Project Summary: Human Voice Gender Classification & Clustering

Problem Statement

The goal is to classify a person's gender from their voice using extracted audio features such as MFCCs, pitch, and spectral properties. The project also explores clustering techniques to group similar voice profiles.

Dataset

The dataset includes 44 features extracted from human speech samples, including MFCCs, spectral contrast, pitch, and energy. The target variable 'label' indicates gender (0 for Female, 1 for Male).

Preprocessing

- Removed missing values

- Standardized features using StandardScaler

- Split data: 80% training, 20% testing

Model Used

Random Forest Classifier: Chosen for its robustness, high accuracy, and ability to handle complex datasets without heavy tuning.

Results

- Accuracy: 99.5%

- High precision, recall, and F1-score

- Confusion Matrix confirms excellent classification

Technologies Used

Python, Pandas, Scikit-learn, Streamlit, joblib

Deployment

A Streamlit app allows users to upload CSV files, run predictions, and view actual vs. predicted results interactively in the browser.

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Future Improvements

- Add real-time voice (.wav) processing

- Improve UI and deploy online via Streamlit Cloud