

Feature Extraction

```
In [1]: # Install dependencies (first cell in Colab)
!pip install librosa pandas scikit-learn

import librosa
import numpy as np
import pandas as pd
import os

# Feature extraction function
def extract_features(file_path):
    y, sr = librosa.load(file_path, sr=None)
    mfcc = np.mean(librosa.feature.mfcc(y=y, sr=sr, n_mfcc=20).T, axis=0)
    chroma = np.mean(librosa.feature.chroma_stft(y=y, sr=sr).T, axis=0)
    zcr = np.mean(librosa.feature.zero_crossing_rate(y).T)
    centroid = np.mean(librosa.feature.spectral_centroid(y=y, sr=sr).T)
    return np.hstack([mfcc, chroma, zcr, centroid])
```

DEPRECATION: Loading egg at c:\users\anagh\appdata\local\programs\python\python311\lib\site-packages\face_alignment-1.4.2-py3.11.egg is deprecated. pip 25.1 will enforce this behaviour change. A possible replacement is to use pip for package installation. Discussion can be found at <https://github.com/pypa/pip/issues/12330>

[notice] A new release of pip is available: 24.3.1 -> 25.0.1
[notice] To update, run: python.exe -m pip install --upgrade pip

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Requirement already satisfied: librosa in c:\users\anagh\appdata\local\programs\python\python311\lib\site-packages (0.11.0)
Requirement already satisfied: pandas in c:\users\anagh\appdata\local\programs\python\python311\lib\site-packages (2.2.3)
Requirement already satisfied: scikit-learn in c:\users\anagh\appdata\local\programs\python\python311\lib\site-packages (1.6.1)
Requirement already satisfied: audioread>=2.1.9 in c:\users\anagh\appdata\local\programs\python\python311\lib\site-packages (from librosa) (3.0.1)
Requirement already satisfied: numba>=0.51.0 in c:\users\anagh\appdata\local\programs\python\python311\lib\site-packages (from librosa) (0.60.0)
Requirement already satisfied: numpy>=1.22.3 in c:\users\anagh\appdata\local\programs\python\python311\lib\site-packages (from librosa) (2.0.2)
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Requirement already satisfied: typing_extensions>=4.1.1 in c:\users\anagh\appdata\local\programs\python\python311\lib\site-packages (from librosa) (4.12.2)
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Requirement already satisfied: pycparser in c:\users\anagh\appdata\local\programs\python\python311\lib\site-packages (from cffi>=1.0->soundfile>=0.12.1->librosa) (2.22)
Requirement already satisfied: charset-normalizer<4,>=2 in c:\users\anagh\appdata\local\programs\python\python311\lib\site-packages (from requests>=2.19.0->pooch>=1.1->librosa) (3.4.1)
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Requirement already satisfied: idna<4,>=2.5 in c:\users\anagh\appdata\local\programs\python\python311\lib\site-packages (from requests>=2.19.0->pooch>=1.1->librosa) (3.10)
Requirement already satisfied: urllib3<3,>=1.21.1 in c:\users\anagh\appdata\local\programs\python\python311\lib\site-packages (from requests>=2.19.0->pooch>=1.1->librosa) (2.3.0)
Requirement already satisfied: certifi>=2017.4.17 in c:\users\anagh\appdata\local\programs\python\python311\lib\site-packages (from requests>=2.19.0->pooch>=1.1->librosa) (2025.1.31)

Load Dataset and Prepare Data

```
In [3]: import os

# Path to your folder in Google Drive (update with your actual path)
data_path = r"C:\Users\anagh\Downloads\ChickenSounds"

features = []
labels = []

for label in os.listdir(data_path):
    folder_path = os.path.join(data_path, label)
    if os.path.isdir(folder_path):
        for file in os.listdir(folder_path):
            if file.endswith(".wav"):
                file_path = os.path.join(folder_path, file)
                try:
                    feature = extract_features(file_path)
                    features.append(feature)
                    labels.append(label)
                except Exception as e:
                    print(f"Error with {file_path}: {e}")

# Convert to DataFrame
X = pd.DataFrame(features)
y = pd.Series(labels)
```

Train-Test Split

```
In [4]: from sklearn.model_selection import train_test_split

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_st
```

Train Model (Random Forest)

```
In [5]: from sklearn.ensemble import RandomForestClassifier

model = RandomForestClassifier()
model.fit(X_train, y_train)
```

Out[5]: ▾ RandomForestClassifier ⓘ ?

RandomForestClassifier()

Evaluate Model

```
In [6]: from sklearn.metrics import accuracy_score, classification_report, confusion_matrix
import matplotlib.pyplot as plt
import seaborn as sns

y_pred = model.predict(X_test)

print("Accuracy:", accuracy_score(y_test, y_pred))
print("\nClassification Report:\n", classification_report(y_test, y_pred))

# Confusion Matrix
cm = confusion_matrix(y_test, y_pred)
plt.figure(figsize=(8, 6))
sns.heatmap(cm, annot=True, fmt='d', cmap='Blues', xticklabels=model.classes_, yticklabels=model.classes_)
plt.xlabel("Predicted")
plt.ylabel("Actual")
plt.title("Confusion Matrix")
plt.show()
```

Accuracy: 0.8

Classification Report:

	precision	recall	f1-score	support
distress	1.00	1.00	1.00	4
food_call	0.75	0.92	0.83	13
hello	0.50	0.50	0.50	2
noise	0.00	0.00	0.00	1
other	0.83	0.62	0.71	8
unclassified	1.00	1.00	1.00	2
accuracy			0.80	30
macro avg	0.68	0.67	0.67	30
weighted avg	0.78	0.80	0.78	30

```
c:\Users\anagh\AppData\Local\Programs\Python\Python311\Lib\site-packages\sklearn\metrics\_classification.py:1565: UndefinedMetricWarning: Precision is ill-defined and being set to 0.0 in labels with no predicted samples. Use `zero_division` parameter to control this behavior.
    _warn_prf(average, modifier, f"{metric.capitalize()} is", len(result))
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