Colaboratory is now known as **Google Colab** or simply Colab. Another attractive feature that Google offers to the developers is the use of GPU. Colab supports GPU and it is totally free. The reasons for making it free for public could be to make its software a standard in the academics for teaching, learning and doing projects machine learning and data science.

We made a common GitHub account so that all the members of group can access and edit the files if needed. So, here is the input folder consist of audio files in it.

os.**environ** behaves like a python dictionary,We can also modify **os**.**environ** but any changes will be effective only for the current process where it was assigned and it will not change the value permanently

```
pip3 install --upgrade pip
python3 -m pip install --upgrade setuptools
sudo apt install libasound2-dev portaudio19-dev libportaudio2 libportaudiocpp0 ffmpeg
sudo apt install python3-venv
pip3 uninstall keras-nightly
pip3 uninstall -y tensorflow
pip3 install librosa
pip3 install matplotlib
pip3 install keras==2.1.6
pip3 install tensorflow==1.15.0
pip3 install h5py==2.10.0
sudo apt-get install -y python3-pyaudio
pip3 install keras==2.3.1
pip3 install torch==1.5.0
pip3 install pydub==0.24.1
pip3 install torchvision==0.6.0
chmod +x pyaudio.sh
./pyaudio.sh
```

TF_**CPP**_**MIN**_**LOG**_LEVEL=3 prevents showing information/warning logs including libpng warnings.

all messages are logged (default behavior)
1 = INFO messages are not printed
2 = INFO and WARNING messages are not printed
3 = INFO, WARNING, and ERROR messages are not printed

every living being has emotions don't try to find logic behind their behaviour but try to find out their feelings. So, to find emotions here we are with emotion recognition through speech analysis.

Yeh et al. proposed a segment based method for recognition of emotion in Mandarin speech.
Algorithm used: Discrete k-NN(k-nearest neighbors algorithm) classifier
Advantages:

a. Sequential Forward Selection (SFS) and Sequential Back- ward Selection (SBS) improves feature accuracy to 84% and 82% respectively.
b. The experimental testing of different k shows the best per- formance for k-NN is when k sets to 10

Disadvantages:

a. The highest accuracy in segment-based method achieves 86% only.
b. Best performance is obtained only at single value of k i.e.when k=10.

c. Only Mandarin language is used for datasets.

Han et al. worked on Speech Emotion Recog- nition Using Deep Neural Network And extreme machine learning
Advantages:

a. Well described methodology on how to conduct experi- ment.

b. Results show that proposed DNN methodology outper- forms HMM(Hidden Markov Mode) and SVM (Support Vector Machine)by 20% relative accuracy.
c. ELMs (Extreme Learning Machine)paradigm proposed are 10 times faster than SVMs.
Disadvantages:

a. While comparison analysis between DNN and HMM and SVM(Support Vector Machine) is attempted, less information is supplied on how the latter (HMM & SVM) is performed.
b. While weighted and unweighted average is more accurate, the overall recognition rate is not mentioned.

3.Wei-Long Zheng and Bao-Liang Lu proposed EEG-based effective models
Advantages:
a. This method was very accurate in terms of positive emo- tion recognition than other techniques used before. Their method achieved 85.01% accuracy.

b. This method achieved 85.01% accuracy

Disadvantages:

a. The achievement is limited to positive emotion recognition only.
b. This method is limited in terms of negative and neutral emotion recognition. Yet a lot improvement needed to recog- nize negative and neutral emotion more accurately.

4.Detection of Emotional Expressions in Speech using SVM (Support Vector Machine)Classifier and Acoustic Features. Algorithm used: RELIEF-F algorithm
Advantages:

a. The emotion of anger was detected with the highest accu- racy and precision.
Disadvantages:
a. As the acoustic feature plays a most important role in this case but it can not be good for all the types of emotion.

b. The major drawback of this model was this classifier rec- ognized most of the happy emotions into anger.
c. Acoustic information is not enough to detect the emotional category.

5. Decision-Level Fusion Method for Emotion Recognition using Multimodal Emotion Recogni-

tion Information
Algorithm used: Artificial Neural Network (ANN) or the k-Nearest Neighbor (k-NN) algorithm.
Advantages:
a. To increase the recognition rate a method was proposed to use the result of each recognizer by fusing their outputs . b. The k-NN was constructed as a classifier of the fusion stage and was trained with the Feature 2 combination, the highest recognition rate of 43.40
Disadvantages:
a. This method is not equipped to recognize emotion through speech individually.
b. It also needs additional video data for recognizing emo- tion.

Feature extraction is a part of the dimensionality reduction process, in which, an initial set of the raw data is divided and reduced to more manageable groups. So when you want to process it will be easier. The most important characteristic of these large data sets is that they have a large number of variables. These variables require a lot of computing resources to process them. So Feature extraction helps to get the best feature from those big data

sets by select and combine variables into features, thus, effectively reducing the amount of data. These features are easy to process, but still able to describe the actual data set with the accuracy and originality.

Applications:

1. Improves Human computer interaction:

The emotion recognition system should be applied in differ- ent kinds of the Human computer interaction systems, such as dialogue systems, automatic answering systems and hu- man robots etc. A system that is based on the user's emo- tion,makes human computer interaction synchronized.

2. Call centre:

The voice call center is a tool that helps operators and super- visors to visualize emotional content of voice messages pro- vided by users which will help to know the emotions of cus- tomer and in turn improve the services that are served by the company.

3. Student's voice review:

Emotion recognition model can be used in education field as to understand whether students enjoy the learning process or not. Teacher can ask students to provide their voice reviews which then can be

analysed by the system. This helps teacher to know where the improvement is needed and accordingly plan their future lectures.

4. Helps to build healthy relationship:

In social media most of the people fears to express their emo- tions. Here the emotion recognition system helps to find their hidden emotions through their own posted videos Which in turn detects emotions behind their voice.

```
score = sklearn.metrics.accuracy_score(label_test, predicted_labels)
```