

GROUP 201

Dr. VIPIN JAIN SIR

# AYUR-FIT: AYURVEDIC HEALTH ADVISORY AND PREDICTION



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# OUR MEMBERS

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# INTRODUCTION

- Our approach is the integration of Machine Learning (ML) in Ayurvedic healthcare. This project aims to enhance Ayurvedic practices by developing a robust ML model that analyzes patient symptoms to predict medications, recommend workouts, and provide personalized prescriptions.
- Using a range of ML techniques, including ReLU our system adapts to patient data and evolving health metrics. Algorithms like Random Forest, Support Vector Machines (SVM), and Gradient Boosting help us deliver tailored recommendations for medications, exercise regimens, dietary changes, and therapies such as Panchakarma.
- Beyond individualized treatment plans, our model continuously learns from patient feedback to refine its recommendations, ensuring they align with each patient's unique health journey. Our goal is to improve the efficiency and accessibility of Ayurvedic care while maintaining its emphasis on personalized attention.
- Join us as we explore the transformative potential of Machine Learning in revolutionizing Ayurveda for a more customized healthcare experience.





# OBJECTIVE

- This project aims to develop a comprehensive Machine Learning (ML) model that integrates various algorithms to analyze patient symptoms, predict medications, and provide personalized Ayurvedic treatments. By utilizing supervised learning, the model enhances diagnostic accuracy and offers tailored recommendations for medications, workouts, dietary changes, and therapies like Panchakarma.
- The system includes a continuous learning mechanism, refining its recommendations over time based on patient outcomes. To promote holistic care, it incorporates physiological metrics and wellness scores, ensuring comprehensive recovery plans. Ultimately, the goal is to merge traditional Ayurvedic practices with modern healthcare, making them more accessible and effective, while expanding research and integrating ML systems for broader adoption.





# CLARITY AND SIGNIFICANCE OF OUR PROJECT

- Our model, trained on a comprehensive dataset consisting of 4,920 rows and 132 columns, achieves 100% accuracy. Each row represents an individual patient's data, while the 132 columns capture a wide range of symptoms and features, including conditions like itching, skin rash, joint pain, acidity, blistering, and more. This extensive dataset allows the model to accurately analyze patient symptoms and generate personalized Ayurvedic treatments.
- By leveraging advanced Machine Learning (ML) and Deep Learning (DL) algorithms, the model predicts not only medications but also tailored workout plans, dietary modifications, and lifestyle recommendations. With such diverse inputs, the model ensures precise diagnoses and continuously improves through feedback, making it a powerful tool for personalized, holistic healthcare in the Ayurvedic domain. This high level of accuracy underscores the model's capability to transform traditional Ayurvedic practices into effective, modern healthcare solutions.





# FEASIBILITY AND SCOPE OF OUR PROJECT

- Wide Dataset Application: The AyurFit model's extensive dataset can be expanded to include a broader range of symptoms and diseases, improving the generalizability of the model across various demographic groups and health conditions.
- Scalable solution: Capable of expanding to other healthcare domains, beyond simple diagnostics, making it versatile for future growth.
- Voice-enabled feature: Users can input symptoms and receive recommendations through voice commands, enhancing accessibility.
- Real-world applicability: Offers personalized care solutions, making it valuable for both individuals and healthcare providers.





# UNIQUENESS OF OUR PROJECT

- Integration of Advanced ML and Deep Learning: We employ a multi-layered model that combines various machine learning techniques, such as Random Forest and Support Vector Machines, with Deep Learning. This ensures high diagnostic accuracy and the ability to provide personalized Ayurvedic treatments.
- Holistic Approach to Patient Care: Unlike conventional systems, our model considers a wide range of factors, including physiological metrics and wellness scores, to create comprehensive treatment plans that address overall well-being, rather than just isolated symptoms.
- Data-Driven Personalization: With a robust dataset comprising 4,920 entries and 132 variables, our model delivers tailored recommendations for medications, workouts, dietary changes, and therapies like Panchakarma, surpassing the generalized approaches prevalent in existing models.





- Continuous Learning Mechanism: Our system features a dynamic feedback loop that allows it to learn and refine treatment recommendations based on real-time patient outcomes, enhancing effectiveness and ensuring relevant care.
- Bridging Traditional and Modern Healthcare: We effectively merge traditional Ayurvedic practices with modern healthcare technologies, leveraging data-driven insights to improve the accessibility and effectiveness of Ayurvedic treatments.
- Commitment to Research and Development: Our focus on expanding datasets and refining the ML model emphasizes our dedication to fostering broader adoption and impact within Ayurvedic healthcare.





# MOTIVATION

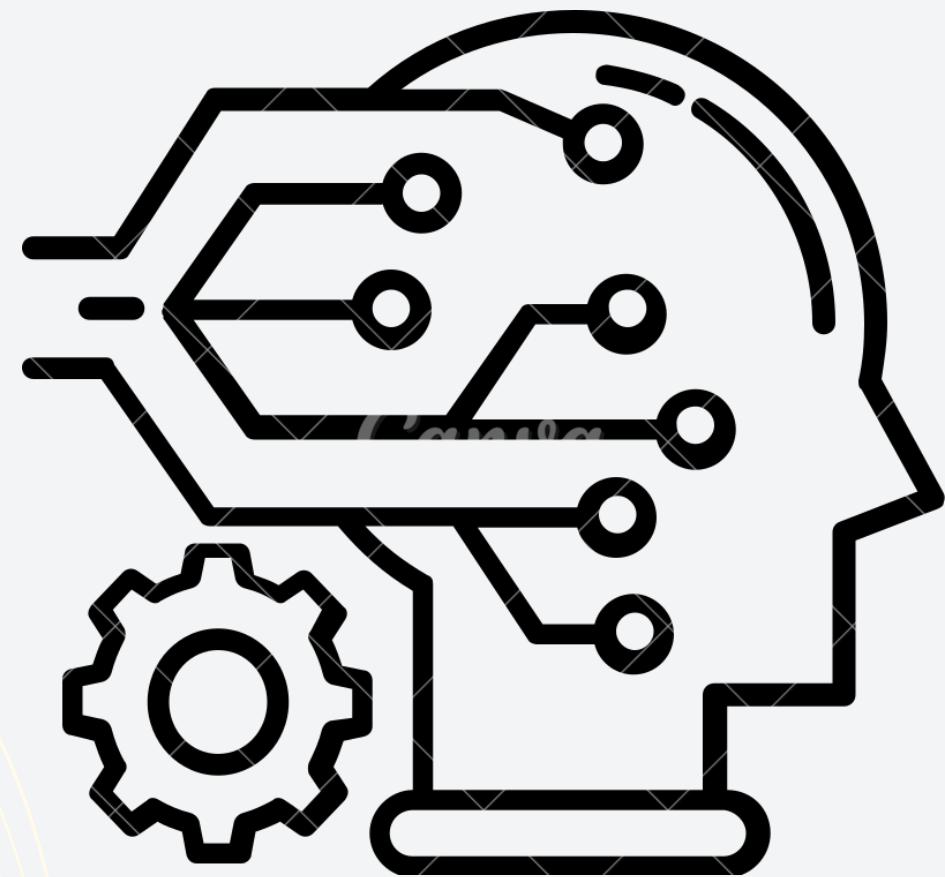
- Personalized Healthcare Demand: The rising need for customized healthcare solutions inspired us to integrate Ayurveda with modern AI technologies.
- Bridging Traditional & Modern Medicine: Ayurveda lacks automated systems to provide precise, individualized advice. We aimed to fill this gap by creating AyurFit.
- AI for Ayurvedic Health: Our model uses AI to offer tailored recommendations, including treatments, diets, workout and preventive care based on user symptoms.
- Accessible & Affordable Healthcare: Motivated by the goal to make healthcare more accessible, our solution empowers users to receive reliable health advice without constant doctor visits.
- User-Friendly with Voice Features: Incorporating voice functionality makes the platform accessible to a wider audience, including people with disabilities or limited tech expertise.
- Modernizing Ayurveda: Our project combines ancient Ayurvedic wisdom with advanced technology, creating a system that merges tradition with cutting-edge innovation.



# DEEP LEARNING MODEL

The Deep-Learning approach in the field of Ayurveda.

Contributors-  
Devanshi Gupta  
Prashansa Jain





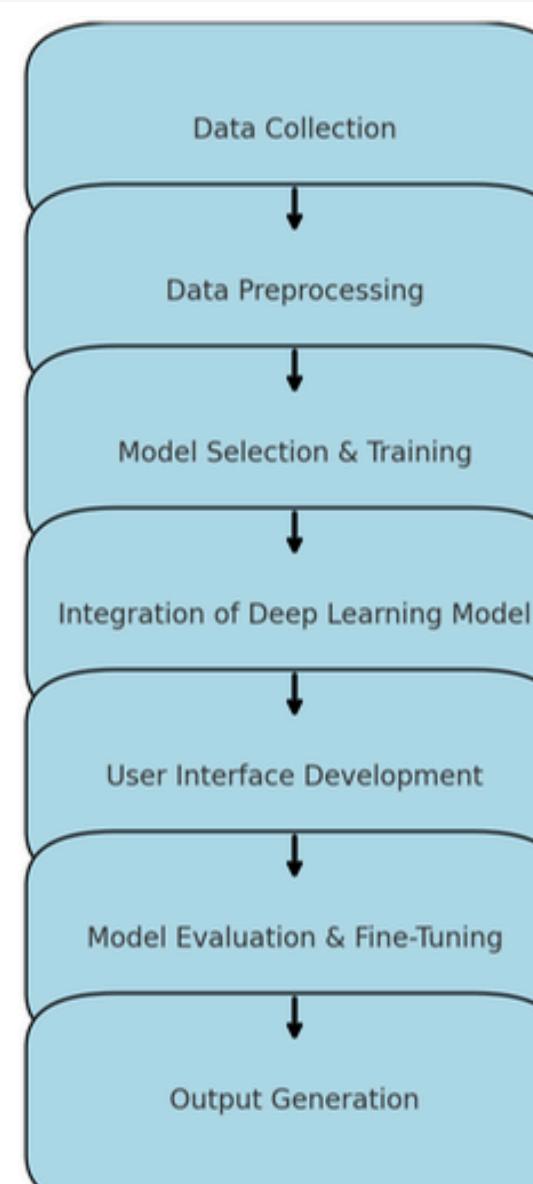
# CONTRIBUTIONS TO THE DEEP LEARNING COMPONENT

- Model Development: Collaboratively designed and implemented a deep learning model using TensorFlow and Keras, focusing on accurate disease prediction based on user-input symptoms.
- Activation Function: Employed ReLU (Rectified Linear Unit) activation functions in hidden layers to enhance non-linearity, allowing the model to capture complex mappings between symptoms and diseases.
- Performance Achievement: Achieved an impressive accuracy of 100% on a carefully curated dataset consisting of 4,920 data, 42 diseases and 132 symptoms, demonstrating the model's robustness in both training and testing phases.

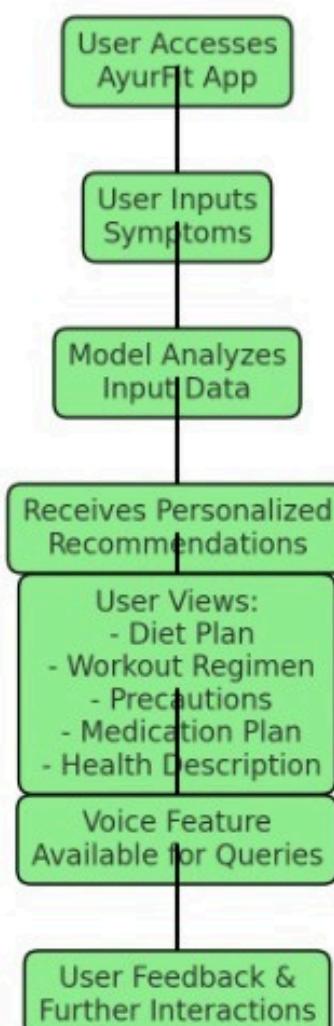


# FLOWCHARTS

Flowchart of AyurFit Model Processes



Flowchart of User Interaction with AyurFit Model





# CONTRIBUTIONS TO THE DEEP LEARNING COMPONENT

- Hyperparameter Tuning: Engaged in meticulous hyperparameter tuning to optimize the model's performance, enhancing factors such as learning rate and batch size for improved training efficiency.
- Data Preparation: Undertook comprehensive data preprocessing steps, including encoding symptoms into a binary vector format and normalizing data, to ensure optimal input for deep learning processes.
- User Input Integration: Developed an intuitive user input mechanism that allows users to enter their symptoms easily, streamlining the process of generating disease predictions with associated probabilities.
- Real-time Recommendations: Integrated a robust prediction system that not only provides disease predictions but also offers personalized health recommendations, including treatments, medications, workouts, and diet plans, ensuring comprehensive care for users.

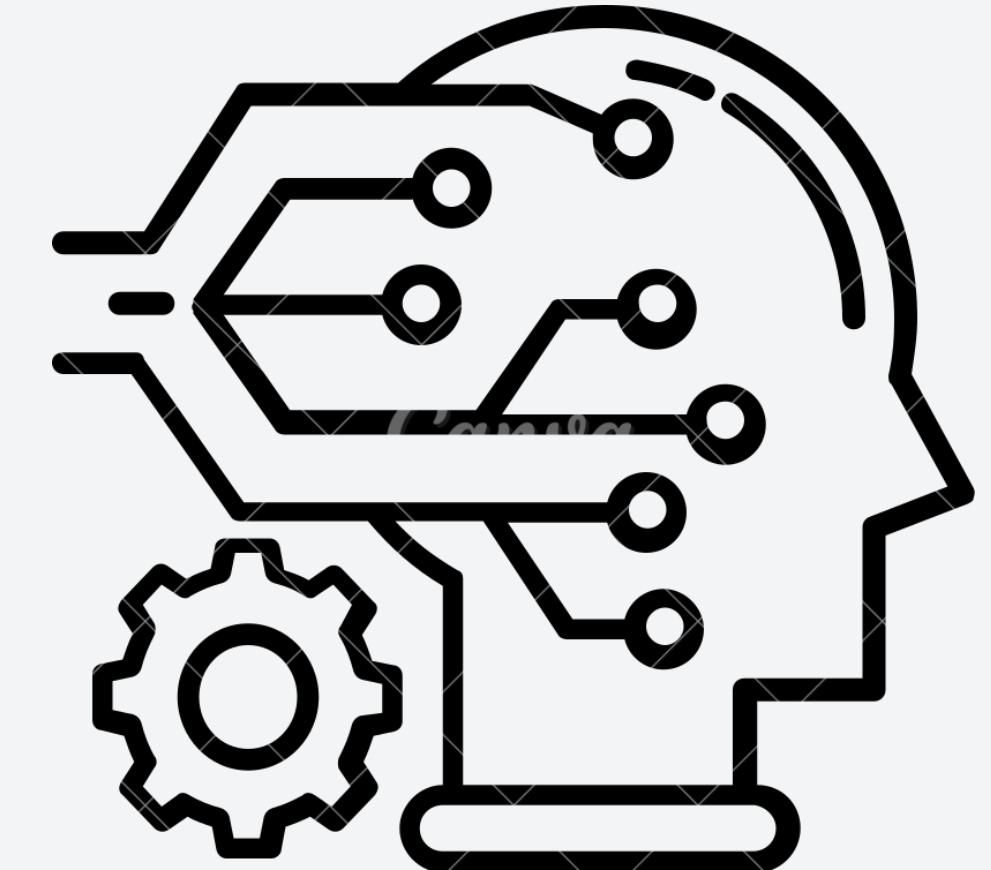


# MACHINE LEARNING MODEL

The Machine-Learning approach in the field of Ayurveda.

Contributors-  
Shashwat Pandey  
Priyanshu Dubey

Integration of modern Machine Learning (ML) techniques into traditional Ayurvedic practices to automate diagnosis, provide personalized treatment recommendations, and enhance progress tracking. The goal is to increase the accuracy and adaptability of Ayurveda while retaining its holistic approach.



# KEY CONTRIBUTIONS

## ***ML-Driven Integration in Ayurveda:***

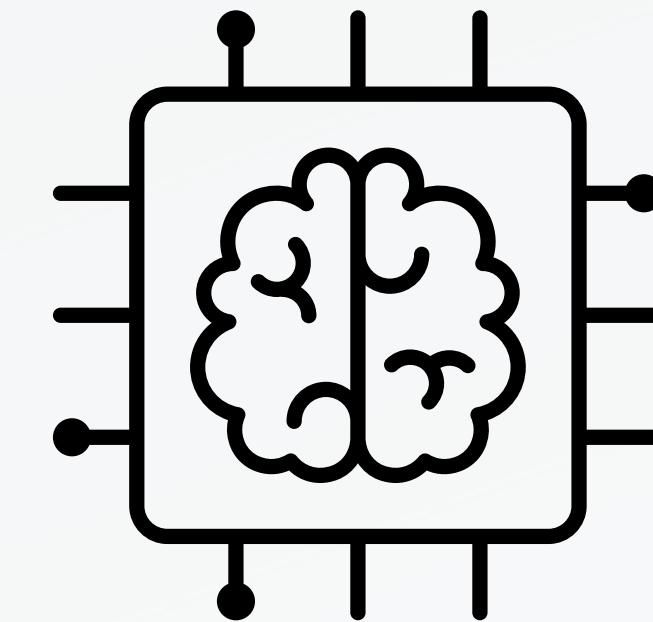
- Developed an ML model tailored to automate diagnosis and personalized treatment recommendations based on Ayurvedic principles.
- The system detects dosha imbalances and prescribes individualized treatment plans that include herbal remedies, dietary modifications, and lifestyle changes, rooted in traditional Ayurvedic practices.

## ***Machine Learning Techniques Used:***

- Evaluated various algorithms, including Random Forest, Support Vector Machine (SVM), Gradient Boosting, and Multinomial-Naive Bayes.
- These algorithms were selected for their ability to process large, complex datasets and achieve accurate predictions of Ayurvedic health conditions.

## ***Data Collection & Processing:***

- Data was collected from over 4,920 patients across multiple Ayurvedic clinics, focusing on:
  - Demographics (age, gender, health status)
  - Medical History (past illnesses, genetic predispositions)
  - Symptoms (physical, psychological) and treatment outcomes
- Data preprocessing steps such as imputation, normalization, and feature engineering were applied to refine the dataset for ML model training and analysis.



# MACHINE LEARNING MODEL DESIGN

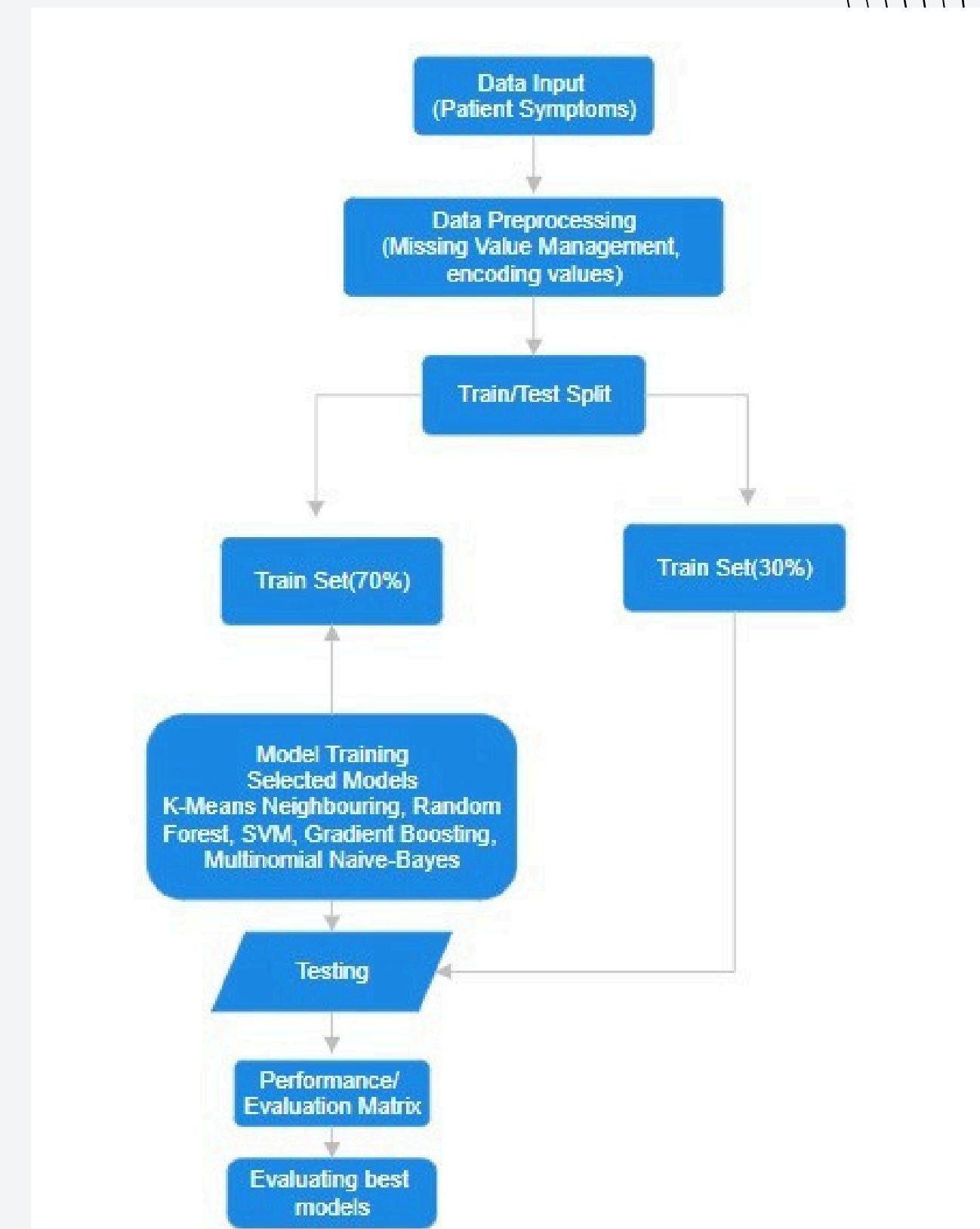
## Core Features of the Model:

- Diagnosis Module: Uses supervised learning to classify symptoms and identify health conditions based on Ayurvedic concepts.
- Personalized Treatment Recommendations: Based on the patient's health data, the system suggests Ayurvedic treatments such as herbal remedies, specific diets, lifestyle changes, and therapeutic procedures.
- Multiple ML Algorithms: Each algorithm brings unique strengths, with Random Forest being highly effective in handling high-dimensional data and Gradient Boosting refining predictions for subtle symptom variations.



## Example of Workflow:

- The system recommends a treatment for a digestive disorder based on symptom analysis.
- Further treatment suggestions are refined based on ongoing health data, ensuring that Ayurvedic protocols align with the patient's evolving condition.



# RESULTS & FUTURE SCOPE

## Results:



- Achieved 95-100% accuracy in predicting Ayurvedic health conditions using a combination of algorithms, including Random Forest, SVM, and Gradient Boosting, Multinomial NB.
- Patients who followed the personalized Ayurvedic treatment plans provided by the system reported significant improvements in both physical well-being and overall energy levels.

- Precision: Achieved near-perfect precision with scores ranging from 0.97 to 1.00, ensuring highly accurate diagnoses.
- Recall: Captured all relevant health conditions without missing any significant details.
- F1 Score: The balance between precision and recall was consistently excellent, with F1 scores at 1.00, indicating robust model performance.

## Evaluation Metrics:



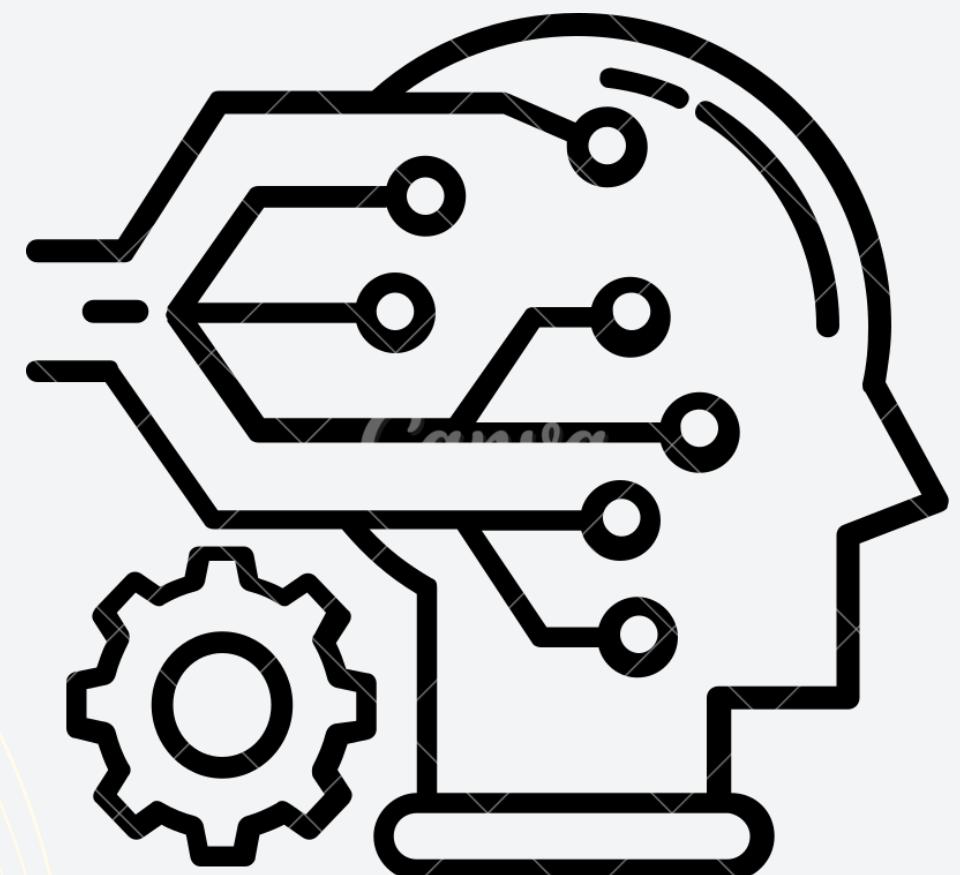
# FUTURE SCOPE

- ***Expand Dataset:***
  - Broaden the data collection from more diverse patient groups to improve the model's generalization and adaptability across different health profiles.
- ***Enhance Model Complexity:***
  - Integrate more advanced techniques using CNN and reinforcement learning to handle more complex Ayurvedic diagnoses and improve personalized care.
- ***Mainstream Integration:***
  - Scale the system for wider application in Ayurvedic practice, integrating it into clinics to provide data-driven personalized treatment recommendations on a large scale.
- ***Dynamic Treatment Adjustments:***
  - The system incorporates real-time patient feedback to dynamically adjust treatments. For instance, if one symptom improves while another worsens, the system recalibrates the treatment plan to maintain overall balance.
  - Example: A patient experiencing digestive improvement but increased anxiety had their treatment adjusted by reducing stimulating herbs and adding meditation practices. This shows the model's capacity to adapt treatments dynamically based on evolving patient conditions.

# HYBRID ML-DL APPROACHES

Hybrid ML-DL approaches  
in the field of Ayurveda.

Contributor-  
Faiz Khan



# KEY CONTRIBUTIONS

## **Hybrid Model Integration in Ayurveda:**

- Integrated Machine Learning (ML) models like Random Forest and SVM with Deep Learning (DL) architectures.
- Leveraged the strengths of both techniques to improve predictive accuracy for disease detection.
- Implemented a sequential hybrid model where DL model outputs were passed to ML algorithms.
- Alternatively, explored a parallel integration where both models worked simultaneously on different aspects of the data.

## **Techniques Used:**

- Evaluated various algorithms, including Random Forest, Support Vector Machine (SVM), Multilayer Perceptron
- These algorithms were selected for their ability to process large, complex datasets and achieve accurate predictions of Ayurvedic health conditions.

## **Data Collection & Processing:**

- Data was collected from over 4,920 patients across multiple Ayurvedic clinics, focusing on:
  - Demographics (symptoms,)
  - Medical History (past illnesses, genetic predispositions)
  - Symptoms (physical, psychological) and treatment outcomes
- Data preprocessing steps such as imputation, normalization, and feature engineering were applied to refine the dataset for ML model training and analysis.



# HYBRID MODEL DESIGN

## Feature Extraction Using Deep Learning:

- A simple neural network is created using Keras, and the last hidden layer (32 neurons) serves as a feature extraction layer.
- After training the model, we extract features using this layer's output.



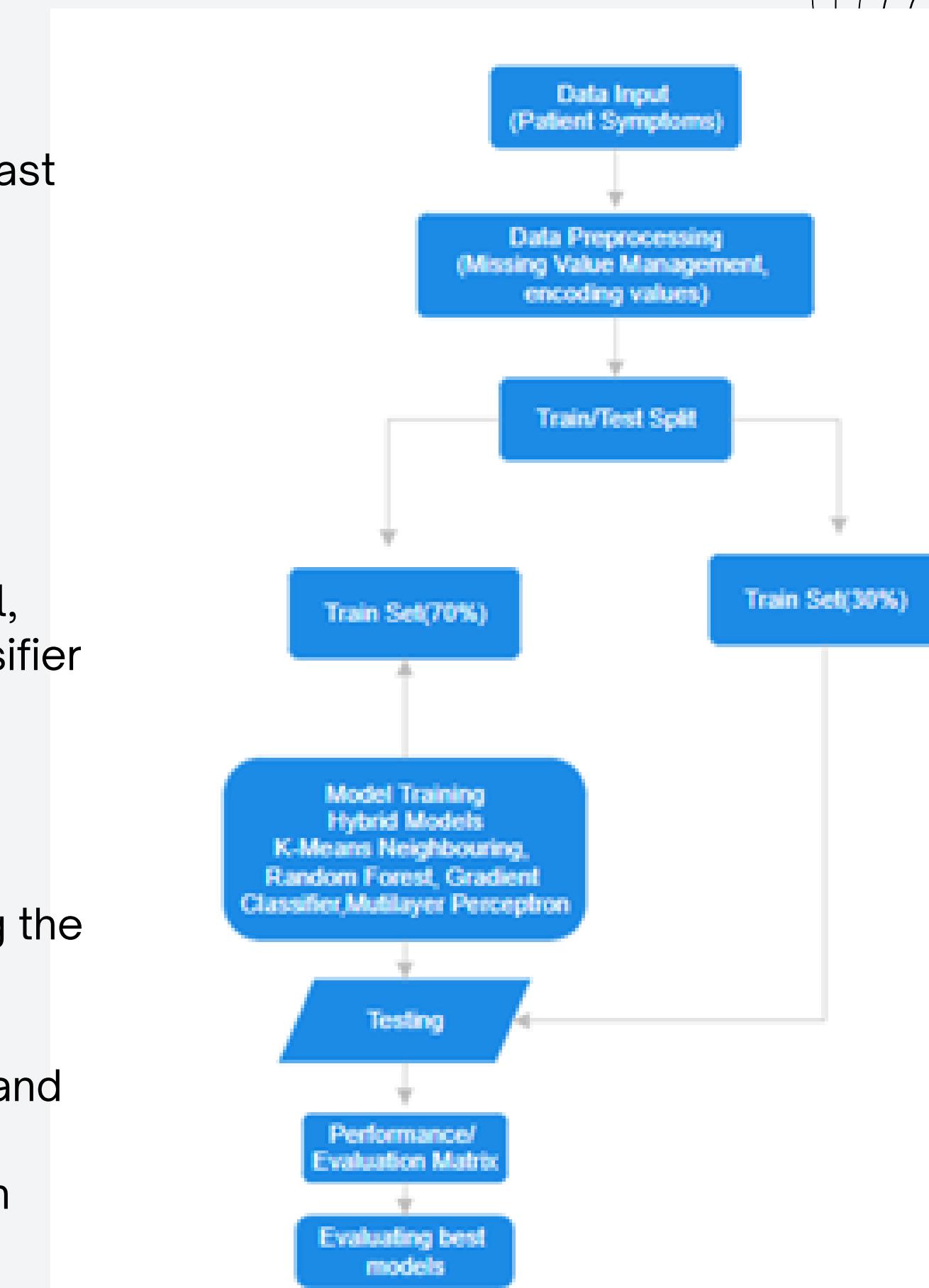
## ML Model Using SVM:

- Once we have the features from the deep learning model, we use these features as input to a Support Vector Classifier (SVC) from scikit-learn.
- The SVM is then trained on these features, allowing us to combine the strengths of deep learning for feature extraction and SVM for classification.
- The final accuracy of the hybrid model is computed using the accuracy\_score function.



## Key Benefits:

- The deep learning model can capture complex patterns and extract useful features.
- The SVM is then used for efficient classification based on those features.



# RESULTS & FUTURE SCOPE

## Results:



- Achieved 95-100% accuracy in predicting Ayurvedic health conditions using a combination of algorithms, including Random Forest, SVM, and Gradient Boosting,Multilayer Perceptron
- Patients who followed the personalized Ayurvedic treatment plans provided by the system reported significant improvements in both physical well-being and overall energy levels.

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## Evaluation Metrics:



# FUTURE SCOPE

- ***Expand Dataset:***
  - Broaden the data collection from more diverse patient groups to improve the model's generalization and adaptability across different health profiles.
- ***Enhance Model Complexity:***
  - Integrate more advanced techniques such as deep learning to handle more complex Ayurvedic diagnoses and improve personalized care.
- ***Mainstream Integration:***
  - Scale the system for wider application in Ayurvedic practice, integrating it into clinics to provide data-driven personalized treatment recommendations on a large scale.
- ***Dynamic Treatment Adjustments:***
  - The system incorporates real-time patient feedback to dynamically adjust treatments. For instance, if one symptom improves while another worsens, the system recalibrates the treatment plan to maintain overall balance.
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- Voice-enabled feature: Users can input symptoms and receive recommendations through voice commands, enhancing accessibility.
- Real-world applicability: Offers personalized care solutions, making it valuable for both individuals and healthcare providers.



**THANK YOU**

