

A Prediction of Ayurveda-Based Constituent Balancing in Human Body using Machine Learning Methods

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Abstract - The Human Body constitution is a set of principles that guide our physical and emotional states. These principles are known as tridosha or the three Elements. The three energies that are referred to as VATT, PITT, and KAPH are concentrated in each individual. They can be used to identify various aspects of our bodies. In some people one will prevail, others will be a mixture of two or more. Although the Ayurveda dosha study has been around for a long time, quantitative measures of the reliability of these diagnostic methods are still lacking. Models are trained using existing machine learning methods for classification analysis, such as K-Nearest Neighbor (KNN), Support Vector Machine (SVM), Random Forest, Naïve-Bayes(NB), Decision Tree (DT), and ensemble methods. This system is also implemented using a combination of several machine learning methods for constitution recognition. Compute and analyze estimated classification measures, such as accuracy. As a result of the experiment, it can be seen that the proposed model based on the ensemble learning method is clearly superior to the existing method. The result is that advances in accelerated algorithms may provide a leading future for machine learning.

Keywords-Ayurveda, VATT, PITT, KAPH, Human body Constituent, Machine Learning

I.Introduction

Ayurveda is one of the oldest medicines that originated on the Indian subcontinent 5,000 years ago. The word "Ayurveda" is defined as the "science of life" as a combination of the two words "Ayur: life" and "Veda: knowledge". Ayurveda helps you maintain a healthy lifestyle by balancing your body, mind and spirit. It is a form of life extension as well as a natural method of problem and treatment resolution. Every human being in today's high-tech civilization is trapped by disease at a very early stage of life, so knowing the right way to live healthy is essential. Ayurveda is one such path that teaches natural harmony and aids in the elimination of disharmony. Ayurveda discovers a link between the use of the senses and disease. Incorrect use of the senses causes discord between man and nature, or an imbalance in human nature. The equality of nature and self is the foundation upon which the Ayurvedic principle is built. One of Ayurveda's most potent weapons is balancing people's lifestyles. Ayurvedic practitioners can conform to the system's

norms and regulations, increasing their chances of living a healthy, disease-free life.

According to the relative predominance of the three physiological factors (doshas), a person's mind and body constitution can be divided into seven categories: VATT, PITT, KAPH, VATT-PITT, VATT-KAPH, PITT-KAPH and samadosha (balance). A person can be dominated by more than one dosha, which puts the person into a specific category of the dosha type. The science of Ayurveda classifies people according to their body structure and physiological characteristics. Research (prakriti) helps doctors lead patients to healthy lives. Prakriti is genetic, which means it dissolves at formation time and is based on numerous parental, prenatal and postnatal factors. A personal analysis of prakriti helps you know your body and its needs. Prakriti helps you stay healthy, personal, family and professional. Prior knowledge of the dosha type will help you plan your lifestyle and diet according to your body's needs. This knowledge ensures the possibility of the occurrence of qualitative and quantitative imbalances in the body. In our research, we are filling out questionnaires to gather important data. Data gathered through pilot studies are tested for internal consistency and then developed a trained modal based on a machine learning approach. Other traditional machine learning methods are also used to recognize the composition of the human body and compare results based on accuracy.

II. LITERATURE REVIEW

Paper 1: “Bridging Ayurveda with evidence-based scientific approaches in medicine” Author Name: B.Patwardhan

Description: This paper describes a modern approach that combines Ayurveda with evidence-based medicine. It discusses the implications of the evidence and points to the need to adopt epistemologically sensitive methods and rigorous experimentation using modern science. It also analyzes the state of Ayurveda medicine based on personal observations, peer interactions, and published research, and concludes that traditional knowledge systems such as Ayurveda and modern evidence-based medicine should be integrated. [1]

Paper 2: “Ayurveda: A Brief Introduction and Guide”

Author Name: Vasant Lad

Description: According to this paper, many scholars consider Ayurveda to be the oldest healing science. Ayurveda means "The Science of Life" in Sanskrit. Ayurvedic knowledge, which originated in India over 5,000 years ago, is often referred to as the "Mother of All Healing." It describes a brief overview of Ayurveda as well as a conceptual understanding of vata, pitta, and kapha. The Ayurvedic approach to food and healing is also discussed.[2]

Paper 3: “Ayurveda and medicalisation today: The loss of important knowledge and practice in health?”

Author Name: M. M.Mathpati, S. Albert, J. D. H. Porter

Description: This paper explores how this shift towards medicalization is affecting Ayurveda's knowledge, education and practice, and examines the medicalization taking place in the profession. It examines the impact and contribution of processes such as standardization, specialization, biomedical and pharmaceuticals to Ayurveda's education, knowledge, practices and policies. To maintain health and well-being, Ayurveda's ancient knowledge and practices must be applied at the individual, community and health level, not limited to the health care system.[3]

Paper 4: “Ayurveda and the science of aging”

Author Name: R. V. Rao

Description: Ayurveda regards aging as a natural and inevitable process and provides a longstanding treatment for healthy aging, stating that individuals must incorporate healthy lifestyles and routines to create harmonious experiences and promote health and well-being. Healthy transformation. Body and mind through harmonious choices and actions. This article explores different aspects of aging and longevity by comparing the science of aging as defined by modern medicine to Ayurvedic treatises.[4]

Paper 5: “Ancient archives of Deha-Prakriti (human body constitutional traits) in ayurvedic literature: A critical review,”

Author Name: R. Chinthala, S. Kamble, A. S. Baghel, N. N. L. Bhagavathi

Description: It explains that Ayurveda has a unique identity that defines the separate principle that Prakriti is the sole principle and that the evaluation of body composition is the first and main element of Dashavidha parikshas. It also states that the Ayurvedic Diagnostic System (of prakriti) provides a unique approach and plays a key role in understanding and assessing one's own health. Distinguish signs (features) related to the composition of the body and classify them into different parts. probstate-knowing the dosha type ahead of time aids in the planning of lifestyle and diet to meet the needs of the body. This information predicts the occurrence of qualitative and quantitative imbalances in the body. Train and implement machine learning models on preprocessed data and analyse performance on various parameters so that human body constituents can be predicted more accurately.[5]

III. Problem Statement

Knowing the dosha type beforehand helps in planning thelifestyle and diet according to the body’s needs. This knowledge provides probable occurrence of qualitative and quantitative imbalances in the body. To train and implement the machine learning models on a preprocessed data and analyze the performance on various parameters, so that the human body consituents can be predicted with better accuracy.

Architecture-

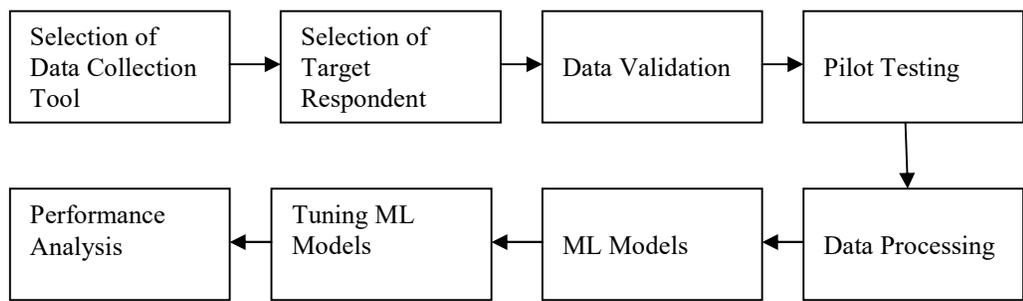


Figure 1. Architecture

IV. MODULE DESCRIPTION

Module-1: Selection of Collection Tool

Accurate and systematic data acquisition is a time-consuming task for model training and accuracy. The methods used to collect data vary depending on the type of research. It could be a document review, an observation, an interview, a measurement, or a combination of methods. We prepare a questionnaire to collect information on these characteristics from various people after identifying the scheme and characteristics of all the different categories. Data collection through the use of a prepared questionnaire is a cost-effective method of gathering information.

Module-2 : Selection of Target Respondent

In order to exclude any have an impact on of the participant's illness at the results, we make certain that healthful volunteers of both sexes are decided on among the a long time of 20 and 60. For this exercising we decided on college students and employees of educational institutions to take part withinside the survey. This document carries 107 samples of twenty-two attributes.

Module-3 : Data Validation

Data validation means verifying the correctness and quality of the original data before training a new version of the model. The model makes predictions with new data coming in during maintenance, the same data is added along with the actual labels and used for retraining. This allows the newly created model to adapt to changes in data characteristics. A questionnaire is used to sort information and is a research tool that consists of a series of questions and various invitations to collect data from respondents. The questionnaire consists of closed-form questions, with multiple answers given to each question. The validity of the questionnaire is checked by Ayurveda experts.

Module-4 : Pilot Testing

A pilot test is a rehearsal of an exploratory study in which an exploratory approach can be tested with a small number of test participants prior to conducting the main study. It is important to test the data collection questionnaire before using it. Pre-tests and pilots can help identify survey issues that can lead to questions or biased responses that don't make sense to participants. A pilot study is being conducted to ensure consistency in data collection. We first test the significance of the questionnaire with 50 randomly selected participants from the entire population of interest. After satisfactory accuracy is achieved in a small-scale implementation of this data set, we proceed with further data collection using the same procedure. Train and test the entire model, trusting the results of the pilot study.

Module-5 : Data Preprocessing

The process of converting raw data into an understandable format is known as data preprocessing. We cannot work with raw data, so this is an important step in data mining. Data preprocessing is the technique of preparing (cleaning and organising) raw data in order to build and train Machine Learning models. We collect data using unbiased survey methods and only ask healthy volunteers to participate. We select participants for data collection using a simple random sample. Simple random sampling involves selecting a small number of people from a large population group. We choose each person with the same chance or probability. As you interact with the participants, they explain and advise on Ayurveda's role in modern life. Volunteers deemed motivated and given informed consent are informed of the purpose of the study. We found that participants were interested in knowing their dosha type.

V. ALGORITHM

A. SVM LEARNING:

SVM is a discriminant classifier formally defined by a separable hyperplane. This hyperplane is a line that divides the plane into two parts, with each class on either side of a two-dimensional space. Implemented on predefined and labeled training data using supervised learning methods. The algorithm outputs an optimal hyperplane that classifies the new data points. It is assumed that support vector machine algorithms and hyperplanes in N-dimensional space uniquely classify data points.

B. KNN METHOD :

The KNN algorithm is a supervised machine learning algorithm used to solve classification and regression problems. This is based on the fact that data elements that are closer in feature space are assigned the same class. This method is based on the Euclidean distance method, which allows you to calculate the distance between two points in a coordinate system. In 2D space, the distance is only between two points (x_i, y_i) in planar space xy . Where $(i = 1, 2, \dots, k)$ is the data point. Similarly, the Manhattan formula and the Minkowski formula are also used to calculate distances. We train and tested k nearest neighbor algorithm on Gaussian distribution for pattern recognition.

C. NB CLASSIFIER:

Naive-Bayes is a classifier based on supervised learning or statistical approaches. An approach based on Bayes' theorem assumes that the existence of a function in a class is completely independent of the existence of other functions. Naive Bayes treats problem instances as feature vectors that are classified into specific classes according to their methods. These characteristics are not interdependent. That is, a value assigned to one attribute does not affect the value of another.

D. RANDOM FOREST CLASSIFIER:

Random Forest creates multiple decision trees that are combined for more accurate predictions. The logic of the random forest model is that multiple uncorrelated models (individual decision trees) perform much better as a group than individually. When using a Random Forest for classification, each tree provides a classification, or "vote". Forest chooses the category with the most "votes".

E. DECISION TREE LEARNING:

The decision tree is a non-parametric classifier and predictive model that employs the divide and conquer strategy. It is a classic example of soft computing and serves the classifier's purpose. A decision tree is made up of the root node at the top, lower child nodes, branches, and internal nodes. A tree's root connects its various classes. The classes are represented by the leaf nodes, the results by the branches, and the processes by the inner leaves. The paths from the root to the leaves are formed by classification rules.

i) BAGGING:

Bagging, also known as bootstrap aggregation, is the process of combining inputs. A Bagging classifier fits base classifiers on irregular subsets of the dataset and then totals their individual expectations, either by voting or averaging, to get a final prediction. Random Forest: It is superior to the bagging algorithm. Only a subset of features are chosen at random in random forest.

ii) *BOOSTING*:

Using feedback, it is possible to improve the predictability of the result. Earlier models are improved by reducing errors and increasing performance. Gradient Boosting: This is a subset of the boosting approach in which the gradient descent algorithm is used to minimise errors.

VI. RESULT

In this section, we will go over how to implement ML models on pre-processed data. Because no single algorithm works best for every problem in machine learning, it is critical to consistently analyse the performance of different learning techniques. Many factors, such as the size and structure of your dataset, have an impact. This is why we have implemented multiple algorithms for our data.

Algorithm	Trained Accuracy	Tested Accuracy
SVM	98.8%	59%
Random Forest Classifier	80%	68.1%
KNN	60%	63.6%
Naive Bayes	81.2%	59.0%
Decision Tree	100%	36.3%
Boosting	24.7%	22.7%
Bagging	98.8%	45.5%

Figure 2. Result

Based on the close accuracy of training and testing data, we implemented a model with the Adaboosting model. We imported the libraries first, and then read the dataset. There are 107 samples in our dataset, each with 25 features. The dataset's EDA is then detected for 107 samples with 22 features. In EDA, we decoded all of the features, created tridosha features, scaled the dataset, and trained the model with the boosting algorithm.

VII. Conclusion

The primary goal of this work was to predict Ayurvedic-based human body constituents using various machine learning models and to analyse their performance on various parameters. To accomplish this, we first created a questionnaire and collected data from end users. Following that, we pre-processed the recorded data before implementing various algorithms such as SVM, Random Forest classifier, KNN, NB, Decision Tree, and finally training and evaluating the model. In this project, we compare the performance of these machine learning methods based on their ability to predict human body constituents. This proposed system could be used to assist Ayurvedic medical practitioners in recognising human constituents. Anyone, healthy or unhealthy, can use this system to learn about constituent imbalances in their bodies without consulting an Ayurvedic practitioner.

The work's novelty would be the application-based advanced machine learning algorithms used to recognise human body constituents (Ayurveda Dosha). This proposed method could be useful for Ayurvedic medical practitioners in recognising human constituents. Anyone, healthy or unhealthy, can use this system to learn about constituent imbalances in their bodies without consulting an Ayurvedic practitioner.

VIII. References

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