Deep Learning Hands-on

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Google site link: https://sites.google.com/phd.nitdgp.ac.in/sandipan-dhar/home

Contents:

Environment Setup

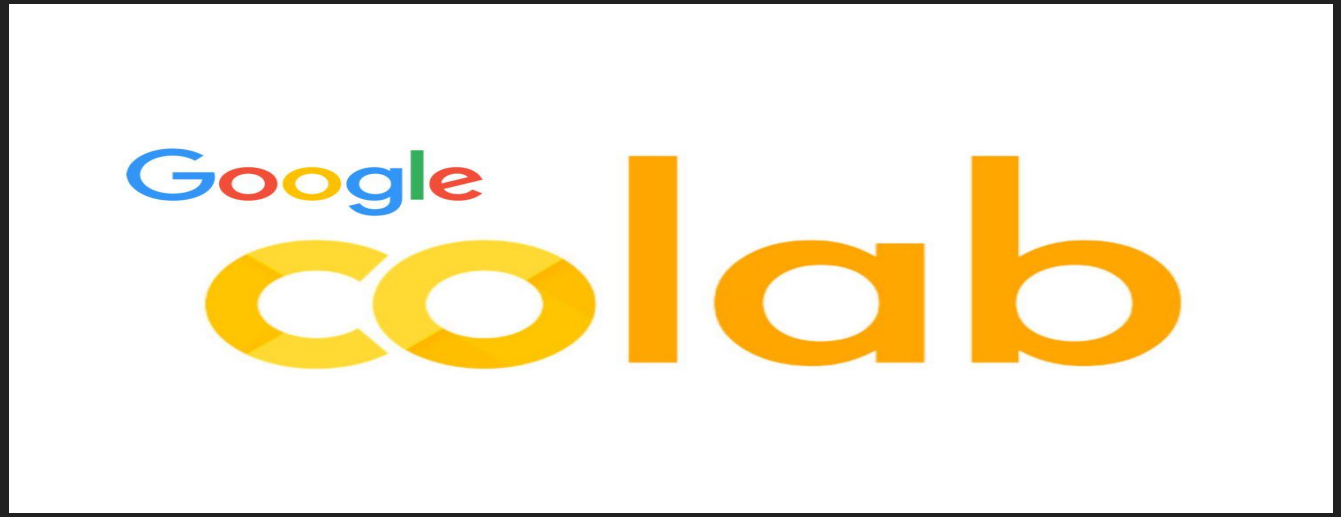
- Notebooks or IDE (integrated development environment) for DL program execution

- **Installation of notebooks or IDE (integrated development environment) for DL program execution**

- Anaconda : https://www.anaconda.com/products/distribution
  Anaconda installation guide: https://www.youtube.com/watch?v=YU7ZGgPKSsA

- Jupyter Notebook: https://jupyter.org/
  Jupyter Notebook installation guide: https://www.youtube.com/watch?v=kf3AwEvNdno

- Pycharm: https://www.jetbrains.com/pycharm/download/#section=windows
  Pycharm installation guide: https://www.youtube.com/watch?v=15daSz2QExo&t=422s


Google
colab


aws


kaggle

CPU-only VMs

Parameter	Google Colab	Kaggle Kernel
CPU Model Name	Intel(R) Xeon(R)	Intel(R) Xeon(R)
CPU Freq.	2.30GHz	2.30GHz
No. CPU Cores	2	4
CPU Family	Haswell	Haswell
Available RAM	12GB (upgradable to 26.75GB)	16GB
Disk Space	25GB	5GB

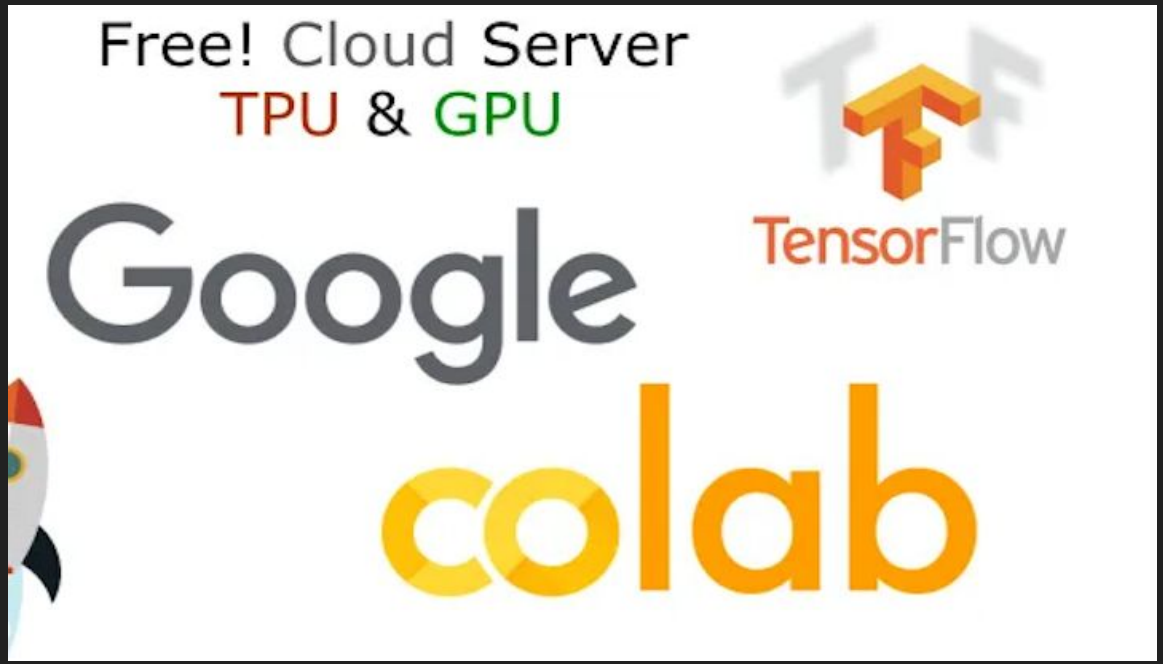
GPU VMs

Parameter	Google Colab	Kaggle Kernel
GPU	Nvidia K80 / T4	Nvidia P100
GPU Memory	12GB / 16GB	16GB
GPU Memory Clock	0.82GHz / 1.59GHz	1.32GHz
Performance	4.1 TFLOPS / 8.1 TFLOPS	9.3 TFLOPS
Support Mixed Precision	No / Yes	No
GPU Release Year	2014 / 2018	2016
No. CPU Cores	2	2
Available RAM	12GB (upgradable to 26.75GB)	12GB
Disk Space	358GB	5GB

Parameter	Google Colab	Kaggle Kernel
Max execution time	12 hours	9 hours
Max idle time	90 min	60 min

Deep Learning Frameworks

- **How to install python libraries in Google Colab**

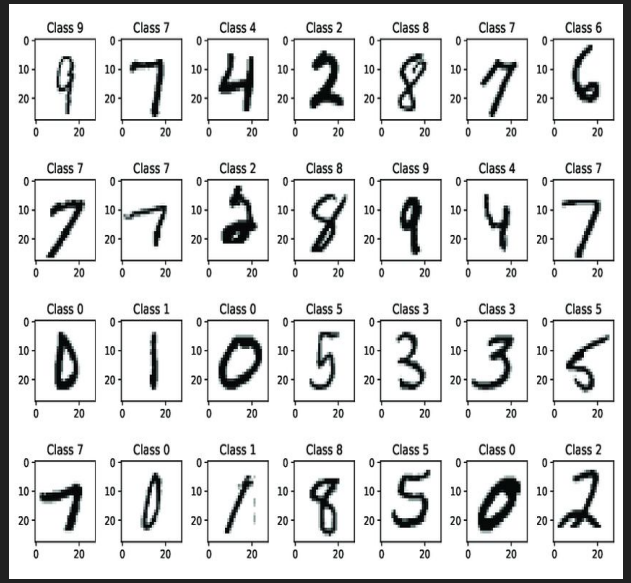


Goto this link: https://github.com/SandyPanda-MLDL/Deep-Learning-Demo

Or else this link:https://drive.google.com/drive/folders/1r_tYFqNUjQTDg6Wus8G5fv8U8AMsdaLX?usp=sharing

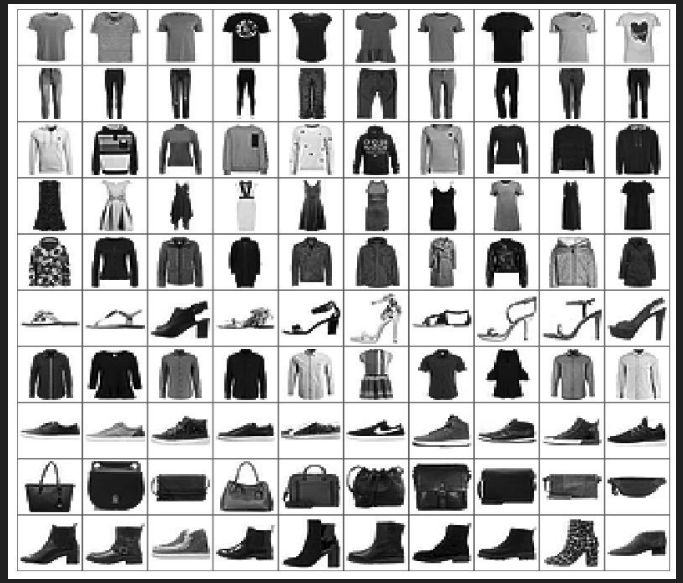
MNIST Dataset

60,000 examples in the training dataset and 10,000 in the test dataset and that images are indeed square with 28×28 pixels grayscale image.



MNIST Handwritten digits

training set of 60,000 examples and a test set of 10,000 examples. Each example is a 28x28 grayscale image, associated with a label from 10 classes.



Fashion MNIST

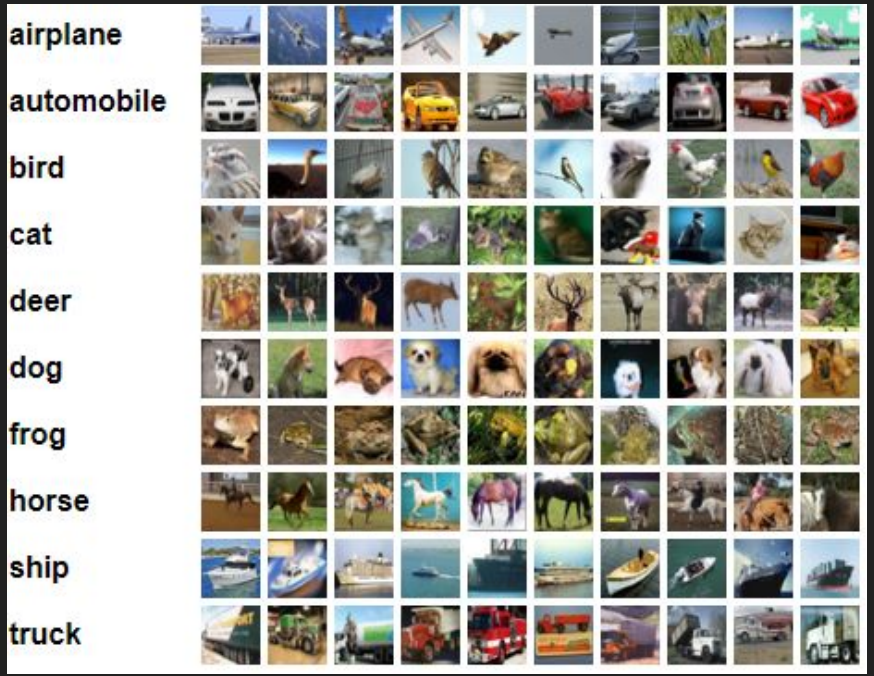
Class labels for each products https://www.tensorflow.org/tutorials/keras/classification

Link of official site of MNIST: http://yann.lecun.com/exdb/mnist/

https://conx.readthedocs.io/en/latest/MNIST.html

CIFAR 10 dataset

CIFAR-10 dataset consists of 60000 32x32 colour images in 10 classes, with 6000 images per class. There are 50000 training images and 10000 test images.



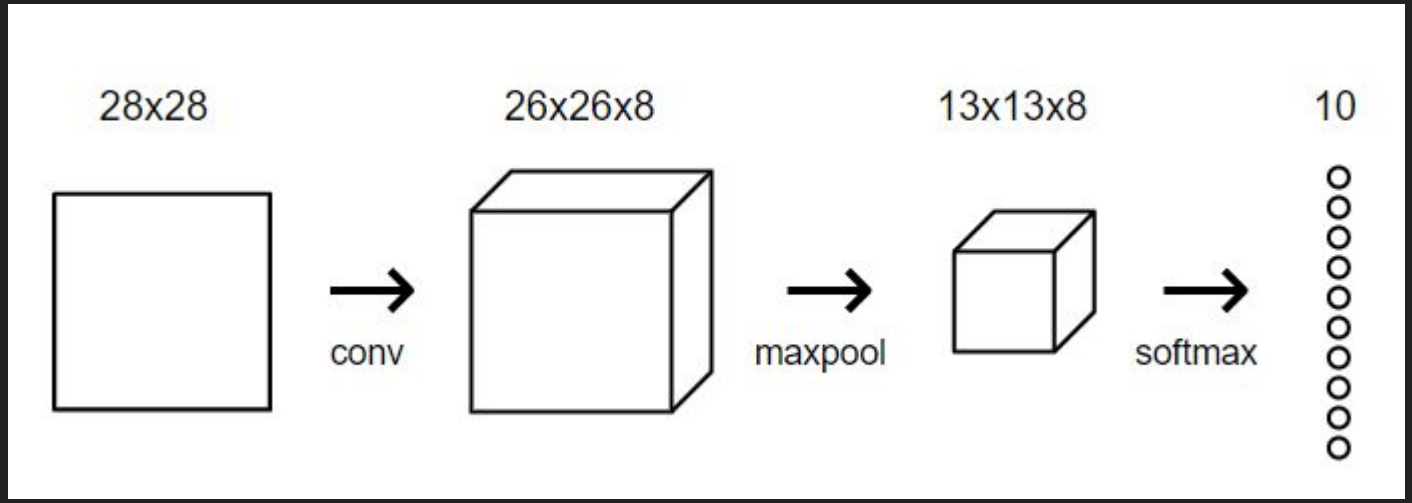
CIFAR 10 dataset official link: https://www.cs.toronto.edu/~kriz/cifar.html

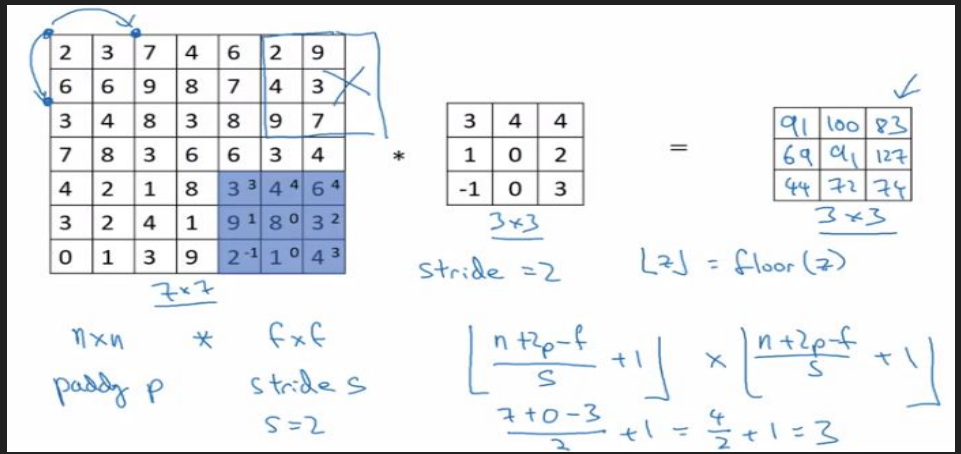
One-hot Encoding

Color
Red
Red
Yellow
Green
Yellow

Red	Yellow	Green
1	0	0
1	0	0
0	1	0
0	0	1

Implementation of DL model in Keras



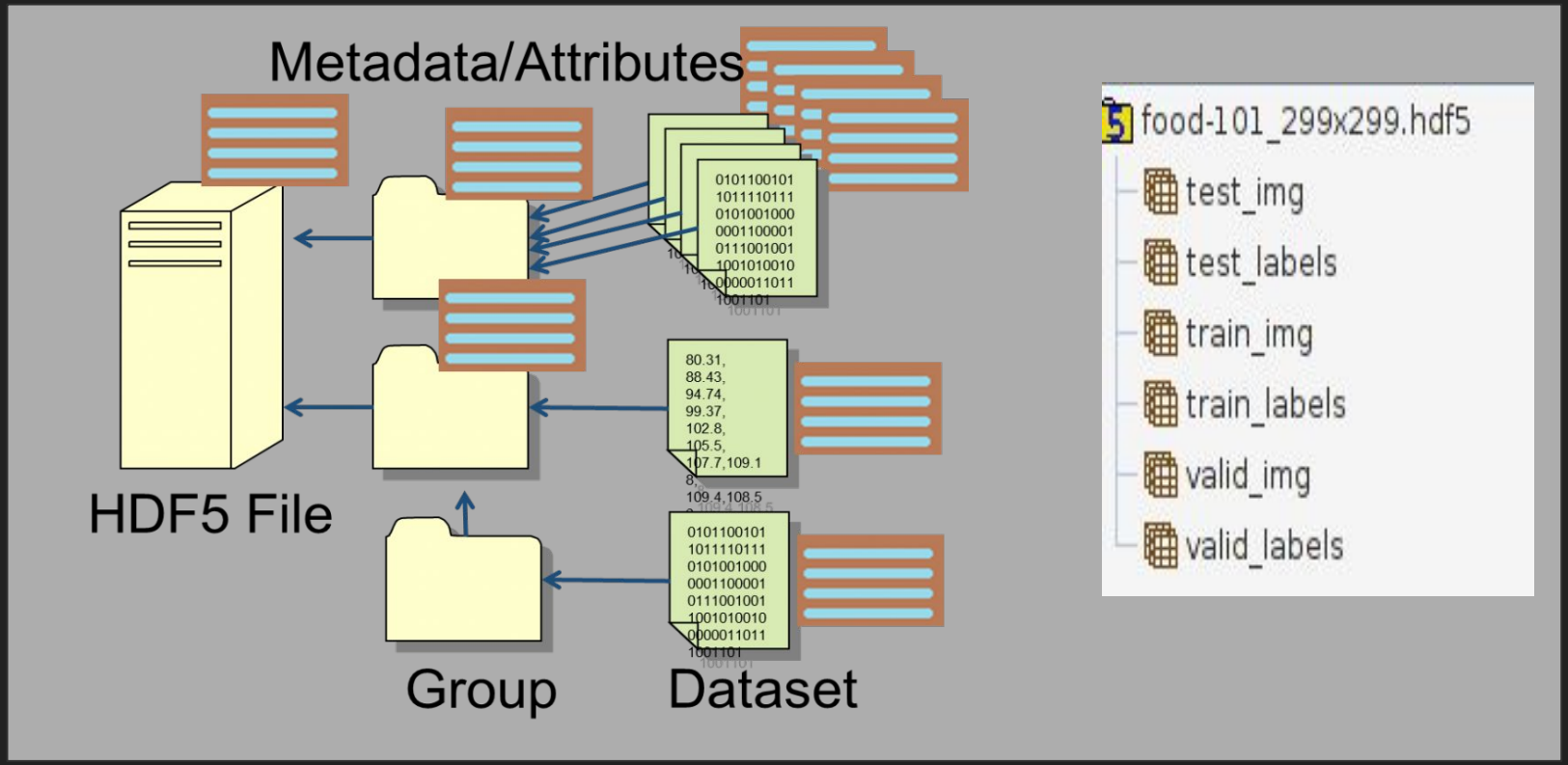


In max pooling filter size is 2*2

Output of 1st Conv 26*26

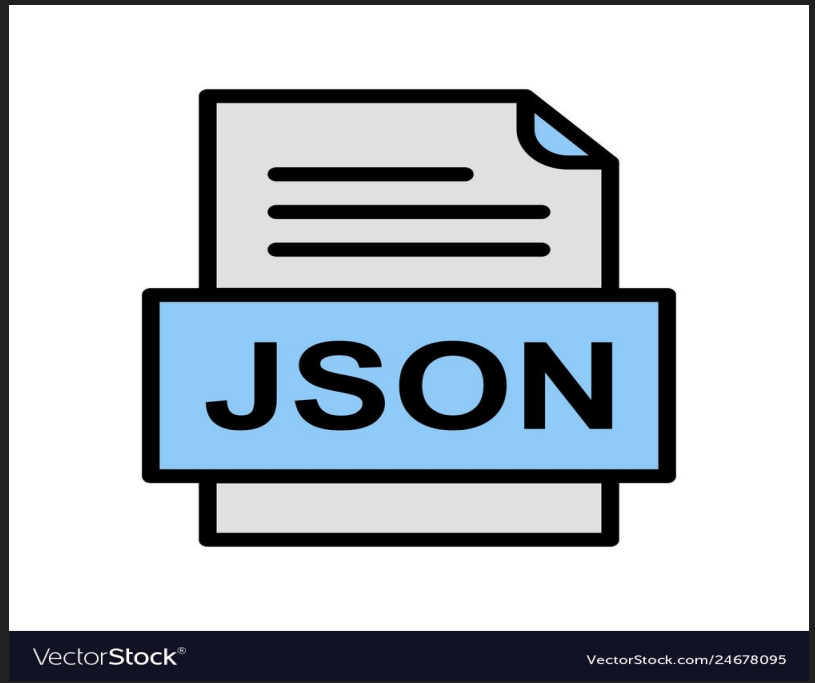
The output of max pooling= 26/2 * 26/2
=13*13

Hdf5 file format

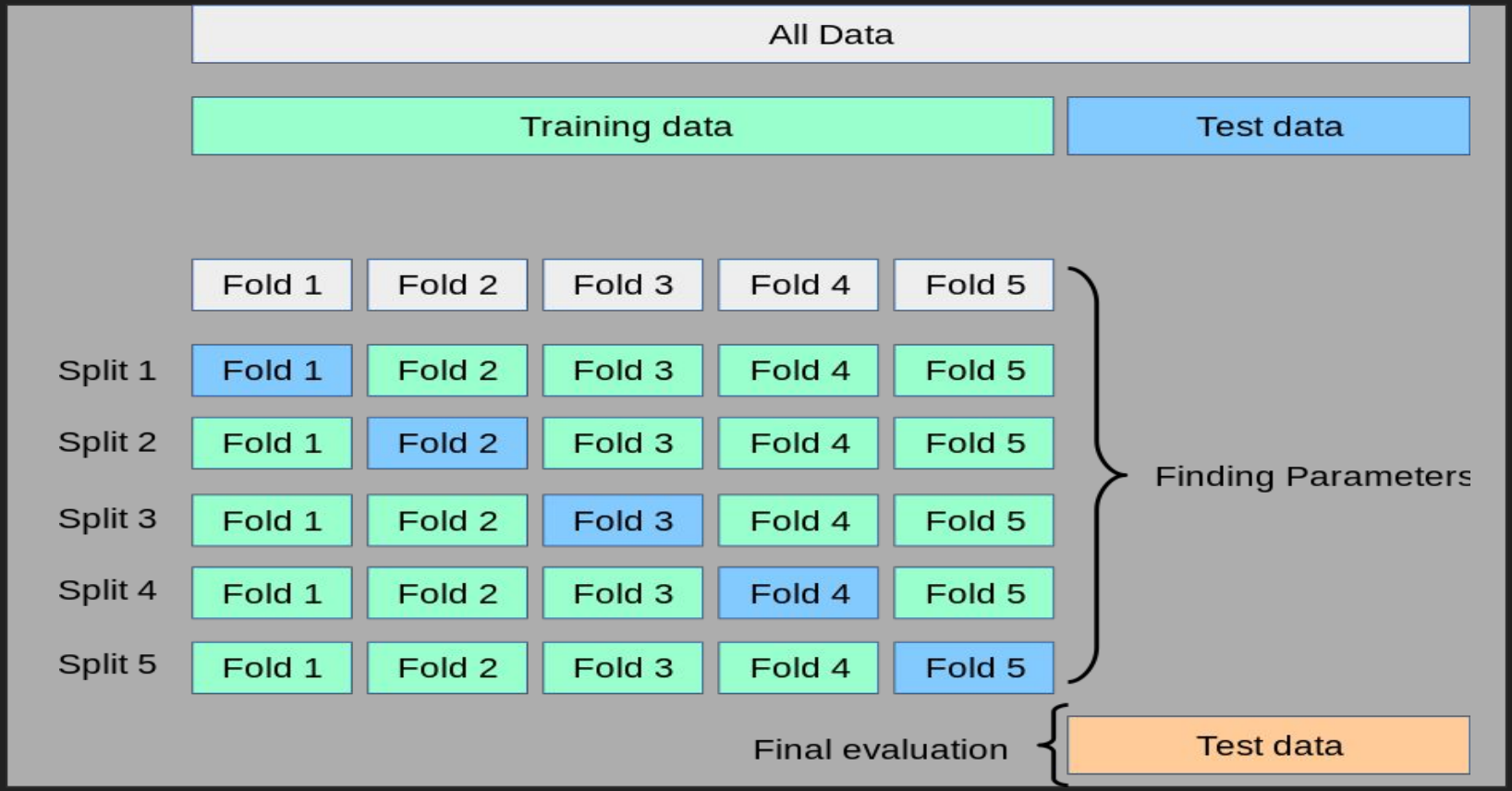


JSON file format

```
{
    "emp_details": [
        {
            "emp_name": "Shubham",
            "email": "ksingh.shubh@gmail.com",
            "job_profile": "intern"
        },
        {
            "emp_name": "Gaurav",
            "email": "gaurav.singh@gmail.com",
            "job_profile": "developer"
        },
        {
            "emp_name": "Nikhil",
            "email": "nikhil@geeksforgeeks.org"
            "job_profile": "Full Time"
        }
    ]
}
```

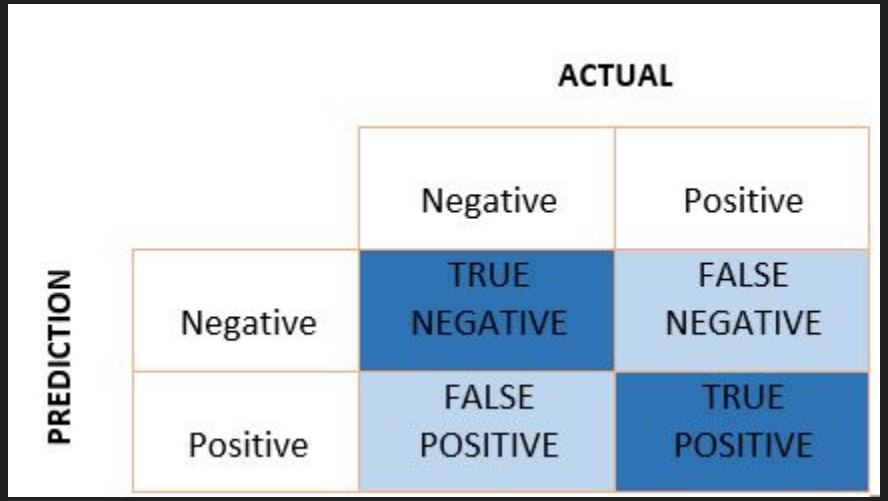


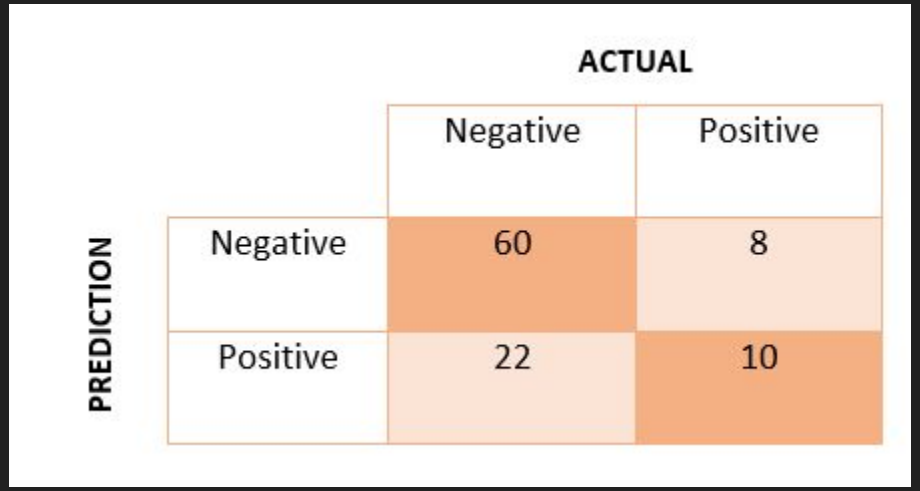
K-fold cross validation



Customization of DL modules and evaluation metrics and all

My medium blog link:
https://medium.com/@sandipandhar_6564/deep-learning-dem-6228e73377ff





$$Precision = \frac{TP}{TP + FP}$$

$$Recall = \frac{TP}{TP + FN}$$

$$F1\ score = \frac{2}{\frac{1}{Precision} + \frac{1}{Recall}} = \frac{2 * (Precision * Recall)}{(Precision + Recall)}$$

Deep Learning in Medical Imaging

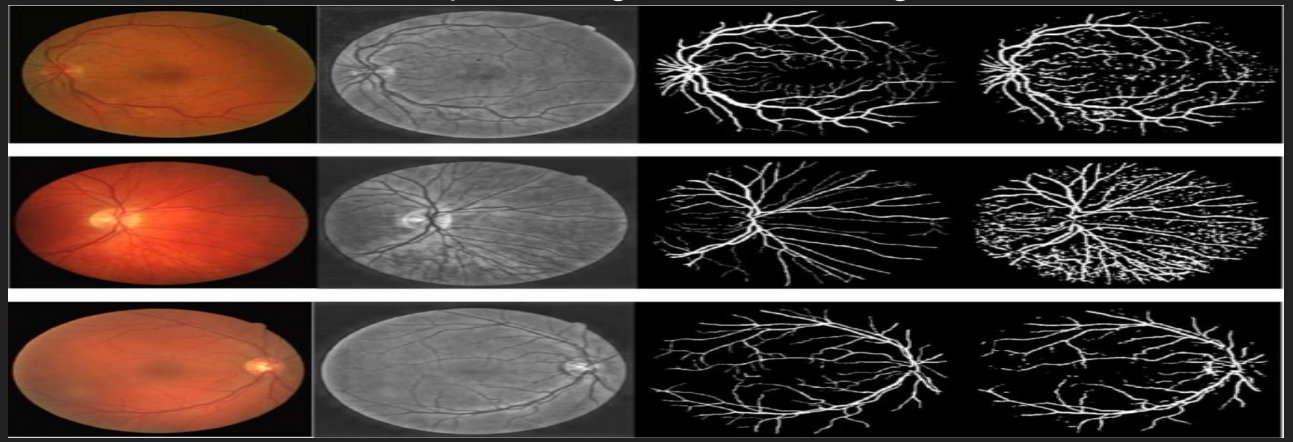
Download the age macular disease dataset from my github repo link:
https://github.com/SandyPanda-MLDL/Deep-Learning-Demo

Or
from my Google drive directly:
https://drive.google.com/drive/folders/1Ghs1YmMdTOdZxHCfaqUaoQPNG79_9GJu?usp=sharing

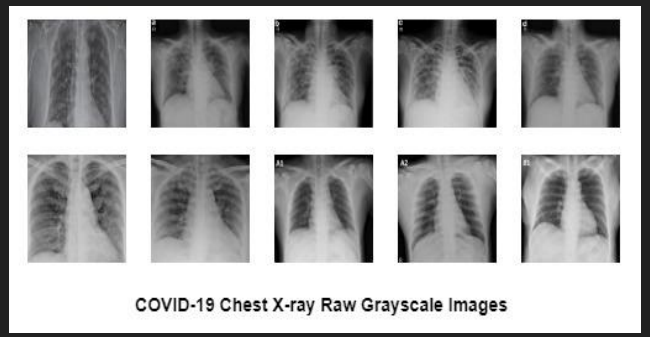
Label 0: Age Macular Disease

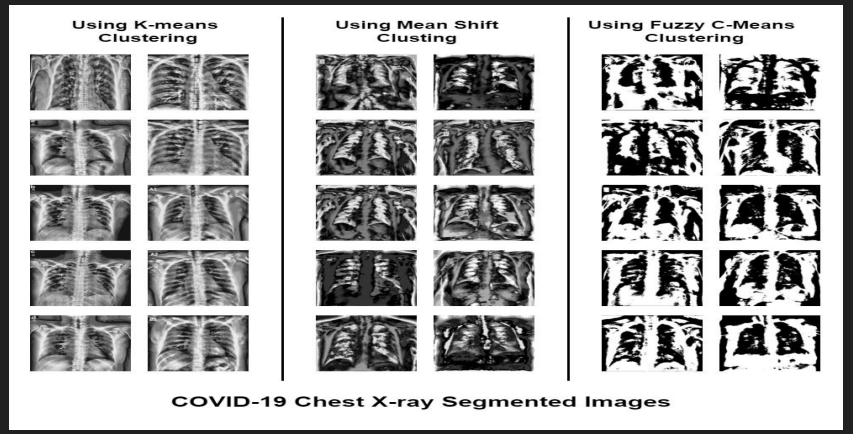
Label 1: Healthy Fundus Image

Preprocessing of medical images



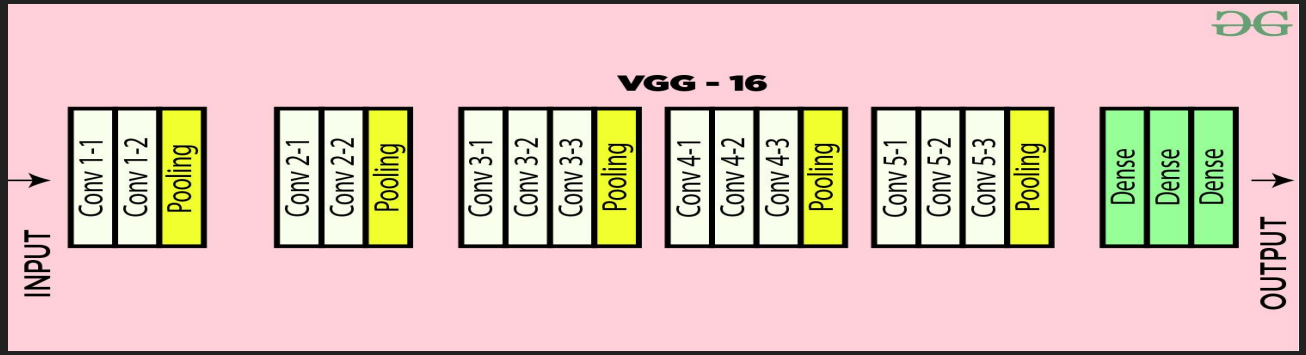
Segmented images

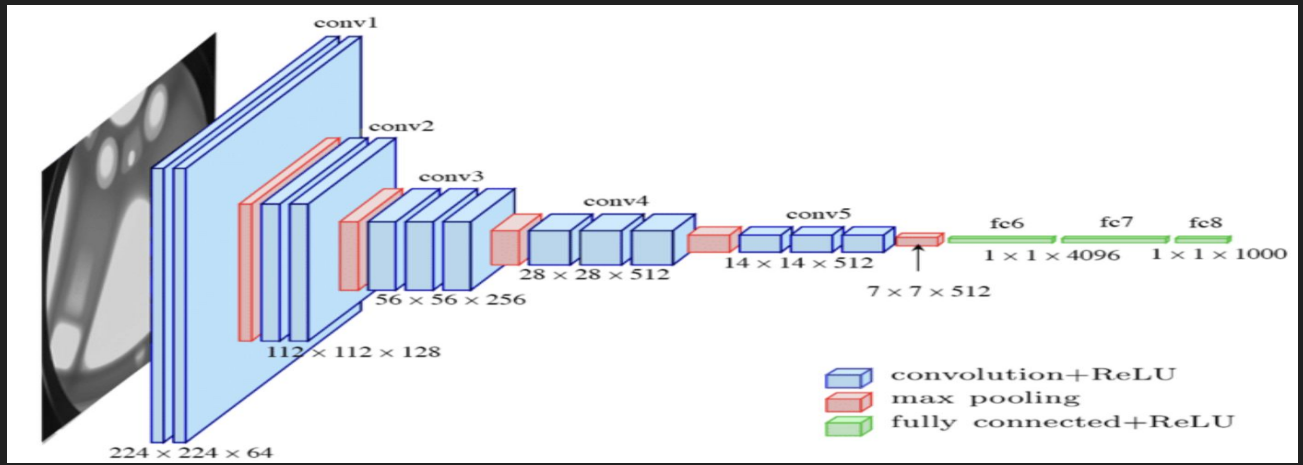




Lecture Notes in Networks and Systems, vol 430. Springer, Singapore.https://doi.org/10.1007/978-981-19-0825-5_24

Code: https://github.com/SukonyaPhukan92/COVID-19_Chest_X-ray_Image_Generation_using_ResNet50_and_DCGAN_Model





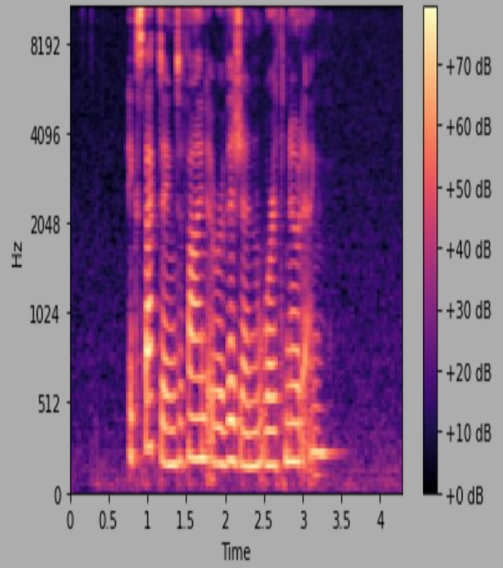
Google colab link: https://colab.research.google.com/drive/1ShC5kN_HhDEK63RRFqsLzf6squeHFPwS?usp=sharing

Or visit my repository: https://github.com/SandyPanda-MLDL/Deep-Learning-Demo

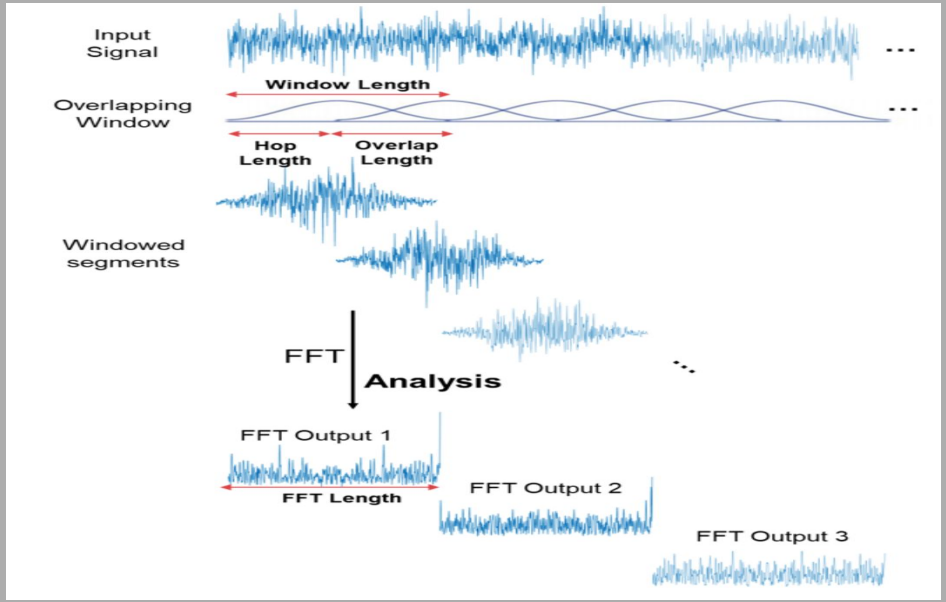
Keras.applications: https://keras.io/api/applications/

Deep Learning in Speaker Identification

Preprocessing

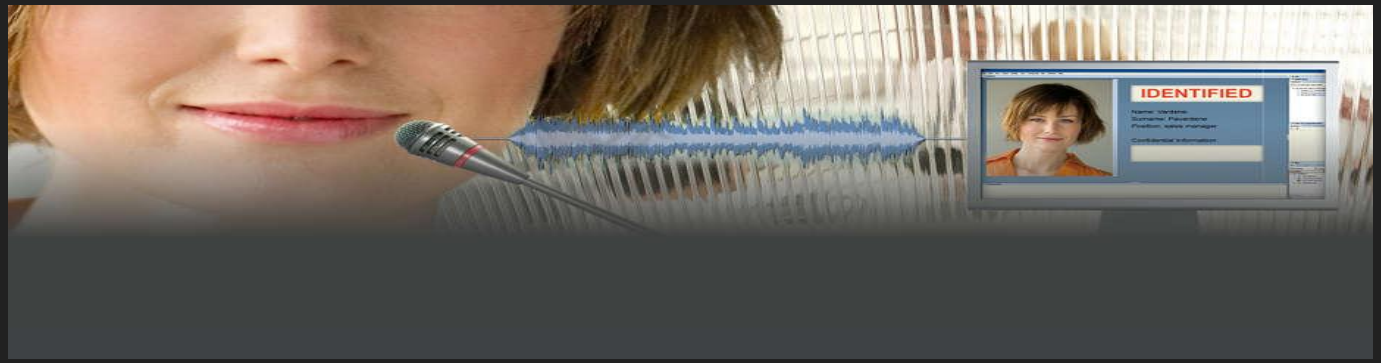


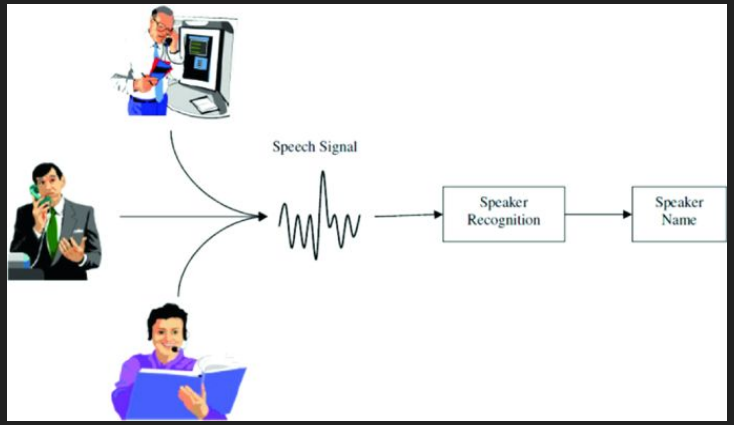
Mel-Spectrogram

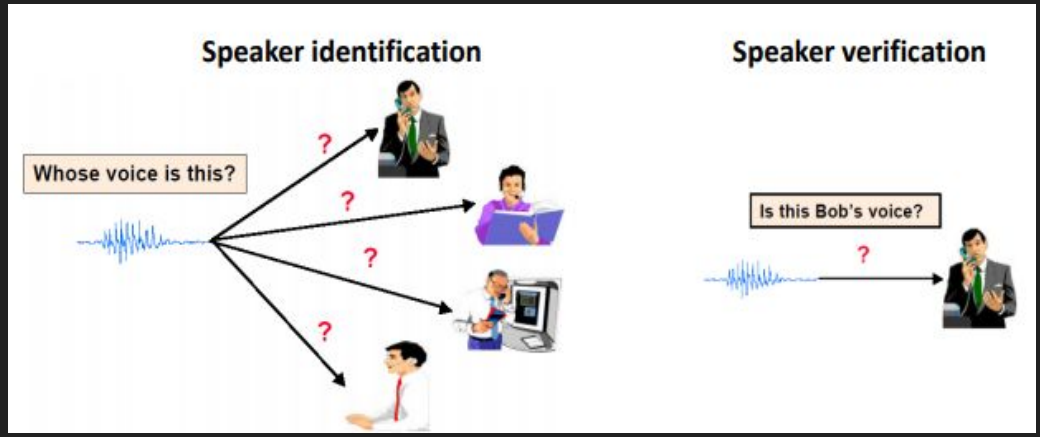


To know more about Speech Processing visit my medium blog https://medium.com/@sandipandhar_6564/visualization-of-speech-data-f6504af6096c

Speaker identification

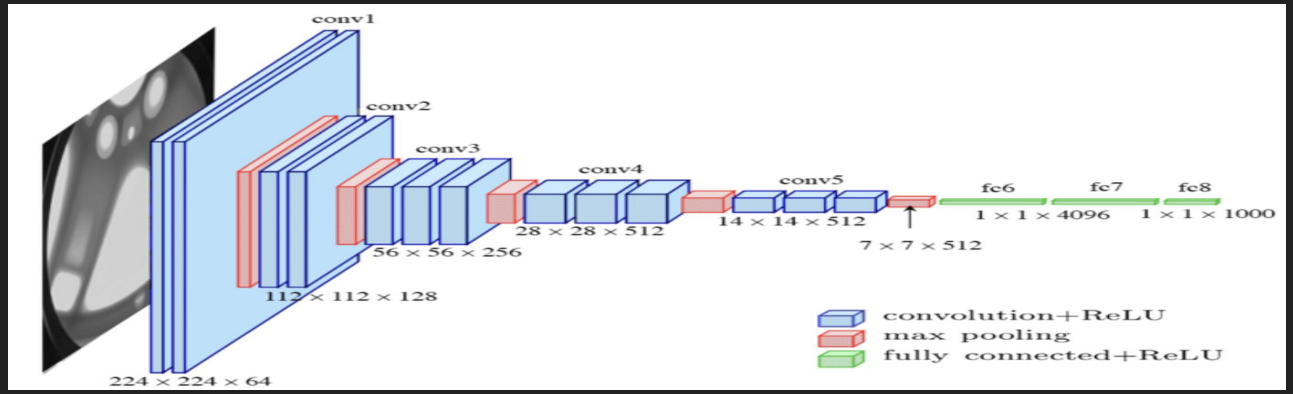


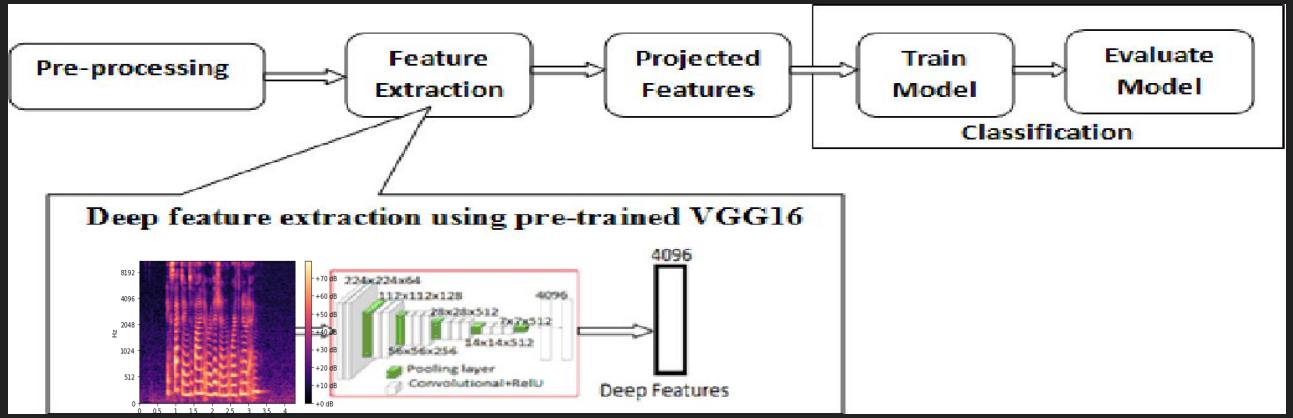




multiclass classification and binary classification

Latent feature from CNN



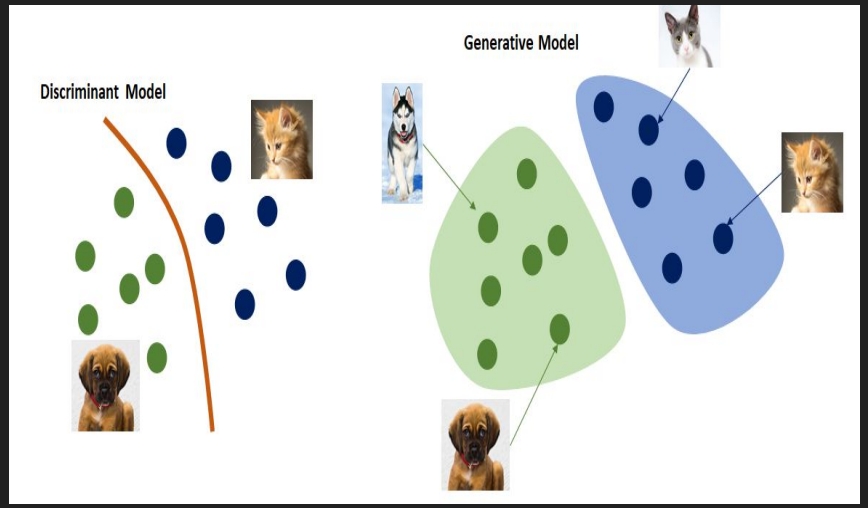


Dataset link: https://drive.google.com/drive/folders/1xZGxMIjAKJKe0wfGCvdIm2QbAJg2jeB6?usp=sharing

Code link forspeaker identification: https://colab.research.google.com/drive/117HnWX-XVGkPh-OVSV5L0o6G1DWmBChK?usp=sharing

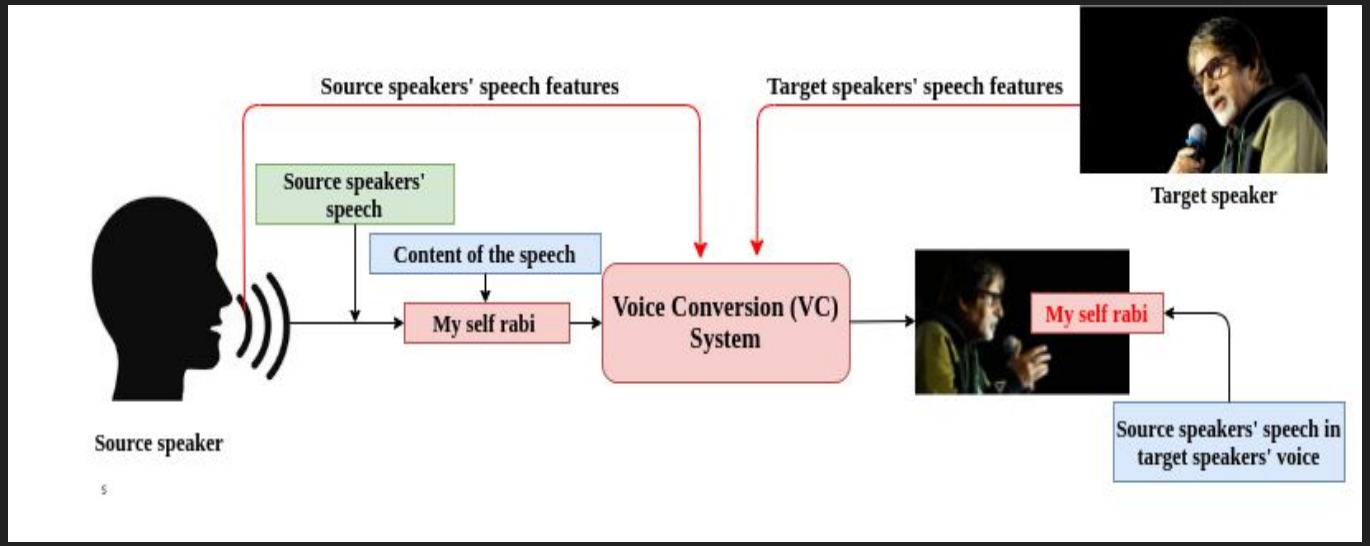
Some advancements

CNN as generative model



Generative Adversarial Network (GAN)

CNN as generative model for speech synthesis

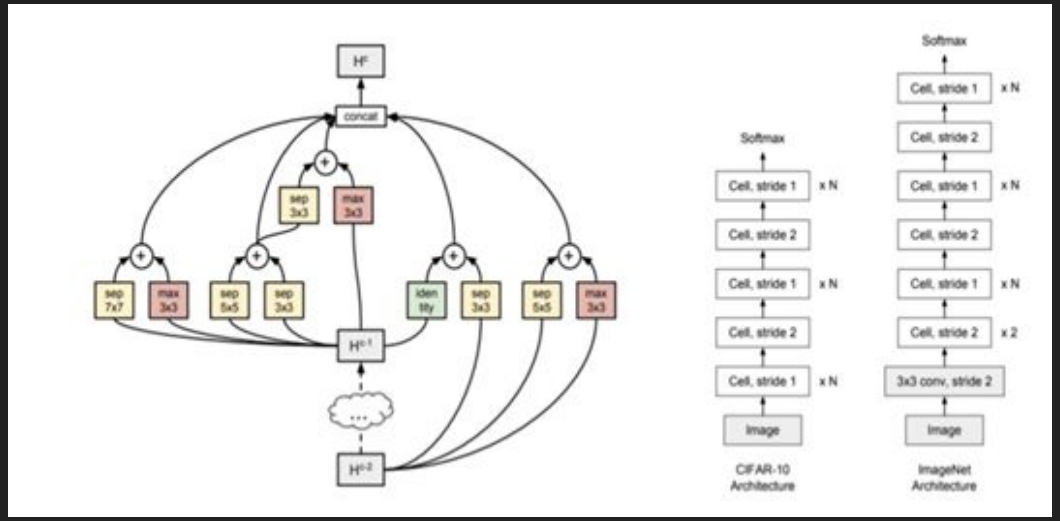


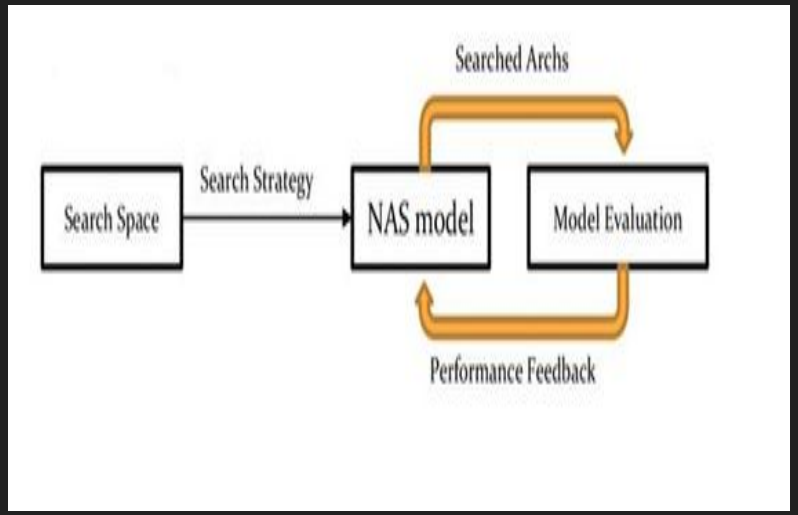
My medium blog: https://medium.com/@sandipandhar_6564

ALGAN-VC: https://ieeexplore.ieee.org/document/9709124

S. Dhar, N. D. Jana and S. Das, "An Adaptive Learning based Generative Adversarial Network for One-To-One Voice Conversion," in *IEEE Transactions on Artificial Intelligence*, doi: 10.1109/TAI.2022.3149858.

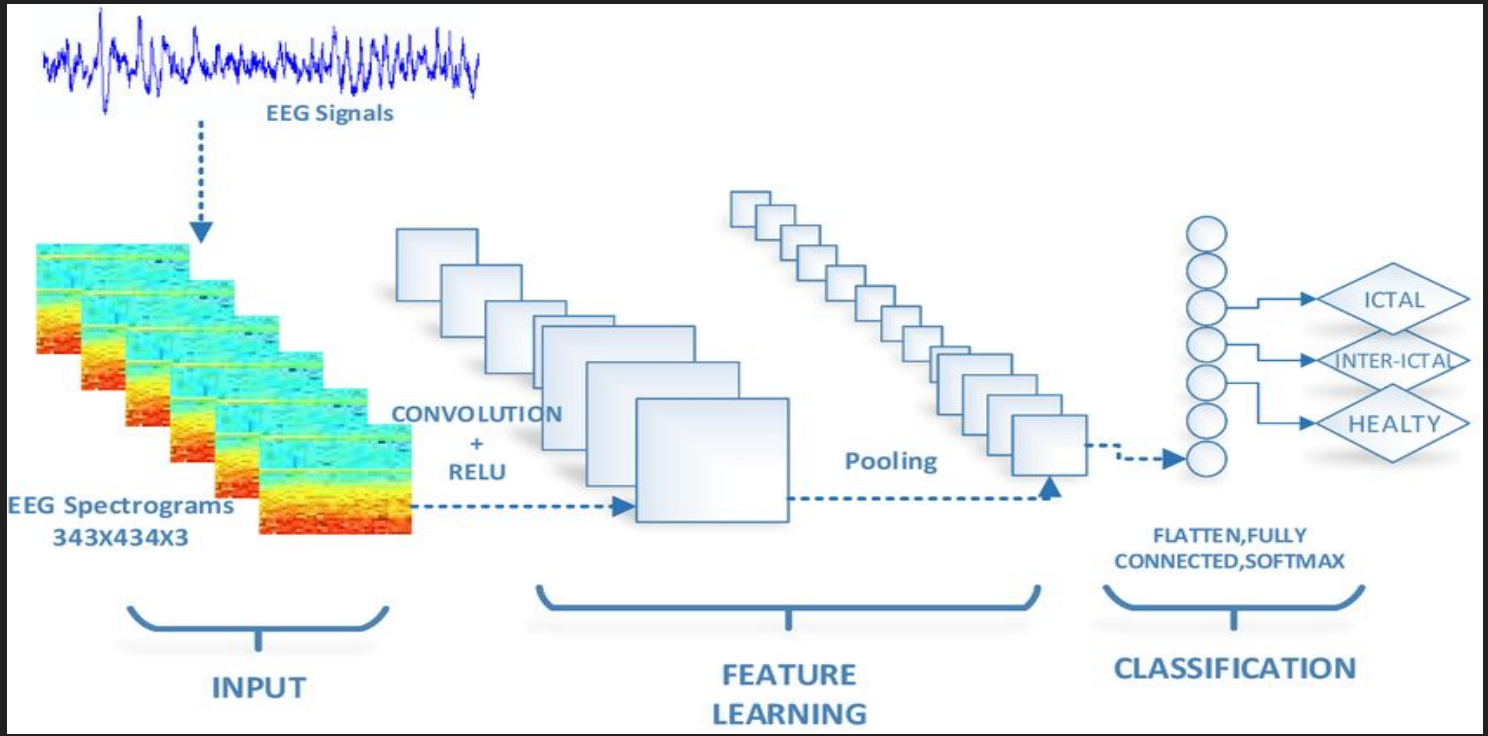
Neural Architecture Search for CNN models



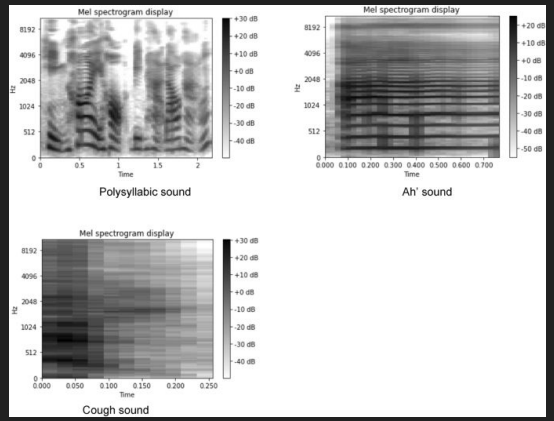


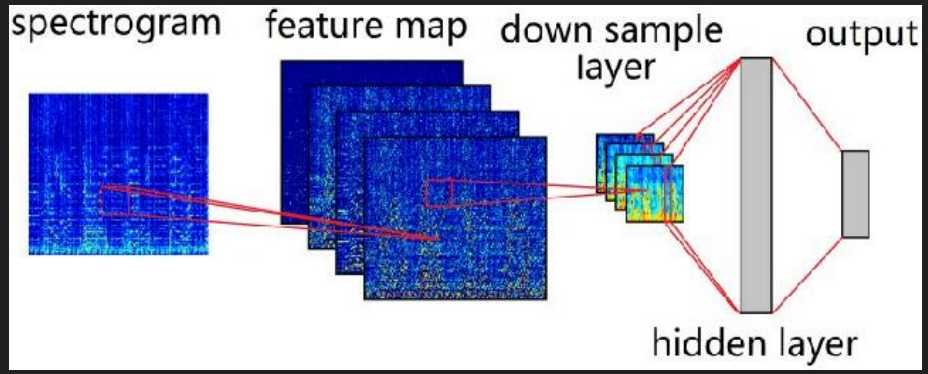
Medium blog of Arjun Ghosh: https://medium.com/@csarjun49

EEG signal classification using CNN

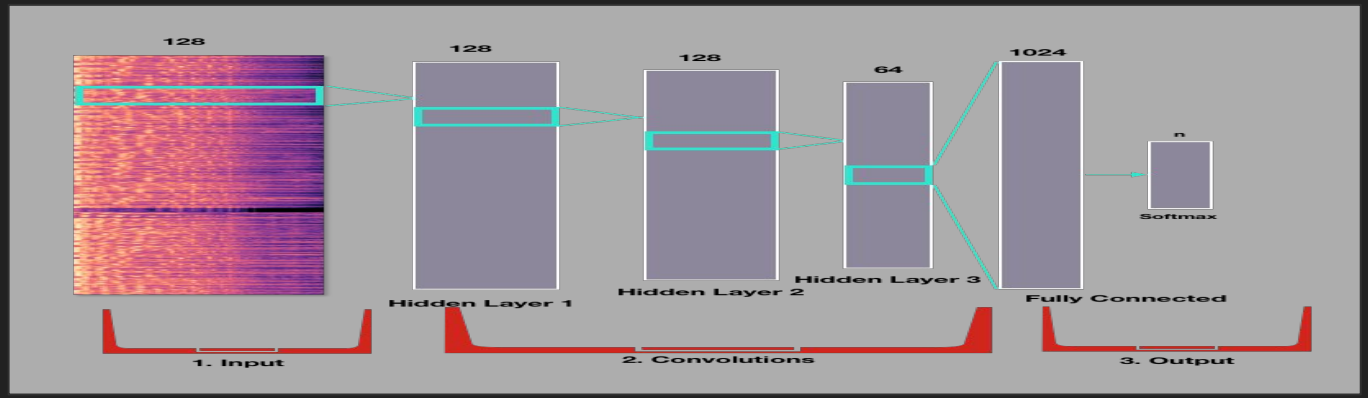


Speech disorder classification using CNN





Musical Data classification using CNN



And many more….

Thank You