

1. Project Title: Development of an AI-Based Cat Emotion Recognition System Using Facial and Vocal Analysis

2. Project Statement and Outcomes:

- The AI-Based Cat Emotion Detector aims to analyze cat emotions through facial expressions and vocalizations using deep learning techniques. Users can upload images and audio files, which the system will process to classify emotions such as happiness, sadness, anger, and fear. By leveraging computer vision (CNNs) for facial analysis and audio processing (LSTMs/RNNs) for voice recognition, the project provides an accurate and user-friendly tool to help cat owners better understand their pets' emotions.
- The final system will be a Streamlit web application where users can upload a cat's image, audio or video to receive emotion predictions with confidence scores. The model will provide insights into cat behavior, helping pet owners recognize their cat's emotional state and respond accordingly. The project will demonstrate real-world AI applications in pet behavior analysis, combining deep learning, computer vision, and audio processing for a seamless user experience.

3. Modules to be Implemented:

- Data Collection, Preprocessing, and Data Transformation
- Model Training, Development, and Evaluation
- User Interface & User Interactions
- Testing, Review, and Documentation

4. Week-wise Module Implementation and High-Level Requirements:

Weeks 1-2: Data Collection, Preprocessing, and Data Transformation

- Collect a dataset of labeled cat facial images & audio clips for emotions (happy, sad, angry, fearful).
- Preprocess images – Resize, grayscale conversion, data augmentation (rotation, flipping).
- Preprocess audio – Convert to spectrograms, normalize, extract key features (pitch, intensity).
- Handle missing or noisy data in both image and audio datasets.

- Perform Exploratory Data Analysis (EDA) to visualize feature distributions and patterns.

Weeks 3-4: Model Training, Development, and Evaluation

- Split datasets into training and testing sets (80-20 split).
- Train a CNN model (e.g., MobileNet, ResNet) for facial emotion classification.
- Train an LSTM/RNN model for voice-based emotion detection.
- Evaluate model performance using accuracy, F1-score, precision-recall curves.
- Optimize hyperparameters (learning rate, dropout, number of layers) for better accuracy.

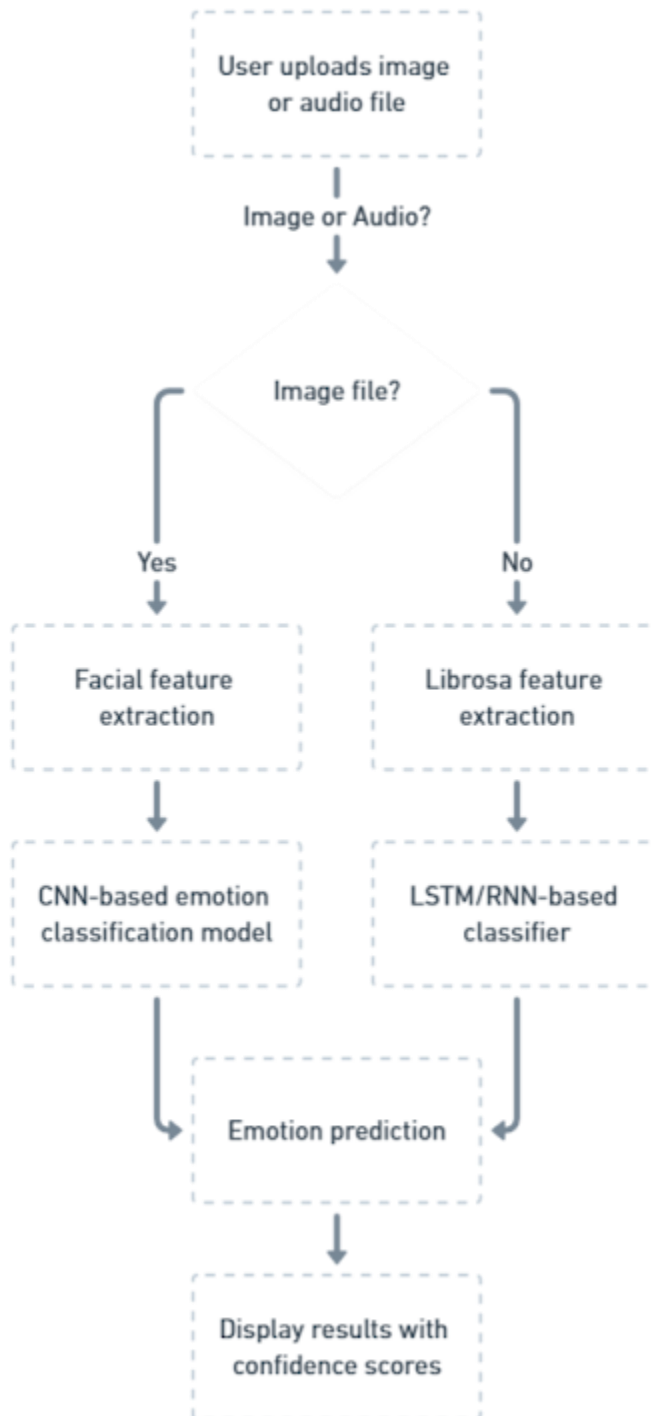
Week 5-6: User Interface & User Interactions

- Develop a Streamlit web application for users to upload cat images & audio.
- Integrate backend processing with Flask/FastAPI to analyze files and return predictions.
- Display results with confidence scores and explanations of detected emotions.
- Add visualizations (feature importance, spectrograms, detected emotion trends).
- Ensure a smooth user experience by handling invalid inputs and errors.

Weeks 7-8: Testing, Review, and Documentation

- Conduct thorough testing and validation to ensure reliability.
- Document the entire process, including data collection, preprocessing, model selection, and deployment.
- Prepare a final report summarizing insights from the project.

5. Flow chart:



6. Sample Dashboard:

