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# AYURVEDA BASED DISEASE DIAGNOSIS USING MACHINE LEARNING

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***ABSTRACT :- The most important component in lowering mortality rates caused by late disease discovery is early disease diagnosis. In order to do this, Ayurveda uses Nadi Pariksha, or pulse examination. The major goal of this research is to create a non-invasive Nadi Pariksha system to help medical professionals diagnose various diseases. The affected organ is identified by palpating the pulse with the index, middle, and ring fingers on the radial artery at the wrist. The number of individuals dying as a result of delayed diagnosis is steadily rising. In such circumstances, being able to monitor the patient's health by monitoring their pulses over time and identifying any aberrant situations as soon as feasible could be important in saving lives. Integrating this pulse testing procedure with modern technologies might provide a tool for early disease detection and diagnosis, lowering mortality rates. To perform the Sparshana phase of Ayurvedic Disease Diagnosis, we will use optical sensors to get the patient's pulse, and then use an Artificial Neural Network algorithm to detect the patient's Prakriti, i.e. Vata, Pitta, or Kapha. A questionnaire that mirrors the Darshana and Prashna phases will also be used to test the Decision Tree algorithm***.

## 1.INTRODUCTION

Nadi Pariksha/Pulse Diagnosis is a non-invasive ayurvedic disease diagnosis approach that uses the pulse. Physical, mental, and emotional disorders are all appropriately diagnosed. It is also the scientific tool that allows a person to secure their individualised health programmes, such as therapeutic massages, customised diets, and detoxification. Ayurveda, a time-tested and age-old natural treatment system, teaches that any ailment in our system is caused by an imbalance in our 'Doshas' - Vata, Pitta, and Kapha. Ayurvedic principles follow a natural approach to diagnosing ailments and restoring body equilibrium, and one such form of diagnosis is Nadi Pariksha.

The suggested model employs Artificial Neural Networks and Decision Trees to develop a tool that can measure VPK pulses using optical sensors and detect the patient's Prakriti (VPK). The Sparshana step of the three-fold Ayurvedic Diagnosis is covered here. For the two disorders under consideration, Anemia and Hyperacidity, questionnaires have been developed. The Darshana and Prashna phases are replaced with these surveys.

### 1.1 AYURVEDIC PULSE DETECTION

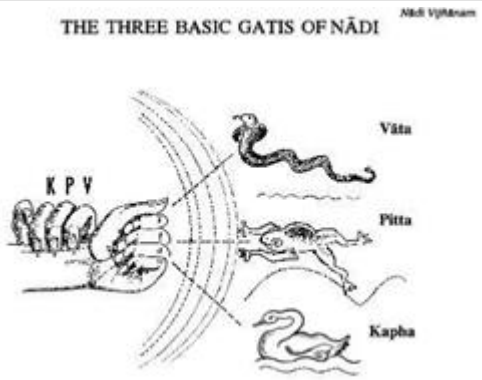


Fig -1: The VPK Pulses

| Dosha | Primary Functions |
|---|---|
| Vata | Movement and Communication |
| Pitta | Digestion and Transformation |
| Kapha | Cohesiveness, Structure, and Lubrication |

### 1.2 VATA PITTA KAPHA CHARACTERISTICS

Table -1: VPK Characteristics

### 1.3 THE THREE-FOLD AYURVEDIC DIAGNOSIS

A. Sparshana

Sparshana, or touching or palpation diagnosis, is the first of three types of diagnosis in which the practitioner examines the person by feeling them. The person's Prakriti (Vata, Pitta, and Kapha) is determined. Optical pulse sensors and Artificial Neural Networks are used in this phase of our study.

B. Darshana

This is a diagnosis based on firsthand observation. The overall physique, motions, and so forth are observed. This phase was implemented using Decision Trees in our project.

C. Prashna

The doctor inquires about the disease's history, the patient's lifestyle, dietary habits, recent changes in activities, and so on. Our project uses Decision Trees to accomplish this.

## 2. RELATED WORK

Begum and Divaakar propose using pressure sensors to detect pulses in their article. The amplitude of the pulse signal grows as the sensor pressure over the pulse increases, reaching a maximum before decreasing. The pulse stops when it reaches a certain threshold value. [3]. A comparison of the implementation of various pulse sensing systems is discussed, including The study by Chauhan[1] uses a microphone as a

  

sensor, a pressure sensor, and a bi-sensing pulse diagnosis instrument. For Nadi Pariksha, Roopini et al proposed a device. It eliminates noise by employing an eighth order Butterworth filter to preprocess the three signals generated by optical pulse sensors. Three pulse sensors are utilised to visualise the three signals.

Artificial neural networks are used to further classify the pulse data into vata, pitta, and kapha. Khair and Joshi presented a pulse-based approach for determining a person's pre- and post-meal differences. The results of their investigation revealed that pulse signals can be used to classify pre-meal and post-meal signals. The accuracy of pre-meal classification was 88.88%, whereas post-meal classification was 81.48 percent. Kulkarni and Kumbhar used two strategies to construct a non-invasive diabetes diagnostic tool: tridosha analysis and artificial neural network application.

## 3. PROPOSED METHODOLOGY

We offer a technique that takes into account all three phases of Ayurvedic disease diagnosis. Sparshana's first phase is implemented with three optical pulse sensors positioned at three positions on the human wrist, as depicted in Fig. 1. The Arduino Uno microcontroller is used to connect these pulse sensors to our system through USB. A 5V power supply is required to run the Arduino board. It contains 14 digital input/output pins, including six PWM output pins, six analogue inputs, a 16MHz crystal oscillator, a USB connector, and a power jack.

The pulse readings are captured in analogue form and translated to digital values using Arduino's ADC. These sensors essentially combine a simple optical heart rate sensor with amplification and noise reduction electronics, allowing for faster and more accurate pulse readings. To reduce external light interference, the three pulse sensors are fastened to a Velcro strap. To get pulse readings, the Velcro strap is put around the patient's wrist.

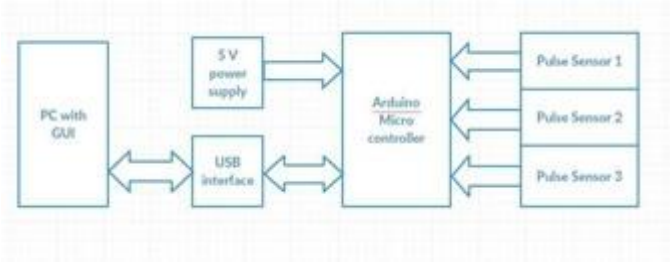


Fig -2: Block Diagram

The next two phases, Darshana and Prashana, are implemented via a questionnaire in our system. We've chosen two disorders, Anemia and Hyperacidity, for which we've created questionnaires based on their most common symptoms. The patient's reaction is recorded and kept in a MySQL database, together with the patient's personal information, for future use.

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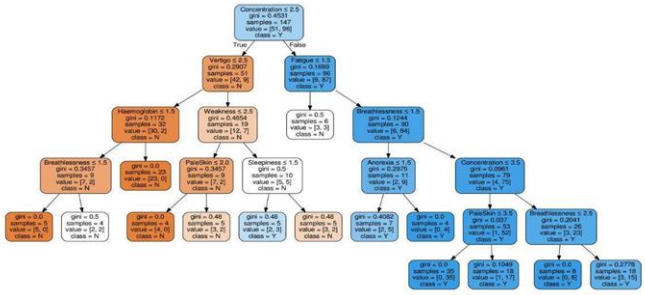

Fig -3: Decision Tree – Anemia

Data was acquired using optical pulse sensors and supplied into an artificial neural networks algorithm as a training dataset. An Ayurvedic doctor assisted in labelling this training data set.

The decision tree was trimmed at five levels to avoid data overfitting, and the minimum sample size per leaf node was set to three. The report provided includes pulse data as well as the completed questionnaire, which can help Ayurvedic practitioners make accurate diagnoses.

The Prakriti of the patient, i.e. vata, pitta, or kapha, is predicted using Artificial Neural Networks. ANN employs a single four-unit hidden layer. Two distinct Decision Trees are used to predict the answer of the questionnaire, namely whether or not the patient has Anemia and whether or not the patient suffers from Hyperacidity. For doctors' contemplation, the pulse measurements are graphically depicted using graphs.

Figure -4 depicts the confusion matrix. The prakrutis vata, pitta, and kapha are represented by the numbers 0, 1, and 2. The chart illustrates that utilising ANN, an accuracy of 84 percent may be achieved in predicting a patient's prakruti.

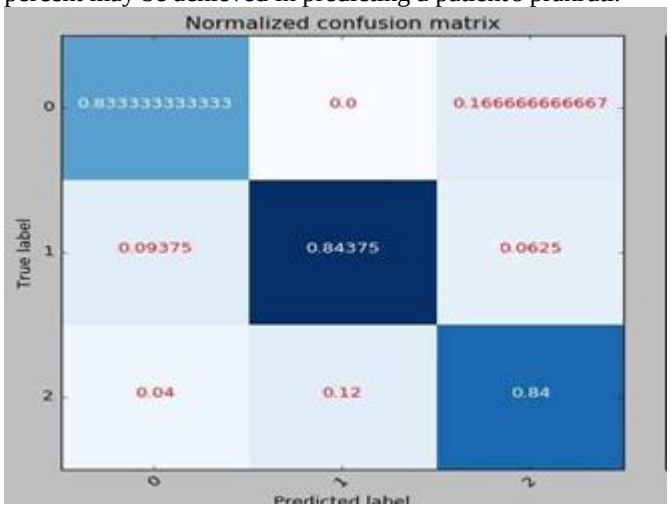


Fig -4: Confusion matrix

## 4. CONCLUSIONS

The suggested methodology combines the concept of Ayurvedic pulse diagnostics with the use of modern technology. With the use of standardised hardware, human error in Ayurvedic pulse diagnosis can be reduced. All of their patients' current and prior records are accessible to the doctor. Patient information can be sent to the doctor over the internet, and processed findings can be made available. The system could be modified to teach new and unskilled Ayurvedic doctors how to diagnose pulses.

  

The number of diseases that our system can diagnose can be increased, and more training data can be collected to improve the system's accuracy. This approach can be used in rural locations where doctors are hard to come by. Anyone with a non-medical background can be educated to operate this system in these areas, assisting in disease early detection.

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