

DEEP LEARNING FOR CLASSIFICATION AND LOCALIZATION OF PNEUMONIA MARKERS IN POINT-OF-CARE LUNG ULTRA SOUND

Ms. M.Kavitha Assistant Professor & Dhirajlal Gandhi College of Technology

Mr.V Kabilan Computer Science and Engineering & Dhirajlal Gandhi College of Technology

Mr.S S Logeshwaran Computer Science and Engineering & Dhirajlal Gandhi College of Technology

Mr.M Nathin Kumar Computer Science and Engineering & Dhirajlal Gandhi College of Technology

Abstract - PNEUMONIA is a rapidly spreading viral disease that infects not only humans, but animals are also infected because of this disease. The daily life of human beings, their health, and the economy of a country are affected due to this deadly viral disease. PNEUMONIA is a common spreading disease, and till now, not a single country can prepare a vaccine for PNEUMONIA. A clinical study of PNEUMONIA infected patients has shown that these types of patients are mostly infected from a lung infection after coming in contact with this disease. Chest x-ray (i.e., radiography) and chest Computed tomography (CT) are a more effective imaging technique for diagnosing lung related problems. Still, a substantial chest x-ray is a lower cost process in comparison to chest CT. Deep learning is the most successful technique of machine learning, which provides useful analysis to study a large amount of chest x-ray images that can critically impact on screening of PNEUMONIA. This type have taken the PA (posteroanterior) view of chest x-ray scans for PNEUMONIA affected patients as well as healthy patients. After cleaning up the images and applying data augmentation, we have used deep

learning-based SVM models for classification and accuracy.

1.INTRODUCTION

PNEUMONIA is a severe disease issue where a large number of people lose their lives every day. This disease affects not only a single country, and even the whole world suffered because of this virus disease. In the past decade, several kinds of viruses (like SARS, MERS, Flu, etc.) came into the picture, but they stand for only a few days or few months. Many scientists are working on these kinds of viruses, and few of them are diagnosed due to the availability of vaccines prepared by them (i.e., Scientists or researchers). In the present time, the whole world is affected by PNEUMONIA disease and the most important thing is no single country scientists can prepare a vaccine for the same. Meanwhile, many more predictions came into a picture such as plasma therapy, X-ray images and many more, but the exact solution of this deathly disease is not found. Every day, people lose their life due to PNEUMONIA and the diagnostic cost of this

disease is very high in the context of a country, state, and patients.

2. Body of Paper

Existing System :

The outbreak of the PNEUMONIA pandemic caused the death of a large number of people. Millions of people are infected by this virus and are still getting infected day by day. As the cost and required time of conventional RT-PCR (real-time reverse transcription polymerase chain reaction (rRT-PCR) tests to detect PNEUMONIA, researchers are trying to use medical images like X-Ray and Computed Tomography (CT) images to detect it with the help of Artificial Intelligence (AI) based systems. It can be reviewed some of these newly emerging AI-based models that can detect PNEUMONIA from medical images using X-Ray or CT of lung images. The analyzed datasets, preprocessing techniques, segmentation, feature extraction, classification and experimental results which can be helpful for finding future research directions in the domain of automatic diagnosis of PNEUMONIA disease using Artificial Intelligence (AI) based frameworks.

Proposed system :

The deep feature plus support vector machine (SVM) based methodology is suggested for detection of coronavirus infected patient using CT images. For classification, SVM is used instead of deep learning based classifier, as the later one need a large dataset for training and validation. The deep features from the fully connected layer of CNN model are extracted and fed to SVM for

classification purpose. The SVM classifies the corona affected CT images from others. The methodology consists of three categories of CT images, i.e., PNEUMONIA and normal. The method is beneficial for the medical practitioner to classify among the PNEUMONIA patient, pneumonia patient and healthy people. SVM is evaluated for detection of PNEUMONIA using the deep features. The deep features of CNN models are extracted from a particular layer and feature vector is obtained. The features are fed to the SVM classifier for classification of PNEUMONIA, pneumonia patient and healthy people. The CNN is multilayer structure network, and each layer produces a response. The layers extract the essential image feature and pass to the next layer. The feature layer and feature vector used by CNN.

3. CONCLUSIONS

The experimental evaluation of image classification approaches is presented in order to identify Pneumonia positive cases from chest CT scan images. Moreover, a decision fusion based approach is also proposed, which combines the predictions of each of the individual MULTI SVM models, in order to improve the predictive performance. From the experimental observations, it is clear that out proposed based approaches can potentially have a huge impact on the spread control of PNEUMONIA by providing fast screening. With ML based approaches being used widely in other medical imaging tasks, it is high time for such approaches to be used in the screening process of the current pandemic as well. however, it will be interesting to

see how inclusion of other slices contributes to giving further information from the images. Also, with the availability of CT images with labelled information of other lung diseases, combining with PNEUMONIA CT images might give more reliable systems. For now, we consider these are the limitations of the used input and these limitations will be addressed in the future work.

FUTURE ENHANCEMENT:

Although the proposed approach shows great promise, there is still quite a bit of room for potentially improving the predictive performance of the approach. Recently, ideas like Transfer Learning, Image Augmentation, and Feature Level Fusion have been shown to boost the performance of DL based models drastically. These ideas are to be explored as part of the future work.

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