Summary of Literature Review papers:

GMBS (slide 91-92):

1. Deep learning based… :

Dataset: 2017 ICBHI

Methodology: MFCC -> Mel-Spectogram -> Chroma(Q const) -> Chroma CENS

Good selection of dataset -> improvement in augmentation and Area-Under-Curve (AUC)

1. Covid-19 and Pneumonia:

Methodology: Transfer Learning + CNN

Batch normalisation and dropout layers used to avoid overfitting

CNN will help in early diagnosis if it is Covid-19 or not, using chest X-ray images.

\*\*published in 2021, due to lack of Covid-19 chest X-rays, not practically implemented transfer learning aspect on dataset.

1. MobileNetV2:

Methodology: Transfer Learning + MobileNetV2 archi

Deep-learning based approach to classify chest X-ray images as Covid, Pneumonia or niether.

Based on MobileNetV2 (lightweight archi) -> trained for both cases: with and without transfer learning.

\*\*since it uses MobileNetV2, may not be good at handling larger datasets.

1. Voice Pathology (audio):

Methodology: Transfer Learning -> CNN -> VGG-16 Model -> CaffeNet Model on “Saarbrucken voice disorder”(SVD) database

Experimentally -> 97.5% accuracy using Transfer learning approach.

On SVD dataset, high accuracy achieved with CaffeNet, followed by SVM classifier.

\*\*Looks promising since it outperformed earlier prevalent method’s accuracy.

\*\* Can increase limits by performing cross-database experiments.

Kaushal:

1. Classification of lung sounds with CNN model:

Dataset: 2017 ICBHI

Methodology: LDA+RSE classifier -> Spectogram img fed to CNN

\*\*converting audio to img -> data loss might happen

\*\*Some Lower-tract diseases cant be diagnosed sololy by Spectrogram img + lung sounds -> addntl info reqd

1. Automatic lung segmentation using U-Net:

Dataset: NIH (same as us) + other datasets for X-ray images.

Methodology: U-Net model for lung segmentation model -> ImageNets pre-trained base networks used with coding and decoding layers.

\*\*It is difficult for the model to distinguish the lung region and lung boundary under the turbidity of the lung region caused by serious lung diseases. In addition, abnormal lung morphology is also difficult to segment.

\*\*The automatic lung segmentation model performs poorly in processing images of some diseases, such as pulmonary consolidation, lung effect, lung oedema, and atelectasis.

1. Hybrind DL to detect lung diseases from X-Rays:

Dataset: Custom images used.

Methodology: VDSNet -> VGG16 model pre-trained -> CapsNet with custom convolutional layers

Vanilla CNN -> worst performance

VDSNet performs best but converges very slowly, possibly due to the little data on the features of the large images.

\*\*Limitations:

* The model needs testing in order to differentiate each type of lung diseases. As a result, the data problem can be explained for each disease which is very skew.
* The proposed model should be trained with a huge number of epochs with the change of a few parameters for getting fast convergence.
* The probability of getting significant features will be increased if the size of training shots can be increased. But this can increase the training time.
* Several pre-trained models can be experimented in order to implement CNN with the fusion of VGG.
* Very complex “locnet” module has been used in order to implement hybrid CNN with the addition of a spatial transformer.
* In order to extract more features, CapsNet has been proposed after adding some more layers. However, it will lead to very long training time.

1. Diagnosing Chronic Obstructive Pulmonary Disease Based on Breathing Sound Using Machine Learning

Dataset: Respiratory Sound Database

Methodology: Wavelet transform -> Classificatio using DL with Transfer Learning

\*\*Novelty -> proposed a breathing sound classification method for chronic obstructory pulmonary diseases.

VGG16 achieved highest accuracy -> 99% -> possibly overfitting, under-trained

Limitations:

* Breathing sounds itself are not enough to correctly diagnose many frequently occurring respiratory diseases.
* Several other pre-trained models can be used as fusions to give better results.

Divyam:

1. Learn to Combine Modalities in Multimodal Deep Learning

Dataset: ?

Method: multiplicative multi model method + boosting

Limitations:

1. It is challenging to fully leverage different modalities due to practical challenges such as varying levels of noise and conflicts between modalities.
2. Signals from different modalities often carry complementary information about different aspects of an object, event, or activity of interest. Therefore, learning-based methods that combine information from multiple modalities are, in principle, capable of more robust inference.

3. What if the modality of data we are receiving is a weak modality

1. Classification of Lung Diseases Using Deep Learning Models

Dataset: Shenzhen and Montgomery lung dataset for comparison(has CXR imgs) + ImageNet dataset

Method:3 layers of CNN pre-trained on ImagenNet dataset -> pipeline for Chest X-Ray -> compare results using above 2 datasets + UNet archi

Conclusion: Our best performing framework we used U-net segmentation network and InceptionV3 deep model classifier. Our frameworks were compared with the existing models. We demonstrated that models pre-trained by transfer learning approach and simple classifiers such as shallow neural networks can successfully compete with the complex systems

1. Respiratory diseases recognition through respiratory sound with the help of deep neural network

Dataset: Custom dataset wch has 920 annotated recordings of varying length from 10s to 90s.

Method:

For construction of the neural network model we have used five types of layer

1. GRU(Gated Recurrent Unit
2. Leaky Relu(Leaky version of a Rectified Linear Unit)
3. Dense Layer
4. Dropout Layer
5. Add Layer
6. Model chk pts used

Conclusion: Medical research and medical science could be progressed further with the help of artificial intelligence. The neural net- work architecture has performed better than our expectations. But still, it needs a lot of improvements to achieve higher accuracy during prediction.

1. Respiratory Analysis –Detection of Various Lung diseases using Audio Signals

CNN algorithm model used

In this paper, we took the disease diagnosis and respiratory audio datasets to implement this work, extracted features from all audio datasets, and trained a convolution neural network (CNN) algorithm, model. After the training model, we can upload any new test data to predict disease from it

Hegde: