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RESPIRATORY ANALYSIS DETECTION OF VARIOUS LUNG INFECTIONS USING COUGH SIGNAL

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ABSTRACT

Large number of people die every year of Pulmonary chronic lung diseases irrespective of their age. Lung sound analysis has been a key diagnostic aid to accurately detect Pulmonary Diseases. Earlier, manual detection was used which was not a dependable method to detect lung diseases due to various reasons like low audibility and difference in perceptions of different physicians for different sounds. Modern computerized analysis yield results with much higher accuracy and thus a better treatment can be given to patients suffering from various kinds of lung diseases. These disorders include Asthma, Bronchitis, Emphysema, Tuberculosis and Pneumonia. Some of the symptoms are wheezing, shortness of breath, rhonchi and chronic cough. In this project we are using respiratory audio dataset to predict various diseases such as Asthma, Pneumonia, Bronchiectasis and many more. To implement this project we have taken disease diagnosis dataset and respiratory audio dataset and then extract features from all audio dataset and then trained a convolution neural network (CNN) algorithm model. After training model we can upload any new test data to predict disease from it.

Keyword: CNN, Asthma, breath, heart sounds, breath.

INTRODUCTION

Pulmonary disorder is the inability of a person to breathe normally. Manual analysis used in the past only gave an approximate idea of the disorder and hence a very rough treatment was given. This was working out well in the past. Drastic increase in pollution and non-healthy habits of people has given rise to more complex diseases and need a very accurate estimation of the extent of disease. This accuracy can only be bought by automation of the analysis. Researchers observed that the difference between sounds made by infected lungs and the normal healthy lungs could serve as a very good tool for the detailed study and detection of the disease. Recording the Lung sounds, filtering them from the Heart sounds and other

noises and studying the waveform of the filtered Lung sound has been the de facto way of performing the analysis. Many methods are given for the filtering and processing of the Lung sounds. Brief review of the previous papers reveals several methods of filtering and examining the LS. The most challenging task in the analysis is the separation of HS from the LS due to spectral and temporal overlap between the two sounds. Filtering techniques used are Modulation Domain filtering [5] that filters the temporal trajectories of shortterm spectral components. Signal analysis is carried out by segmentation into consecutive overlapping frames and performing Fourier transform. Combination of adaptive-frequency domain filtering [10] where a very simple method is described that involves subtracting heart sounds from combination of heart and lung sound.

EXISTING SYSTEM:

The lungs are important organs in the respiratory system and used for gas exchange (oxygen and carbon dioxide). When we breathe. Our lungs transfer oxygen from the air into the blood, and carbon dioxide from the blood into the air. Cough is the most common symptom of several respiratory diseases. Cough is a defense mechanism of the body which prevents the respiratory tract from inhaling foreign materials accidentally or those produced internally by infection , it is characterized as wet when the sounds carry features indicative of mucus; in the absence of perceivable wetness it is called dry . Changes in the character of the cough sound can reflect pathological situations in the lungs .Pathological situations arise due to some conditions like obstruction, restriction, and combined patterns.

PROPOSED SYSTEM:

In this project we are using respiratory audio dataset to predict various diseases such as Asthma, Pneumonia, Bronchiectasis and many more. To implement this project we have taken disease diagnosis dataset and respiratory audio dataset and then extract features from all audio dataset and then trained a convolution neural network (CNN) algorithm model. After training model we can upload any new test data to predict disease from it.

MODULES DESCRIPTION:

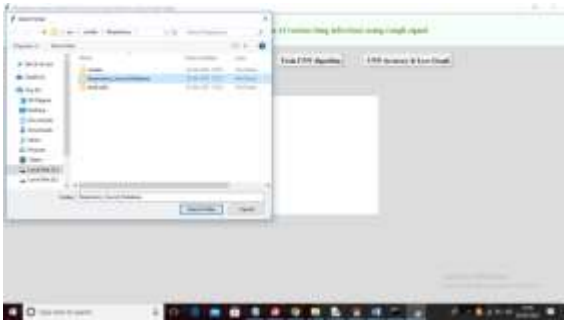
1) Upload Respiratory Audio Dataset: using this module we will upload disease diagnosis dataset and respiratory audio dataset

2) Extract Features from Audio Dataset: using this module we will extract features from both datasets and then build training dataset
3) Train CNN Algorithm: using above train dataset we will train CNN model and then build a trained model and this model can be used to predict disease from any new test audio files
4) CNN Accuracy & Loss Graph: using this module we will display comparison graph between accuracy and loss of CNN trained model
5) Upload Test Audio & Predict Disease: using this module we will upload test audio files and then apply CNN trained model on that test audio to predict disease

Operation:

To run project double click on 'run.bat' file to get below screen

In above screen click on 'Upload Respiratory Audio Dataset' button to upload dataset



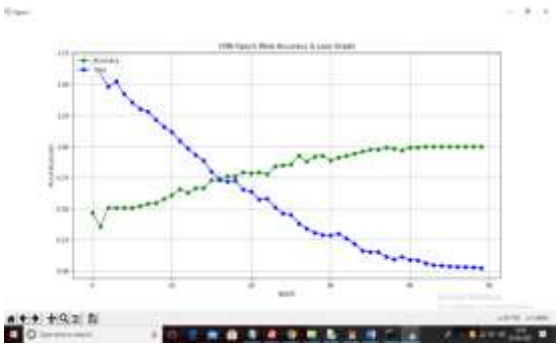
In above screen selecting and uploading entire respiratory sound folder and then click on 'Select Folder' button to load dataset and to get below screen

In above screen for each patient we can see associated with disease diagnose and above disease will be used as class label for each extracted audio features and now click on 'Extract Features from Audio Dataset' button to extract features from each audio files and then associate detected disease as class label to audio file.

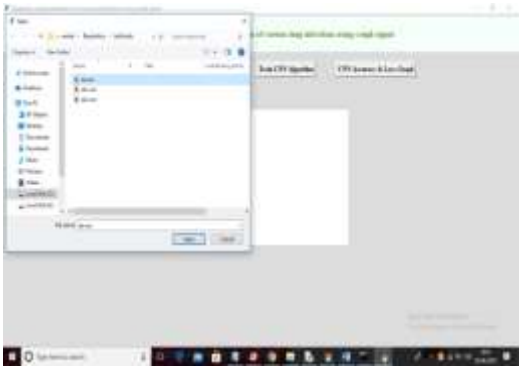
In above screen application found 126

patients audio files and this audio dataset contains 8 different diseases and now dataset is ready and now click on 'Train CNN Algorithm' button to train CNN with above dataset and then calculate CNN prediction accuracy

In above screen CNN trained on audio features and got 100% accuracy and now click on 'CNN Accuracy & Loss Graph' button to get below graph



In above graph x-axis represents EPOCH/ITERATIONS and Y-axis represents accuracy and loss values and green line represents accuracy and blue line represents LOSS and we used 50 EPOCH to train CNN model and we can see with each increasing epoch accuracy get increased and loss value got decrease to 0 and accuracy increased to 100%. Now click on 'Upload Test Audio & Predict Disease' button to upload test audio file



In above screen selecting and uploading 'aa.wav' file and then click on 'Open' button to get below prediction result

In above screen in blue colour text we can see disease predicted as "ASTHMA" form uploaded audio file and test with other file also

CONCLUSION

The lungs are important organs in the respiratory system and used for gas exchange (oxygen and carbon dioxide). When we breathe. Our lungs transfer oxygen from the air into the blood, and carbon dioxide from the blood into the air. To implement this project we have taken disease diagnosis dataset and respiratory audio dataset and then extract features from all audio dataset and then trained a convolution neural

network (CNN) algorithm model. After training model we can upload any new test data to predict disease from it.

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