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RAGA CLASSIFICATION AND RECOMMENDATION FOR HEALING DISEASES USING DEEP LEARNING

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INTRODUCTION

- Indian Classical Music has a traditional belief in healing power.
- Specific ragas are believed to affect mental and physical health.
- This project combines AI + music therapy by:
  - Classifying ragas using ML/DL
  - Mapping ragas to potential healing benefits

PROBLEM STATEMENT

- No current automated systems that classify ragas and link them to diseases.
- Challenges:
    - Variability in raga performance (tempo, pitch, artis)
    - Lack of validated therapeutic mappings
    - Sparse, unbalanced datasets
- Need: A robust raga recognition and recommendation framework

OBJECTIVES

- Automatically classify Indian classical ragas using audio.
- Apply MFCC feature extraction for better audio representation.
- Use ML and DL models for accurate classification.
- Map each raga to disease it is believed to help cure.

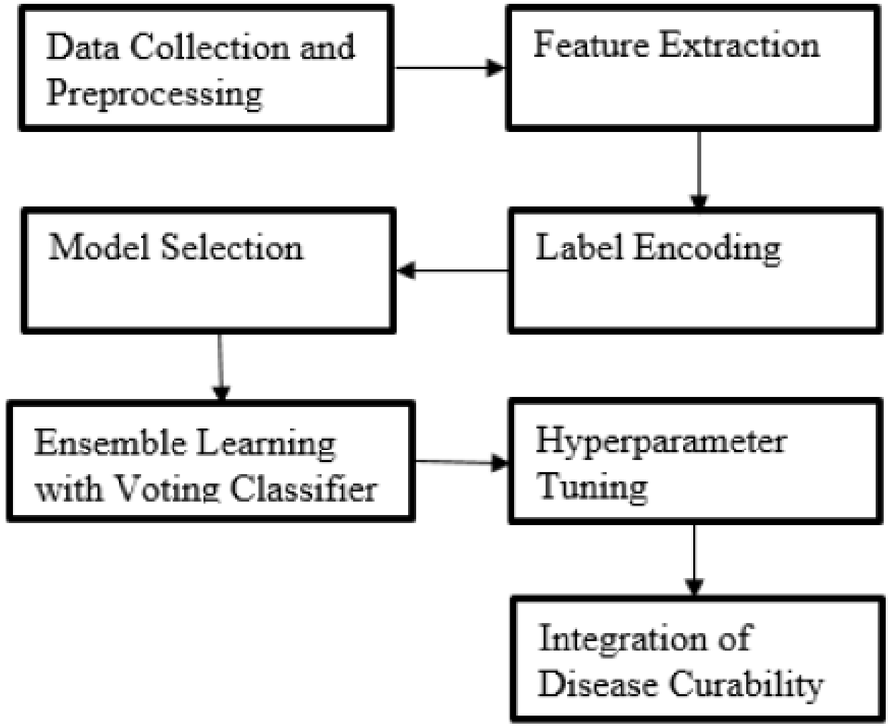
DATASET

- 8 Indian Ragas: Asawari, Bageshree, Bhairavi, Boopali, Darbari Kanada, Malkauns, Vrindavani Sarang, Yaman.
- Audio Format: WAV, 44.1 kHz
- Duration: 30 seconds to 2 minutes
- Structure: Folder-based raga separation

METHODOLOGY OVERVIEW

Pipeline:

- Data Preprocessing
- MFCC Feature Extraction
- Label Encoding
- Model Training
- Ensemble Voting
- Disease Mapping



MODELS USED

ML Models:

- Random Forest (with GridSearchCV)
- K-Nearest Neighbors (k=5)

DL Model:

- CNN (13 MFCCs reshaped to 2D)
  - 2 Conv layers
  - MaxPooling
  - Flatten → Dense → Softmax

Ensemble:

- Voting Classifier (Soft voting)

DATA AUGMENTATION

- Pitch Shifting: ±2 semitones
- Noise Injection: Background noise for robustness
- Result: Doubled dataset size → better generalization

RESULTS

Model	Accuracy	Precision
VGGish + SVM	65.96%	63.63%
YAMNet + RF	84.25%	83.00%
OpenL3 + KNN	87.47%	84.63%
VGG16 + Gradient Boosting	73.00%	68.72%
CNN	**98.64%**	**95.36%**
Voting Classifier	92.57%	88.63%

CNN performs best due to its ability to learn complex patterns.

DISEASE MAPPING

Raga Name	Associated Healing/Benefit
Darbari Kanada	Relieves anxiety, mental tension, and stress
Bhairavi	Improves sleep quality, calms the mind
Yaman	Enhances concentration, useful in meditation, mental clarity
Malkauns	Helps with insomnia, mental depression, promotes tranquility
Asawari	Soothes sadness, reduces fatigue and emotional pain
Bageshree	Known to alleviate insomnia, mental fatigue, and sadness
Vrindavani Sarang	Cools the mind, good for hypertension and anger
Boopali (Bhoopali)	Creates a peaceful atmosphere, believed to balance blood pressure

This therapeutic recommendation system adds a real-world value to ML models.

CONCLUSION & CONTRIBUTIONS

- Achieved 98.64% accuracy in raga classification
- Integrated music therapy concept with AI
- Used a Voting Classifier for enhanced performance
- Proposed a healing suggestion system based on ragas

FUTURE WORK

- Conduct clinical trials to validate therapeutic claims
- Integrate with real-time music therapy apps
- Explore transfer learning and transformer-based models
- Expand dataset to include more ragas and artists

THANK YOU