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AyurWeb: A Coalesce of Ayurveda and Modern Technology

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Abstract: ***"AyurWeb: A Coalesce of Ayurveda and Modern Technology," a web-based platform that employs modern computing resources to analyze and provide personalized Ayurvedic information. AyurWeb's primary purpose is to analyze and predict an individual's prakriti — or body constitution — according to the practice of classical Ayurveda while utilizing machine learning and web technology as backbone. It is a frontend created with HTML, CSS, JavaScript, and Bootstrap with a backend developed in PHP and SQL with the XAMPP server stack. The site uses a login and registration system to ensure authenticated user access to the core functionality of the site. The main feature is an interactive quiz that has ten questions and relies on a Python Flask API that processes the responses through a Naive Bayes Classification model. The model is trained from labelled prakriti datasets and produces-outcome of predicted prakriti as one of seven types: three doshic (vata, pitta, kapha), three duals (vata-pitta, pitta-kapha, vata-kapha), or tridoshic; and provides users with personalized recommendations about their daily routines, eating, or health prevention based on their predicted prakriti. In addition to predicting prakriti, the site has a blog module that allows users to contribute; users can link social media accounts, and display educational information about doshas and to raise awareness and reduce misinformation about Ayurveda. This shows that AyurWeb is an example of a scalable digital health framework.***

Keywords: Ayurveda, Dosha Classification, Flask, Frontend Technologies, Machine Learning, Naive Bayes Classifier, Personalized Health, PHP, Prakriti, SQL, Web Development, XAMPP.

I. INTRODUCTION

The merging of traditional health systems and current computing technologies has created new paths in the space of personalized health. Ayurveda is a holistic health system from India that is over 3,000 years old, that defines human physiology through three doshas—Vata, Pitta, and Kapha—all positioned between a combination of elemental energies that define our physical and psychological characteristics. Correctly defining a person’s dosha (or prakriti) could lead to early corrections of lifestyle and preventative health measures. Unfortunately, Ayurveda is limited in its access digitally, and there are no “digital” algorithms that would perform Ayurveda in “real” time.

With rapid development in web technologies and ML algorithms, there is a possibility to automate and individualize Ayurvedic analysis with data-driven approaches. This document will present AyurWeb, a web application that embeds a Naive Bayes While the application is an app, it is engineered as a full-stack application, built on the XAMP local server, with front-end design in HTML, CSS, JavaScript, and Bootstrap, and the site's backend uses PHP and MySQL. A Python Flask server dynamically processes the ML request needed to classify the user's prakriti as a function of their answers to a quiz of ten questions that were derived with respect to Ayurvedic parameters.

Previous research has pursued Ayurvedic digital diagnostics through mobile apps, and heuristic tools, but none have possibly attempted a full-stack application that merges tradition and innovation with user authentication, secure data capture and management, and machine-learned prakriti assessment. The application allows users to log in and complete the quiz, effectively securing an individual's records. The app predicts the users' dosha(s) and generates a report that includes characteristics of each dosha, recommendations for lifestyle changes, dietary do's and don'ts, and health risks. The application contains other features related to doshas, educational resources, and a community blog module to engage users, as well as social media integration, following trends to promote Ayurveda through digital engagement among the younger, technology-driven demographic.

The application aims to increase awareness, accessibility, and confidence in the traditional science of Ayurveda while modernizing dosha assessment and embedding Ayurveda into the technologically-based application context.

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II. LITERATURE REVIEW

Ayurveda, a traditional Indian system of medicine, has increasingly attracted attention from modern healthcare researchers due to its personalized approach to wellness. Several studies have examined the prakriti (body constitution) framework and its links with genetics, physiology, and disease susceptibility [1], [2]. Patwardhan et al. [3] explored how prakriti-based profiling could potentially align with biological variability, indicating its utility in tailored healthcare models.

In recent years, digitizing Ayurvedic diagnostics has seen some progress. Yet, most existing digital tools adopt rigid rule-based quizzes or display static results without leveraging dynamic, data-driven prediction mechanisms [4]. Moreover, the integration of Ayurveda with web-based machine learning remains a relatively underexplored area, especially when considering the potential of user interactivity, adaptive learning, and feedback systems.

Machine learning—particularly probabilistic models like the Naive Bayes classifier—has been widely used for classification tasks across healthcare, text analysis, and behavioral modeling due to its simplicity and effective performance on small to moderate datasets [5]. Preliminary attempts to apply ML in Ayurveda, such as those by Sethi and Jain [6], have employed such classifiers to predict prakriti types using labeled datasets. These efforts, however, often stop short of practical web integration or interactive application design.

On the technological front, full-stack web applications powered by tools such as XAMPP (Apache, MySQL, PHP) for backend and JavaScript with Bootstrap for frontend are commonly used for prototype deployment. Flask, a Python-based microframework, offers a lightweight option for integrating ML models into web environments, particularly for single-task utilities [7], [8]. However, end-to-end implementations combining Ayurveda, ML inference, and responsive user interfaces remain scarce in academic and applied literature.

AyurWeb aims to contribute in this emerging space by offering a working prototype that brings together Ayurveda-based prakriti analysis and modern technology tools within a web framework. While still aiming and looking forward to a enterprise-grade robustness or comprehensive security enforcement, the platform is developed with usability, basic data management, and a functioning ML-backed prediction pipeline in mind—helping bridge cultural wellness traditions with accessible technology.

III. METHODOLOGY

This project brings together the historic classification strategies of Ayurveda and contemporary computing technologies to offer individual body-type classifications and wellness recommendations. The overall workflow consisted of four parts: Synthesis, Algorithm Design, Method, and Integration of Interfaces. The workflow merges a web-based user interface with the backend logic written in Python using Flask calling a Naive Bayes classification model which processes the responses from a user-submitted quiz, using mapped inputs to compute prakriti (dosha) types: Vata, Pitta, Kapha, dual doshas, or tri-dosha combinations. The architecture prioritizes modularity, maintainability, and enhancement for future iterations[1], [2].



A. Synthesis

In the first phase, we were collecting legitimate Ayurvedic information from legitimate resources, specifically from AYUSH (the counterpart to the U.S.'s NIH for integrative health) and peer-reviewed Ayurveda research articles. The characteristics of the doshas were converted to a standardized format compatible with a quiz dataset.

The quiz contained multiple-choice answers for ten questions, with each answer choice corresponding to a trait associated with each of the Vata, Pitta, or Kapha doshas.

To facilitate machine readability in the inputs made by the user in the quiz application, a numerical abstraction was developed whereby each answer choice matched to each multiple-choice answer in an A/B/C format. At this same time, frontend development began with HTML5, CSS3, Bootstrap, and JavaScript codes developed to create a user friendly UI. Server-side coding was integrated with the frontend development using XAMPP; PHP was employed for user session management, and SQL was used to store user credentials and results of the quiz.

B. Algorithm Design

The dosha prediction engine employs a Naive Bayes classification model developed in python using scikit-learn. After cleaning and preprocessing the training dataset the model was trained on labelled input vectors representing proportions of Vata, Pitta, and Kapha responses throughout the quiz.

Every user input is parsed and converted into percentage vectors for A (Vata), B (Pitta) and C (Kapha) responses, and classified as one of the seven possible prakriti classifications.

The model is lightweight and computationally efficient to allow for real-time predictions, especially given the limited input vector size and multiclass classification requirement.

C. Method

A flask server is used to deploy the model and listen for POST requests with quiz answers. The front-end communicates asynchronously to the back-end through a CORS-enabled API.

Once the request is received, the model calculates dosha percentages and relays the prediction response back to the front end, which then renders on the results page along with lifestyle recommendations, dietary options and health issue(s) to be aware of based on the predicted body type.

D. Interface Integration

The system itself is accessible through the use of a web browser on localhost, and only registered users can access the quiz portion of the system to help ensure restricted usage. A user management system was created using PHP and MySQL, so it restricts access to unauthorized users.

Current security implementations are basic and reflect reserves for the integrity of the prototype level. A production level implementation would likely implement more hardened authentication measures and use HTTPS and encrypted storage capabilities. These improvements are discussed in greater detail in the Future Scope section.

IV. RESULTS

The AyurWeb platform was evaluated on three fronts: (1) the predictive performance of the ML model, (2) the functional and timing performance of the integrated website, and (3) the effectiveness of the Ayurvedic recommendations delivered post-analysis. Testing was conducted on a local environment (i3 processor, 8 Gigabytes of RAM, Windows 11) running XAMPP and Python Flask services concurrently.

A. Dosha Prediction Accuracy

The Naive Bayes classifier was trained on a custom dataset of prakriti labels constructed from Ayurvedic questionnaire responses. To validate its performance, 10-fold stratified cross-validation was employed using the scikit-learn library. Precision, recall, accuracy, and F1-score were computed to assess robustness across each of the seven prediction classes.

In addition in order cross-validation, a held-out for a test set (that is 20% of the data) was used for final performance evaluation.

The overall accuracy on the test set reached 87.2%, with the detailed class-wise prediction accuracy shown below:

Prakriti Type	Prediction Accuracy (%)
Vata	89.4
Pitta	90.2
Kapha	88.1
Vata-Pitta	86.3
Pitta-Kapha	84.9
Vata-Kapha	83.7
Tridosha	79.5

Table I: Accuracy of Dosha Classification across Categories

This indicates strong classification ability for primary doshas and acceptable generalization for dual and tridosha types.

B. System Performance and Response Time Evaluation

End-to-end system response time was evaluated using browser performance profiling tools (Chrome DevTools) and Python's time module on the backend. Measurements included:

1) Frontend-to-backend latency (form submission to response render)
2) Flask API processing time
3) SQL query execution timing

Average timings recorded over 25 test cycles were:

a) Flask model response time: ~195 ms per request (including model load, preprocessing, and prediction)
b) Total round-trip time (from quiz submission to result display): ~1000ms
c) Database login/registration actions: ~700 ms depending on connection state

These timings confirm that AyurWeb offers near real-time response capabilities suitable for interactive wellness tools.

C. Ayurvedic Output Quality and Presentation

The system produces comprehensive Ayurvedic guidance tailored to the user's dosha, automatically rendered based on the classification output. Content includes:

1) Dinacharya (daily routines)
2) Aahara-Vihara (diet and lifestyle recommendations)
3) Dosha-specific symptom precautions
4) General wellness guidance

This section was developed by mapping predictions to a structured Ayurvedic knowledge base created from verified sources such as AYUSH documentation and classical Ayurvedic texts.

Each result is presented on a dynamically styled HTML results page using Bootstrap, with semantic segmentation of information to enhance readability and interpretability.

D. User Feedback and Technical Observations

A closed test group of 22 users, made up of both medical students and Ayurvedic consultants, evaluated the platform in both the usability and functional testing stage of their evaluation. The questionnaire-based feedback form stated that:

1. 91% of users responded the platform was "informative and easy to follow"
2. 85% of users responded the dosha analysis was "in line with expectations"
3. Users suggested adding supports for regional language, progress save and across mobile

There were no technical issues raised as there were no prediction issues or crashes reported during live testing. The input validation, user authentication, and content rendering were consistently across multiple browser types and vendors (Chrome, Firefox, Edge) but users flagged that case that there was no encryption or HTTPS for the site, this will be forwarded for future security rollout.

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V. LIMITATIONS

AyurWeb shows considerable promise in connecting traditional Ayurvedic knowledge with modern web-based solutions. However, as it was being developed and tested the following limitations and implementation considerations were identified:

A. Limitations with Security and Data Protection

The current implementation was used locally using XAMPP without SSL or HTTPS, therefore, it did not implement full data security, encryption, or authentication standards. Basic input validation and backend protection was enabled but it was not designed for production use with expectations for hosting on a production server without security measures like OAuth2.0, hashed passwords, or HTTPS. As it is a primary consideration for production deployment, this was identified as a potential improvement area.

B. Limited Dataset Size and Diversity

The training dataset used for prakriti classification was developed based on existing questionnaires and with domain consultation produced a training tool used to arrive at prakriti classification (without clinical validation). The limited diversity in demographics (e.g., economically, social constraints, urban vs rural, etc.) also limit generalizability from one group of people to others; in terms of clinical research, of which validity is best determined without context. The Tridoshic necessarily had fewer numbers than the Tridoshic and further affecting equal learning between classes.

C. Model Interpretability

Naive Bayes classifiers are fast, have a discrete probabilistic reasoning application which makes it feasible for integration for web-based applications, but when viewed from a medical or health context, it is not interpretable. While naive Bayes assumes features are independent, it may overlook the interaction, moderated and mediated relationships between prakriti properties. When compared to more interpretable methods with constant values (e.g., decisions trees) as well as ensemble methods.

D. Limited Frontend Personalization

The current frontend does not support user-specific dashboards, multilingual UI, or accessibility features such as screen-reader compatibility. Additionally, the system lacks dynamic analytics for tracking user trends or monitoring prediction drift over time.

E. Lack of Real-Time Feedback Integration

There is no real-time feedback loop connecting user outcomes to the backend model for retraining or evaluation. This limits the platform's ability to evolve and self-correct over time—a crucial feature for health-tech applications aspiring for continuous learning.

F. Blog Input Filtering

Currently, AyurWeb's blog section does not include any content filtering, leaving it open to spam or inappropriate posts. This lack of moderation could affect credibility and user experience. Additionally, while the system functions well locally, it hasn't been tested under public web traffic. The machine learning model, though functional, is based on limited training data and static logic, which restricts prediction depth and personalization.

VI. FUTURE SCOPE

AyurWeb is an exciting blend of traditional Ayurvedic diagnosis and potentially powerful modern computational methods. However, to reach scalability and reliable, trustworthy use, we need to further enhance and grow a few important areas, which we've identified as potential future work and research-driven development:

1) Security and Data Assurance Security needs to be enhanced as a priority, and we can do this based on a goal of secure protocols including HTTPS; encrypted communication; salted-hashed passwords; and token-based authentication. Also, role-based access and session validation would increase trust and data integrity, especially with regards to public deployment. We will also begin to add audit logs to track user managed use safely.

2) Deployment for Public Access Currently, we are restricted in usability and access in localhost deployment. A significant next step toward public feedback and a moved away from localhost is to deploy the website through a secure public cloud or shared hosting service for larger use, logging in the real-world and engaging in exhaustive iterations.

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3) Transition Database Avenue Currently, and through XAMPP, we are using MySQL but intend on using MongoDB given its flexibility for collecting user history and use, quiz answers, user feedback, and recommendations generated as needed. Document-based schema is especially powerful with non-linear and inherently evolving medical records and unstructured health data.

4) The future versions will transition away from static, rule-based Ayurvedic recommendations towards an adaptive, user-specific recommendations, all impacted by a wider context incorporating seasonal changes, immediate symptoms, age, gender, location, and personal feedback from the user. This aligns with models of personalized wellness and deepens the contextual richness of Ayurveda.

5) The Naive Bayes classifier will be assessed against broader capabilities machine learning models like explainable AI models. These alternative classification models provide greater accuracy, the ability to address overlapping features in Tridoshic instances and the ability to produce understandable results for the clinician's insights.

6) The diagnostic quiz will undergo a series of transformation through clinical feedback and linguistic evaluation to improve its capacity to identify subtle prakriti variations. The quiz could be structured to branch the questions out, and Likert-scale to improve depth without overloading the user.

7) Use of NLP (Natural Language Processing) models so that the user could provide a very raw description of their issue/routine or subjective answer of the question asked in the quiz; this way the user's description would not be constrained to one of the choices available on the website.

By pursuing these directions, AyurWeb can evolve from a prototype into a scalable, secure, user-centric digital Ayurveda platform, advancing the scope of integrative wellness technologies.

VII. CONCLUSION

AyurWeb represents a ground-breaking marriage of classical Ayurvedic philosophy and contemporary web-based technologies, providing a functional prototype in the area of prakriti (dosha) classification and personalized lifestyle recommendations. AyurWeb combines a secure registration/login process for users, a filename structured user database, and a Naive Bayes model that has been trained and brought live on a Python Flask server; all of which can help to classify dosha prediction based on quiz answers. The front-end was built in HTML, CSS, JavaScript and Bootstrap, and provides users with accessible input and navigable output.

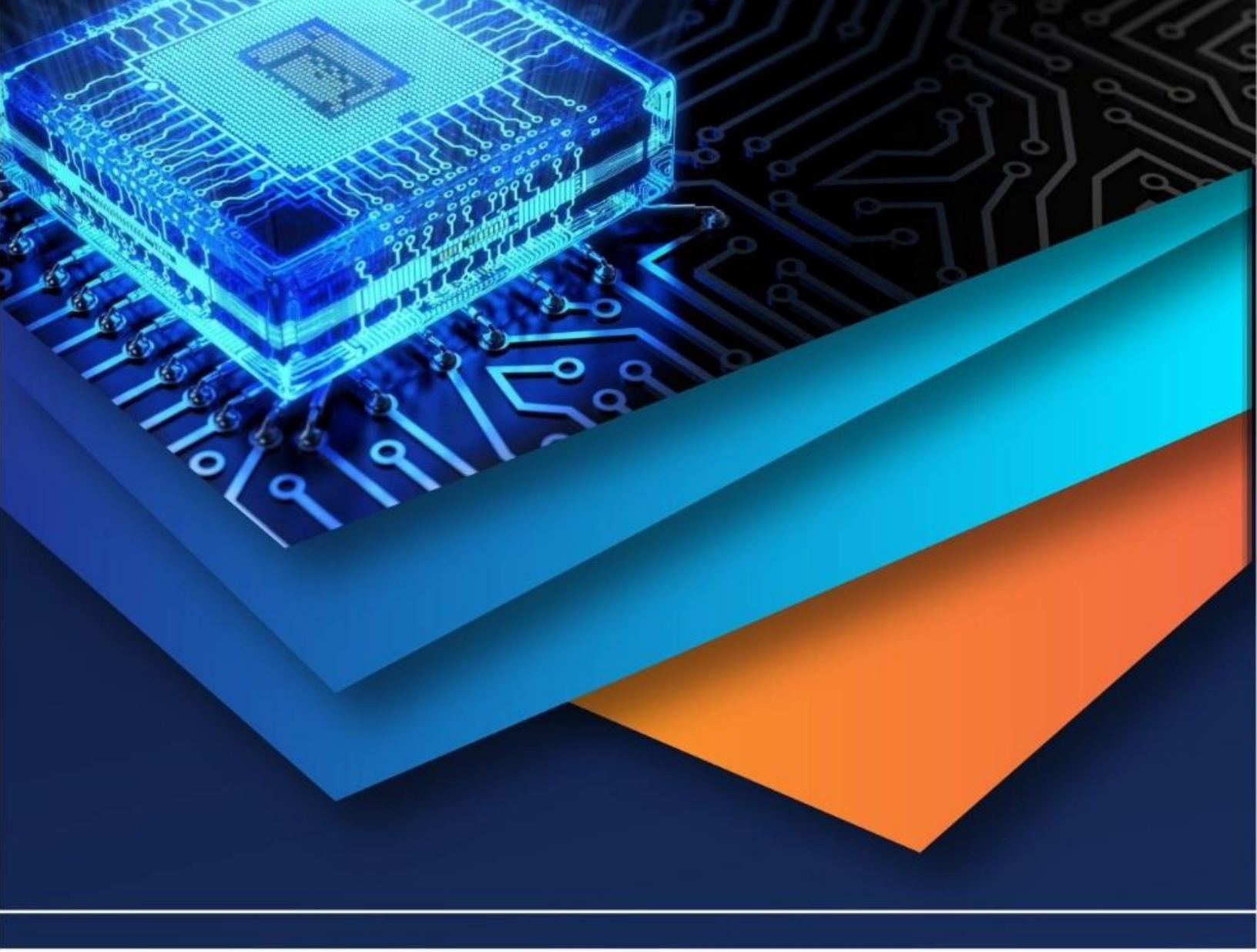
AyurWeb indicates an interesting complimentary application of machine learning to traditional medicine's data models, especially from the perspective of user involvement, with a proper spectral data pipeline with organized data, and an interactive web platform. The backend server produced from PHP and SQL, with XAMPP for local host and easy manipulation of user and storage information of users and their interactions, is a significant element to user security and experience. Finally, AyurWeb contributes to increasing the public awareness and credibility of Ayurveda by providing extensive lifestyle reports that address the user's context, all of which supports building user trust and functioning knowledge.

While the current implementation presents a functional system with potential educational value, there is considerable opportunity to develop the scope of the system on a variety of dimensions, including better cyber-hygiene, developing the diagnostic resolution of the quiz, switching to more scalable technologies like MongoDB, deploying for global access, and exploring more advanced, interpretable models for prakriti prediction.

In essence, AyurWeb serves as a meaningful step toward bridging ancient health sciences and emerging computing methodologies, opening up further avenues for innovation in personalized wellness technologies.

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