Lab Assignment 1: Introduction to Speech Processing

Objective1: Record their own voice using a microphone, save as .wav. Play back and listen. What is the sampling rate and bit depth?

Objective2: Introduction to basic operations on speech signals. Perform the following tasks:

1. Import and read a speech file. You can download The LJ Speech Dataset
2. Plot the waveform of speech signal (time-domain signal). Display basic information about the speech file: sample rate, no. of samples, and total duration and active speech duration (i.e. only where energy is above silence threshold).
3. Perform basic signal operations:
    i. *Slicing (extract first 2 sec.) and normalization*. Plot each sliced signal and the normalized signal.
    ii. *Amplification, de-amplification, Up-sampling and Down-sampling* the audio signal. Plot the waveform for each.
    iii. Identify voiced/unvoiced/silence portions visually.

Expected Outcomes:

1. Observe the speech waveform and understand how amplitude changes over time.
2. Familiarization with basic signal processing tasks.
3. Hands-on experience playing and manipulating audio signals.

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Instructions for the lab-1:

1. **# You need to install and import the following libraries**

```
!pip install soundfile simpleaudio
!pip install librosa scipy

# Import necessary libraries
import numpy as np
import matplotlib.pyplot as plt
import soundfile as sf
import simpleaudio as sa
```

2. **Make the lab report that must include the following components and submit to teams assignment page**
    i. Title of the experiment
    ii. Dataset description
    iii. Objective
    iv. Code

v. Output
vi. Conclusion/Inference from output.