

می‌توانید مراحل زیر را دنبال کنید. این مراحل شامل بارگذاری داده‌ها، پردازش آن‌ها، و آموزش مدل است. در Google Colab، SVM برای اجرای پروژه طبقه‌بندی صدای قلب با استفاده از خود دارید Google Drive اینجا، ما فرض می‌کنیم که شما فایل‌های صوتی را در

## Google Drive و اتصال به Google Colab مرحله ۱: راه‌اندازی

- بروید و یک نوت‌بوک جدید ایجاد کنید Google Colab به.
- خود اجرا کنید Google Drive کد زیر را برای اتصال به.

```
from google.colab import drive
drive.mount('/content/drive')
```

Mounted at /content/drive

## مرحله ۲: نصب کتابخانه‌های لازم

کتابخانه‌های مورد نیاز را نصب کنید

```
!pip install numpy pandas librosa scikit-learn matplotlib
```

```
Requirement already satisfied: numpy in /usr/local/lib/python3.10/dist-packages (1.26.4)
Requirement already satisfied: pandas in /usr/local/lib/python3.10/dist-packages (2.2.2)
Requirement already satisfied: librosa in /usr/local/lib/python3.10/dist-packages (0.10.2.post1)
Requirement already satisfied: scikit-learn in /usr/local/lib/python3.10/dist-packages (1.5.2)
Requirement already satisfied: matplotlib in /usr/local/lib/python3.10/dist-packages (3.7.1)
Requirement already satisfied: python-dateutil>=2.8.2 in /usr/local/lib/python3.10/dist-packages (from pandas) (2.8.2)
Requirement already satisfied: pytz>=2020.1 in /usr/local/lib/python3.10/dist-packages (from pandas) (2024.2)
Requirement already satisfied: tzdata>=2022.7 in /usr/local/lib/python3.10/dist-packages (from pandas) (2024.2)
Requirement already satisfied: audioread>=2.1.9 in /usr/local/lib/python3.10/dist-packages (from librosa) (3.0.1)
Requirement already satisfied: scipy>=1.2.0 in /usr/local/lib/python3.10/dist-packages (from librosa) (1.13.1)
Requirement already satisfied: joblib>=0.14 in /usr/local/lib/python3.10/dist-packages (from librosa) (1.4.2)
Requirement already satisfied: decorator>=4.3.0 in /usr/local/lib/python3.10/dist-packages (from librosa) (4.4.2)
Requirement already satisfied: numba>=0.51.0 in /usr/local/lib/python3.10/dist-packages (from librosa) (0.60.0)
Requirement already satisfied: soundfile>=0.12.1 in /usr/local/lib/python3.10/dist-packages (from librosa) (0.12.1)
Requirement already satisfied: pooch>=1.1 in /usr/local/lib/python3.10/dist-packages (from librosa) (1.8.2)
Requirement already satisfied: soxr>=0.3.2 in /usr/local/lib/python3.10/dist-packages (from librosa) (0.5.0.post1)
Requirement already satisfied: typing-extensions>=4.1.1 in /usr/local/lib/python3.10/dist-packages (from librosa) (4.12.2)
Requirement already satisfied: lazy-loader>=0.1 in /usr/local/lib/python3.10/dist-packages (from librosa) (0.4)
Requirement already satisfied: msgpack>=1.0 in /usr/local/lib/python3.10/dist-packages (from librosa) (1.1.0)
Requirement already satisfied: threadpoolctl>=3.1.0 in /usr/local/lib/python3.10/dist-packages (from scikit-learn) (3.5.0)
Requirement already satisfied: contourpy>=1.0.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib) (1.3.0)
Requirement already satisfied: cycler>=0.10 in /usr/local/lib/python3.10/dist-packages (from matplotlib) (0.12.1)
Requirement already satisfied: fonttools>=4.22.0 in /usr/local/lib/python3.10/dist-packages (from matplotlib) (4.54.1)
Requirement already satisfied: kiwisolver>=1.0.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib) (1.4.7)
Requirement already satisfied: packaging>=20.0 in /usr/local/lib/python3.10/dist-packages (from matplotlib) (24.1)
Requirement already satisfied: pillow>=6.2.0 in /usr/local/lib/python3.10/dist-packages (from matplotlib) (10.4.0)
Requirement already satisfied: pyparsing>=2.3.1 in /usr/local/lib/python3.10/dist-packages (from matplotlib) (3.2.0)
Requirement already satisfied: llvmlite<0.44,>=0.43.0dev0 in /usr/local/lib/python3.10/dist-packages (from numba>=0.51.0->librosa) (0.43.0)
Requirement already satisfied: platformdirs>=2.5.0 in /usr/local/lib/python3.10/dist-packages (from pooch>=1.1->librosa) (4.3.6)
Requirement already satisfied: requests>=2.19.0 in /usr/local/lib/python3.10/dist-packages (from pooch>=1.1->librosa) (2.32.3)
Requirement already satisfied: six>=1.5 in /usr/local/lib/python3.10/dist-packages (from python-dateutil>=2.8.2->pandas) (1.16.0)
Requirement already satisfied: cffi>=1.0 in /usr/local/lib/python3.10/dist-packages (from soundfile>=0.12.1->librosa) (1.17.1)
Requirement already satisfied: pycparser in /usr/local/lib/python3.10/dist-packages (from cffi>=1.0->soundfile>=0.12.1->librosa) (2.22)
Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.10/dist-packages (from requests>=2.19.0->pooch>=1.1->librosa) (3.4.0)
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.10/dist-packages (from requests>=2.19.0->pooch>=1.1->librosa) (3.10)
Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/local/lib/python3.10/dist-packages (from requests>=2.19.0->pooch>=1.1->librosa) (2.2.3)
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.10/dist-packages (from requests>=2.19.0->pooch>=1.1->librosa) (2024.8.30)
```

```
%cd /content/drive/MyDrive/SourceKaravi/
```

```
/content/drive/MyDrive/SourceKaravi
```

## مرحله ۳: بارگذاری و پردازش داده‌ها

قرار دارند Google Drive در heart\_sounds کد زیر را برای بارگذاری و پردازش داده‌های صوتی بنویسید. فرض می‌کنیم که فایل‌های صوتی شما در پوشه‌ای به نام

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

تابعی برای استخراج ویژگی‌ها از فایل‌های صوتی #

```
def extract_features(file_name):
    audio, sample_rate = librosa.load(file_name, sr=None)
    mfccs = librosa.feature.mfcc(y=audio, sr=sample_rate, n_mfcc=40)
    return np.mean(mfccs.T, axis=0)
```

بارگذاری داده‌ها #

```
def load_data(data_directory):
    features = []
    labels = []
```

```
for file in os.listdir(data_directory):
    if file.endswith('.wav'): # هستند wav فرض بر این است که فایل‌ها با فرمت
        label = file.split('.')[0] # فرض بر این است که نام فایل برچسب است
        file_path = os.path.join(data_directory, file)
        mfccs = extract_features(file_path)
```

```
features.append(mfccs)
labels.append(label)
```

```
return np.array(features), np.array(labels)
```

```
data_directory = '/content/drive/MyDrive/SourceKaravi/DataSet/heart_sounds_upload/set_a' # مسیر به پوشه فایل‌های صوتی در Google Drive
X, y = load_data(data_directory)
```

مرحله ۴: تقسیم داده‌ها به مجموعه‌های آموزشی و آزمایشی

```
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_state=42)
```

مرحله ۵: آموزش مدل SVM

بنویسید SVM که زیر را برای آموزش مدل

```
from sklearn import svm
from sklearn.metrics import classification_report, accuracy_score
```

```
# ایجاد مدل SVM
model = svm.SVC(kernel='linear') # می‌توانید از 'rbf' یا 'poly' نیز استفاده کنید
model.fit(X_train, y_train)
```

```
# پیش‌بینی بر روی مجموعه آزمایشی
y_pred = model.predict(X_test)
```

```
# ارزیابی مدل
print("Accuracy:", accuracy_score(y_test, y_pred))
print(classification_report(y_test, y_pred))
```

```
Accuracy: 0.42105263157894735
```

	precision	recall	f1-score	support
Aunlabelledtest	0.31	0.36	0.33	11
artifact	0.73	0.80	0.76	10
extrahls	0.50	0.60	0.55	5
murmur	0.00	0.00	0.00	2
normal	0.20	0.10	0.13	10
accuracy			0.42	38
macro avg	0.35	0.37	0.35	38
weighted avg	0.40	0.42	0.40	38

مرحله ۶: تجزیه و تحلیل نتایج

بررسی کنید classification\_report پس از اجرای کد، دقت و نتایج را با استفاده از

یادداشت

- اطمینان حاصل کنید که فایل‌های صوتی شما به درستی برچسب‌گذاری شده‌اند.
- می‌توانید دیگر تکنیک‌های پیش‌پردازش و بهینه‌سازی مدل را نیز امتحان کنید.
- حتماً نام پوشه و مسیر فایل‌ها را به درستی تنظیم کنید.

Start coding or [generate](#) with AI.