DETECTION AND COMPARISON OF ALGORITHM FOR PREDICTION OF PNEUMONIA

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OBJECTIVE

1. Although the treatment of pneumonia can be challenging, it can be prevented by early diagnosis using Computer-Aided Diagnosis (CAD) systems.
2. Chest X-Rays (CXRs) are currently the primary imaging tool for detection of pneumonia, which are widely used by radiologists.
3. While the standard approach of detecting pneumonia is based on clinicians' decisions, various Deep Learning (DL) methods have been developed for detection of pneumonia considering CAD system.
4. Ultimately, this model is deployed to create a web-based CAD system to assist radiologists in pneumonia detection with a significant accuracy.

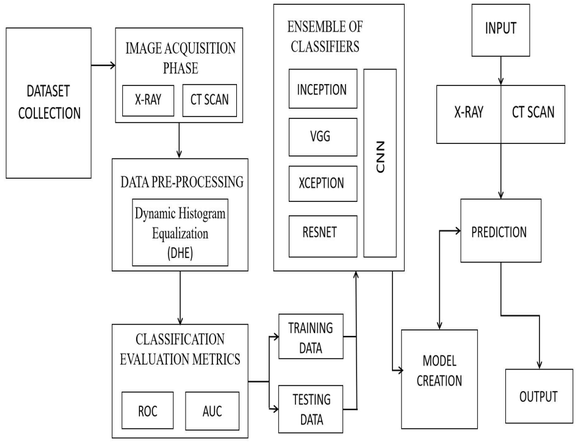
KEY ASPECTS

1. The hybrid CNN model with fully connected (FC) layers and trained the hybrid model for a defined number of epochs.
2. To train the proposed ensemble classifier,CNN model and ml classifiers has to be utilized to extract the features of CXR images in the test set.
3. The highest training accuracy in the proposed hybrid CNN model with FC layers is 97.78%, which was brought about in epoch 20.
4. This system have implemented a CAD system for a reliable and accurate detection of pneumonia.

SOFTWARE/HARDWARE REQUIREMENTS

HARDWARE	SOFTWARE
Processor : 1.1GHZ i3,i5,i7	Windows7/8/10
Hard Disk :500GB	Python
RAM :8GB	Jupyter Notebook

ARCHITECTURE DIAGRAM



MODULES

1. Image Acquisition Phase

The first step is to acquire images. To produce a classification model, the computer needs to learn by example. The computer needs to view many images to recognize an object. Other types of data, such as time series data and voice data, can also be used to train deep learning models. In the context of the work surveyed in this paper, the relevant data required to detect lung disease will be images. Images that could be used include chest X-ray, CT scan image.

2. Data Pre-Processing

Image pre-processing is a very common and beneficial technique and it not only could enlarge the quantity of the original dataset but also enrich the information implicit in the dataset. As previously mentioned, we utilized an effective image enhancement method named Dynamic Histogram Equalization (DHE) to improve the quality of images before they were inputted into the CNN model.

Histogram Equalization (HE), which denotes mapping from the initial narrow pixel levels to a wider extent and improves image enhancement, has been widely used in image processing. The HE technique means to convert the gray levels of an image by using cumulative effort function globally, yet always brings about the problem that elaboration information in images is damaged, leading to awful image quality. This popular image contrast enhancement method could enhance image contrast effectively in many aspects, like MRI, X-rays, and CT..

4. Classification Evaluation Metrics

In this subsection, several evaluation metrics, accuracy, precision, recall, F1 score and so on, are described. According to the outputs of model, four indices, True Positive, True Negative, False Positive, False Negative, are used to analyze and identify the performance of model. The True Positive means that the chest X-ray images, which suffer from pneumonia, are signed as pneumonia as well by the model. The True Negative means if the chest X-ray images do not show pneumonia as well as the model predicts. The precision rate was always used to estimate how much the number of images that are truly pneumonia accounted for in the total number examples, which are classified as positive for pneumonia. That is, the pneumonia images must be identified in practical clinical diagnoses and hence, the precision rate is especially important. In most cases, the higher the precision rate gets, the lower the recall rate is. Thus, F1 score rate is widely considered as a proper criterion.

5. Ensemble Of Classifiers

When more than one classifier is combined to make a prediction, this is known as ensemble classification. Ensemble decreases the variance of predictions, therefore making predictions that are more accurate than any individual model. From work found in the literature, the ensemble techniques used include majority voting, probability score averaging and stacking.An alternate version of majority voting is weighted majority voting, in which the votes of certain models are deemed more important than others.An alternate version of this is weighted averaging, where the prediction score of each model is multiplied by the weight, and then their average is calculated. Examples of works which used probability score averaging are found. In stacking ensemble, an algorithm receives the outputs of weaker models as input and tries to learn how to best combine the input predictions to provide a better output prediction.

SYSTEM OUTPUT

Inception Classification Report

	precision	recall	f1-score	support
0	0.92	0.99	0.96	87
1	0.99	0.93	0.96	101
accuracy			0.96	188
macro avg	0.96	0.96	0.96	188
weighted avg	0.96	0.96	0.96	188

Inception Prediction Result

This Inception algorithm model shows the output of about 96% accuracy as the classification report.This helps determine the best algorithm.

PERFOMANCE ANALYSIS

There are numerous image processing algorithms available for various applications, and the best algorithm to use depends on the specific task at hand.Here the numbers on the y-axis denote the percentage of the accuracy of the algorithms and the x-axis denots the previous algorithms used in other systems and some in the literature survey.The performance of the previous algorithms is still impressive but there is a significant difference between is that this proposed system has a little increased accuracy than the previous algorithms with an accuracy of 96 percentage.

CONCLUSION

Reliable recognition of infections in the lung is a key step in the diagnosis of Pneumonia disease.This research proposed and developed a Pneumonia detection model using the Deep Convolutional Neural Network and Pneumonia Chest X-ray dataset. This data was collected from the various patients and clinically examined and categorized by human examiners. The proposed Deep Convolutional Neural Network was trained on by using 1000 training epochs with nvidia tesla v100 GPU and tensorflow framework. The training process of the model uses 7000 chest X-ray Images and the testing process uses 200 images.This will allow clinicians to recognize lung diseases from chest X-ray images at an earlier stage of the disease.

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