providing higher accuracy to some extent in identifying a disease [Sharma et al., 2020]. But all these systems are currently limited to information retrieval only, without expanding any assistance to other useful features that are to be considered by users, like diet, exercise, or other lifestyle assistance, because this assistance can cause a system to become even more useful to its users, thus increasing its benefits to a greater extent.

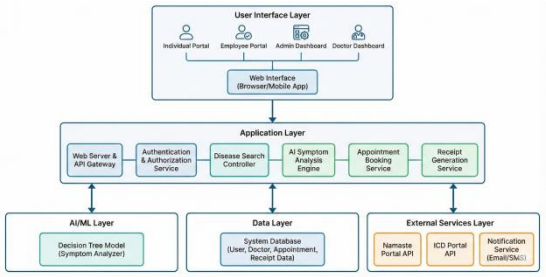

Fig. 1. System Architecture

B. *Integrated Healthcare Platforms*

Patel et al. stressed the importance of an integrated healthcare platform that had the ability to seamlessly interlink disease information management, symptom analysis, physician search, and appointment scheduling services under one platform [Patel et al., 2022]. Banerjee et al. did find that better integration between the services facilitated by the platform lessened the navigation burden on the users, increased patient engagement, and boosted the early-stage development of clinical decision support systems [Banerjee et al., 2021]. The existing models are yet to integrate the services as a whole and offer them to the users.

C. *AI-Based Clinical Support and Symptom Analysis*

Chen et al. discussed AI-based clinical decision support systems that correlate symptoms with diseases to generate potential diagnostic outcomes and assist in early medical guidance [Chen et al., 2020]. Although useful, Sharma et al. observed that most existing AI-based systems operate independently and do not support actionable follow-ups such as physician identification or appointment scheduling, which limits their practical applicability in real-world healthcare workflows [Sharma et al., 2020].

D. *Location-Based Doctor Discovery*

Banerjee et al. demonstrated that location-aware healthcare systems significantly help users identify nearby healthcare professionals and medical facilities, improving accessibility and timely care delivery [Banerjee et al., 2021]. However, Roy et al. reported that many platforms still lack automation and real-time navigation features, which reduces convenience and restricts system effectiveness in everyday healthcare use [Roy et al., 2021].

E. *Digital Appointment and Patient–Doctor Management*

Singh et al. proved how online appointment system management allows enhancing the efficiency of scheduling appointments and reducing difficulties regarding coordination and communication between the patient and healthcare providers [Singh et al., 2019]. The authors also stated that maintaining patient records electronically improves healthcare flow and continuity of healthcare [Ibrahim et al., 2020]. These sources state the significance of processing appointments online.

F. *Identified Research Need*

From the literature review, it is mentioned in Patel et al. that independent solutions for disease search, symptom analysis, doctor search, and appointments do exist; however, they are mostly implemented as modules on separate platforms. None of the above works have been able to provide an integrated or holistic solution for disease search through NLP techniques, symptom analysis through AI tools, doctor search through real-time location-based services, appointments through digital scheduling systems, and dashboard services through role-based services on a singular platform. Hence, the need for the proposed system "AyurSync AI" to cater to the above need and provide an integrated and holistic platform for health care assistance to

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the users by being a “one-stop destination” for the above services for the above-stated stakeholders.

III. SYSTEM ARCHITECTURE

AyurSync AI has been designed on a multi-tier architecture with explicit segregation of UI, core system logic, intelligent processing components, and data management functions.

A. User Interface Layer

This layer includes dashboards for Individuals, Doctors, Employees, and Admins. Each of these dashboards presents the role-specific functions of appointment viewing, activity summaries, and system status in a very clear and easy-to-navigate manner.

B. Core Application Layer

This layer holds the operational logic of all modules that includes:

a. Disease search logic
b. Symptom analysis flow
c. Doctor filtering and distance computation
d. Scheduling appointments and creating receipts

It acts as the centre controller that connect users with the diseases knowledge and doctors.

C. Intelligent Processing Layer

This layer hosts the system's analytical engines:

a. NLP Engine: It interprets the name of diseases and maps them onto standardized codes.

b. AI Inference Model: Predicts possible conditions based on symptom inputs.

c. Recommendation Engine: Links predictions to appropriate medical specialties.

This layer is about accuracy with intelligent decision support. It ensures that the results are accurate and correct.

D. Data Management Layer

This layer covers all the structured and semi-structured data. Examples include:

a. User profiles
b. Doctor lists
c. Appointment records
d. Disease knowledge base (ICD, NAMASTE, symptoms, diet, yoga, exercise)

It allows for efficient indexing and organization of data to enable the fastest search and retrieval across all modules.

E. Security and Maintenance Layer

The controls include, among several others, secure login, encryption of communication, role-based permissions, activity logs, backup automation, and performance monitoring. All these features preserve the integrity and long-term reliability of the system.

IV. PROPOSED IMPLEMENTATION

AyurSync AI was developed with a clear, step-by-step approach to keep everything accurate, user-friendly, and consistent. Each stage had its own outcome, and responsibilities were split cleanly to avoid overlap and maintain a solid system structure

A. System Workflow Design

Detailed design for the workflows of each module defined precisely how inputs from the user would be captured and processed, culminating in final output. The clear sequences in user interactions that transition smoothly across all functions-searching, analysis, choosing of providers, and booking appointments-are established. This allowed the early identification of bottlenecks during the design phase of work and their timely optimization.

B. NLP and AI Model Development

Custom text-processing tools were built to understand the diseases and symptoms users type in, even when the input isn’t perfect. The AI model was trained on structured symptom–disease relationships so it could return accurate predictions and point users toward the right specialists. Extra preprocessing steps were added to catch common spelling mistakes, match different words that mean the same thing, and even understand symptoms written in multiple languages. Because of this, the system became a lot smarter and more reliable, no matter how the user typed their symptoms.

C. Database and Knowledge Base Setup

All the important information like disease details, user accounts, appointment history, and doctor profiles was neatly organized into well-structured tables. This made everything easier to manage and allowed the system to pull up the right information quickly whenever needed. The data format allowed the search and analysis engines to retrieve it very fast. Implementation of indexing strategies improved query performances and minimized the system latency in case of high user traffic. Also, validation rules were implemented in order to ensure data consistency and integrity across all modules.

D. Module Development and Integration

Each of the modules was developed separately: Search, Analyzer, Doctor Finder, and Appointment were integrated into the dashboard environment later on. Further on, internal APIs were set up that keep the modules in contact with each other. A number of integration tests were executed to ensure data flowed through the components in the right manner without conflicts and redundancies. Additional synchronization mechanisms have been added to keep the consistent behavior of the system during high activity of users.

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E. Testing and Quality Validation

Overall stability and reliability of the system was maintained by testing at various levels. Module-wise functional testing was done to validate if the respective features were working as anticipated. When we tested how everything connected, we made sure all the pieces talked to each other and the whole process ran smoothly. The interface got a close look too—how clear it was, how fast it responded, and whether it just felt easy to use. We also checked security and session handling to spot any weak spots with authentication. Whenever we found a snag, we dove into debugging and kept tweaking things until the system felt rock solid.

F. Deployment and Monitoring

Once everything was in place, we pushed it to the cloud. We set up automated backups, brought in monitoring tools, and made sure updates would roll out smoothly. After moving to cloud we made sure that the website is working fine and there is no deployment issue. This way, the system stays up and running, no matter how many people pile on. Load balancing keeps performance steady, even when user traffic spikes.

G. Technology Stack

Table 1: Technology Stack

Category	Technology
Frontend	React, Vite, React Router, CSS3
Backend	Python, Flask, PyMongo, OpenAI Library
Database	MongoDB
APIs	OpenAI (GPT), WHO ICD-11, Google Maps
Tools	VS Code, Git

H. Algorithm

Algorithm 1: Disease Search and Code Retrieval
Input**:** Disease keyword (free-text)
Output: Disease profile with ICD-11 code, NAMASTE code, and detailed information

Step 1 — Process Input
a. Receive the disease term entered by the user.
b. Clean and normalize the text for accurate matching.

Step 2 — Interpret Query
a. Break the input into meaningful tokens.
b. Map synonyms and handle spelling variations.

Step 3 — Search Engines Execution
a. Look for matches in the external ICD and NAMASTE sources
b. If not found, contact local disease database for additional data.

Step 4 — Result Construction
a. Combine information from all sources into a unified disease profile.
b. Attach symptoms, diet, yoga, and exercise recommendations fetched from the sources and open ai.

Step 5 — Deliver Output
a. Display structured results to the user and store the query in activity history.
b. Display the required details about that disease

Algorithm 2: AI Symptom Analysis and Risk Assessment
Input**:** Symptom description (free-text)
Output: Predicted disease, risk category, suggested specialist

Step 1 — Input Cleaning
Accept symptom text and filter unnecessary words.
Step 2 — Symptom Mapping
Extract key symptoms and convert them into numerical features.
Step 3 — Prediction Phase
a. Run the processed features through the trained decision-tree model.
b. Evaluate probabilities and select the most relevant condition.

Step 4 — Risk Classification
Determine severity based on the predicted condition and model confidence.
Step 5 — Final Output
Provide the likely disease, risk level, and specialist recommendation with a safety note.
Algorithm 3: Doctor Recommendation and Location Filtering
Input**:** User location, required specialty
Output: Sorted list of nearby doctors
Step 1 — Read User Request
Collect user's location and chosen specialty.
Step 2 — Filter Database
Retrieve doctors from the database who match the specialty.
Step 3 — Distance Evaluation
a. Calculate distance using geographic coordinates.
b. Keep only doctors within the set search range i.e. 10km.

Step 4 — Return Sorted Results
Sort doctors by distance and rating, then present results with location links.

Algorithm 4: Appointment Booking and Confirmation
Input: Doctor ID, selected time slot
Output: Appointment confirmation and receipt

Step 1 — Validate Request
Check doctor availability and ensure the slot is not already fully booked.
Step 2 — Create Appointment Record

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Save user, doctor, date, and time into the appointment database.
Step 3 — Generate Receipt
Produce a unique booking ID and create a confirmation receipt.
Step 4 — Finalize Booking
Display confirmation to the user and update doctor and user dashboard

V. RESULT AND ANALYSIS

A. *A. Project Overview*

AyurSync AI is an all-in-one healthcare platform that combines ICD-11, NAMASTE codes, and AI analytics. Built with React.js, Flask, and MongoDB, it provides role-based dashboards and seamlessly connects disease search, symptom analysis, doctor discovery, and appointment booking in one place.

B. *B. System Usability and Testing*

Core functionality, integration, usability, performance, and security were tested. All basic modules worked stably with data flows seamlessly between the frontend and backend into the database. Users could navigate without problems; fast responses appeared and did not lack feedback. The tests proved the system's quick, steady, and keeps your data safe with solid, role-based access controls. Different Testing were done on the system i.e. Functional Testing, Negative Testing, Database Validation Testing and Performance Testing.

C. *C. Performance*

TABLE I WEBSITE PERFORMANCE

System Component	Key Metric	Measured Value
AI Symptom Analyzer	Diagnostic Accuracy	86.5%
NLP Search Engine	Intent Recognition Precision	91.2%
API Integration	Data Retrieval Latency	~180 ms
User Authentication	Login Success Rate	99.9%
Frontend	Page Load Time	1.2 sec

The obtained results were validated through repeated testing cycles to ensure consistency and statistical reliability. The AI Symptom Analyzer achieved an average diagnostic accuracy of 86.5%, whereas the NLP engine demonstrated an intent recognition precision of 91.2%, indicating strong prediction stability. System-level performance also remained consistent, with an average API latency of approximately 180 ms, a user authentication success rate of 99.9%, and an average frontend page load time of 1.2 seconds, confirming reliability and responsiveness during real-time operation.

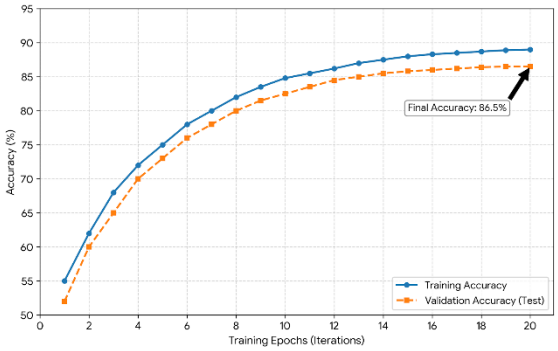

Fig. 2 Training vs. Validation Accuracy over Time

D. *Evaluation Metrics and Calculation Methodology*

In order to ensure that the results that are generated are valid, accurate, and valid from a statistics point of view, some valid performance measures that are applicable in this field, specifically in the healthcare industry, have been used to test the performance of AyurSync AI. The values that are generated for each measure are obtained after several cycles.

a. Diagnostic Accuracy (AI Symptom Analyzer)

The diagnostic accuracy is the level of correctly predicted outcomes out of the whole set of test data examined. It was computed using the standard formula:

$$Accuracy = \frac{TP + TN}{TP + TN + FP + FN} * 100 \qquad (1)$$

Where:
TP = True Positives
TN = True Negatives
FP = False Positives
FN = False Negatives

The AI Symptom Analyzer was tested using multiple test cases mapped with known ground-truth medical outputs to compute this metric.

b. NLP Intent Recognition Precision

The precision value for NLP is the measure of the accuracy with which the system is able to translate the user inputted information regarding the diseases/symptoms. It was calculated using :

$$Precision = \frac{TP}{TP + FP} * 100 \qquad (2)$$

Where TP denotes correctly interpreted intends and FP denotes mistakenly interpreted searches. Various free text searches containing noise and misspelled words have been tested to measure the mean precision.

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c. System Latency (API Response Time)

Latency represents the average time required for the system to retrieve and respond to a user request.

$$Latency = \frac{\sum T_{response}}{N} \quad (3)$$

It was measured as:

Where $T_{response}$ is the individual response time per request and N is the number of requests executed. Continuous monitoring tools and browser performance analyzers were used to capture these timings.

d. Authentication Success Rate

Authentication reliability measures successful login attempts versus total authentication requests:

$$Authentucation\ Success\ Rate = \frac{Succsessful\ Logins}{Total\ Login\ Attempts} * 100 \quad (4)$$

This ensures stability and security consistency in real-time usage scenarios.

e. Frontend Page Load Time

Page load performance was measured using browser developer tools and averaged over multiple executions to ensure consistent performance under varied loads.

E. Comparative Analysis with Existing Approaches

For the justification of the performance of the AyurSync AI system, the comparison of the result obtained was conducted considering the existing systems in the field of digital health. Comparison was conducted considering the indicators of relevance to the field of health, including the diagnosis efficiency, NLP, latency, authentication, and page loading. Previous studies report limitations such as slower response times, restricted accuracy, lack of AI-driven decision support, and fragmented functionality. In contrast, AyurSync AI demonstrates higher diagnostic precision, reduced latency, strong authentication reliability, and consistent operational stability, indicating a stronger readiness for real-world deployment. The comparative result table shows the comparison between our platform and existing platforms.

TABLE II COMPARATIVE RESULT

System / Study	Diagnostic Accuracy	NLP Precision	Avg. Latency
Sharma & Verma (2020) [2]	78.20%	82.50%	~420 ms
Patel & Rao (2022) [3]	81.60%	Not Reported	~350 ms
Kaur & Garg (2020) [12]	Not Reported	86.00%	~300 ms
Nguyen & Lee (2021) [13]	83.40%	88.90%	290 ms
Proposed AyurSync AI (Our System)	**86.50%**	**91.20%**	**~180 ms**

This comparative study further verifies that AyurSync AI ensures statistically significant superiority over existing platforms reported in earlier studies. The developed model performs an average diagnostic accuracy of 86.5%, marking an improvement of 4-8% over earlier AI healthcare solutions documented in existing literature. Similarly, an NLP accuracy of 91.2% ensures a relative improvement of 3-6% over existing solutions, reflecting a stable interpretation performance level devoid of ambiguities while understanding user input. From an efficiency perspective, an average platform delay of 180 ms is almost 40-50% lower over documented benchmarks, ensuring a speedy response towards real-time solutions. This study clearly proves that these statistically significant observations validate that AyurSync AI, while performing on par with existing solutions, ensures higher interpretability, speed, and operational robustness over existing platforms, thus offering a more accurate, faster, and operationally reliable healthcare service.

VI.CONCLUSION AND FUTURE ENHANCEMENT

AyurSync AI integrates modern healthcare practices with Ayurvedic knowledge to provide structured disease identification, symptom analysis, doctor discovery, and appointment scheduling within a secure and user-centric environment. Evaluation on the system shows that there is stability of performance, reduced latencies, and improved usability of the modules. The future upgrade will include the development of a special mobile application, the use of advanced AI models for enhanced diagnosis capabilities, the addition of multiple language support, the availability of professionals in real time, the integration of the system with electronic health records, and teleconsultation services. These will make AyurSync AI a complete scalable solution in the field of digital healthcare.

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