

## Task Description

The objective of this lab evaluation is to work with the Speech Commands dataset, as detailed in the paper *An Overview of the Speech Commands Dataset*. The tasks include summarizing the paper, performing statistical analysis on the dataset, training a classifier, and fine-tuning it with custom-recorded samples.

## Task Breakdown

1. Read and Summarize the Paper
2. Download and Analyze the Dataset
3. Train a Classifier (Google Collab in the Repo)
4. Report Performance Results
5. Create a New Dataset with Custom Samples (google link attached)
6. Fine-tune the Classifier (To be Done)
7. Report the Results

## Summary of the Paper (50 Words)

The paper "Speech Command Recognition with TensorFlow" presents a simple yet effective approach for recognizing spoken commands using a neural network model. It introduces a dataset of one-second long audio recordings of 30 different commands. The authors build a small convolutional neural network (CNN) to classify these commands and discuss performance benchmarks on recognition accuracy and model efficiency.

## Creating a Custom Dataset.

```
import sounddevice as sd
import numpy as np
import scipy.io.wavfile as wav
import os

def record_audio(duration, sample_rate=8000):
    print("Recording...")
    audio = sd.rec(int(duration * sample_rate), samplerate=sample_rate, channels=1, dtype='int16')
    sd.wait() # Wait for the recording to finish
    return audio

words = ['backward', 'bed', 'bird', 'cat', 'dog', 'down', 'eight', 'five', 'follow', 'forward',
        'four', 'go', 'happy', 'house', 'learn', 'left', 'marvin', 'nine', 'no', 'off', 'on', 'one', 'right', 'seven',
        'sheila', 'six', 'stop', 'three', 'tree', 'two', 'up', 'visual', 'wow', 'yes', 'zero']

# Record a sample
for j in words:
    print(j)
    for kk in range(100):
        continue
    os.mkdir(j)
    for i in range(30):
        audio_sample = record_audio(1)
        wav.write(f"{j}/{i}.wav", 8000, audio_sample)
```

Link to the Dataset in the README file of the git repository.