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Deep Learning For Detecting Pneumonia From X-ray Images

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Abstract: The infection spreads in the lungs area of a human body. The chest x-ray is performed to diagnose this infection. Physicians use this X-ray image to diagnose or monitor treatment for conditions of pneumonia. This type of chest X-ray is also used in the diagnosis of diseases like emphysema, lung cancer, line and tube placement and tuberculosis. Feature extraction methods like DWT, WFT, and WPT can also be used. In this paper, detection of pneumonia infection by unsupervised fuzzy c-means classification learning algorithm is used. This approach gives better result than the rest of the methods. In fuzzy c-means, each resultant pixel gives accurate value since it has a weight associated with it.

Keywords: Deep learning · Chest CT scan · X-Ray Image · Cough analysis, radiomics, medical imaging, CNN, chest X-ray, neural networks,

1 .INTRODUCTION:

Pneumonia is an acute respiratory infection that affects the lungs. It is a fatal illness in which the air sacs get filled with pus and other liquid. There are mainly two types of pneumonia: bacterial and viral. Generally, it is observed that bacterial pneumonia causes more acute symptoms. The most significant difference between bacterial and viral pneumonia is the treatment. Treatment of bacterial pneumonia is done using antibiotic therapy, while viral pneumonia will usually get better on its own. It is a prevalent disease all across the globe. Its principal cause includes a high level of pollution. Pneumonia is ranked eight in the list of the top 10 causes of death in the United States. Due to pneumonia, every year, 3.7 lakh children die in India, which constitutes a total of fifty percent of the pneumonia deaths that occur in India.The disease frequently goes overlooked and untreated until it has reached a fatal point, especially in the case of old patients. It is the single largest cause of death in children (especially under the age of five) worldwide. According to the WHO, "Every year, it kills an estimated 1.4 million children under the age of five years, accounting for 18% of all deaths of children under five years old worldwide. Pneumonia affects children and families everywhere but is most prevalent in South Asia and sub-Saharan Africa. Children can be protected from pneumonia. It can be prevented with simple interventions and treated with low-cost, low-tech medication and care" .Therefore, there is an urgent need to do research and development on computer-aided diagnosis so that the pneumonia-related mortality, especially in children, can be reduced.learning techniques to achieve an expert level of performance in classification, segmentation, and detection of medical images.

In this study, we proposed a framework that leverages radiomic features and contrastive learning to detect pneumonia in chest X-ray. Our framework improves chest x-ray representations by maximizing the agreement between true image-radiomics pairs versus random pairs via a bidirectional contrastive objective between the image and human-crafted radiomic features. Experiments on the RSNA Pneumonia Detection Challenge dataseshow that our methods can fully utilize unlabeled data, provide a more accurate pneumonia diagnosis, and remedy the black-box's transparency. One method of increasing the explain ability of DNNs in chest radiographs is to leverage radiomics. Radiomics is a novel feature transformation method for detecting clinically relevant features from radiological imaging data that are difficult for the human eye to perceive. It has proven to be a highly explainable and robust technique because it is related to a specific region of interest (ROI) of the chest X-rays However, directly combining radiomic features and medical image hidden features provides only marginal benefits, a result mostly due to the lack of correlations at a "mid-level"; it can be challenging to relate raw pixels to radiomic features. In efforts to make more efficient use of multimodal data, several recent studies have shown promising results from contrastive representation learning But, to the best of our knowledge, no studies have exploited the naturally occurring pairing of images and radiomic data.

2. PROJECT RELATED WORK:

Deep learning based methods are already being used in various fields Different authors have already proposed several biomedical image detection techniques. future of medical image processing. Much work has already been done for the detection of numerous diseases by using deep learning based techniques, as presented a deep learning model for dermatologist-level classification of skin cancer, also proposed a methodology for the depiction of prostrate in MRI volumes using CNN.used the technique of deep learning for brain hemorrhage detection in CT scans, and proposed a

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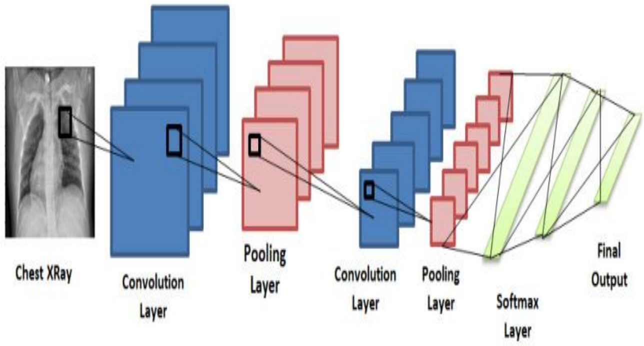
method for detecting diabetic retinopathy in retinal fundus photographs. also discussed chest pathology detection by the techniques based on deep learning. Methods regarding the examination of the detection of disease by chest X-ray have also been worked on earlier by performing various examination techniques The chest X-ray images are passed through the evaluation process of scan line optimization such that it eliminates all the other body parts to avoid any error in diagnosis. The algorithm was described used two deep three-dimensional (3D) customized mixed link network (CMixNet) architectures for lung nodule detection and classification combined DenseNet and long-short term memory networks (LSTM) to exploit the dependencies between abnormalities. Several authors also have worked on pneumonia classification.. proposed the use of EMD (earth mover's distance) to identify infected pneumonia lungs from normal non-infected lungs. Rahib et al. [and Okeke et al used a CNN model for pneumonia classification. Some researchers have shown assuring results such asand et al. tried to explain the performance of customized CNNs to detect pneumonia and further differentiate between bacterial and viral types in pediatric CXRs. Sirazitdinov et al.used a region based convolutional neural network for segmenting the pulmonary images along with image augmentation for pneumonia identification. and used the AlexNet and GoogLeNet neural networks with data augmentation and without any pre-training to obtain an area under the used CheXNeXt, a very deep CNN with 121 layers, to detect 14 different pathologies, including pneumonia, in frontal-view chest X-rays. A localization approach based on pre-trained DenseNet-121, along with feature extraction, was used to identify 14 thoracic diseases in [. Saraiva et al. Ayan et al., and Rahman et al. used deep learning based methods for pneumonia classification. Xiao et al. [4 proposed a novel multi-scale heterogeneous three-dimensional (3D) convolutional neural network (MSH-CNN) based on chest computed tomography (CT) images. Xu et al. used a hierarchical convolutional neural network (CNN) structure and a novel loss function, sin-loss, for pneumonia detection. et al. used Mask-RCNN, utilizing both global and local features for pulmonary image segmentation, with dropout and L2 regularization, for pneumonia identification. Jung et al used a 3D deep CNN which had shortcut connections. et al. combined the outputs of different neural networks and reached the final prediction using majority voting. None of the above-mentioned approaches except that of et al. tried to combine predictions from different neural networks.

3. METHODS:

Recurrent Neural Networks (RNNs) are the other type of deep learning technique and are mainly used for prediction purposes. They feed the output from the previous step and use it as an input for the current step. In this case, the networks themselves have repetitive loops. These loops, which are in the hidden neurons, allow for the storing of previous input information for a while so that the system can predict future outputs. Its most important feature is the hidden state, which



remembers information about the sequence Scan and X-ray images of human organs comprises of more valuable medical information that can help diagnose and treat diseases in hospitals. The Manual examination approach was not suitable to handle the large amounts of medical imaging data. The purpose of this review is to show the capability of image processing techniques that can efficiently handle these different but closely related human disease diagnosis. It also conducts a comparative study of various image classification and image retrieval techniques that are applied to the human lung disease identification systems. a content based medical image technique to retrieve the CT Imaging Signs of Lung Diseases using considering fused, and context-sensitive similarity measures. The fused pairwise similarity was used to minimize the semantic gap for obtaining a more accurate pairwise similarity measure. proposed the distance combining Tamura texture features and wavelet transform algorithm based brain MRI database and the lung CT image retrieval technique. The performance of the technique is better than the single feature texture technique. The Three dimensional Convolutional Neural Network framework was proposed by et al. (to produce radiological grading of spinal lumbar MRIs and also localize the predicted pathologies using disc volumes. proposed an ECG data classifications model using Convolutional Neural Network, deployed the model in Internet of Things devices. This approach uses the existing ECG dataset to classify the patient's health status. The edge computing devices reduced the cost of implementation and increased the portability of the devi

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4. FUTURE WORK:

In this work, we present a novel framework by combining radiomic features and contrastive learning to detect pneumonia from chest X-ray. Experimental results showed that our proposed models could achieve superior performance to baselines. We also observed that our model could benefit from the attention mechanism to highlight the ROI of chest X-rays. There are two limitations to this work. First, we evaluated our framework on one deep learning model (Rest net). We plan to assess the effect of radiomic features on other DNNs in the future. Second, our model relies on bounding box annotations during the training phase. We plan to leverage weakly supervised learning to automatically generate bounding boxes on large-scale datasets to ease the expert annotating process. In addition, we will compare contrastive learning with multitask learning to further exploit the integration of radiomics with deep learning.

5. CONCLUSION:

In this paper, we firstly collected a dataset of CXR images from normal lungs infected patients. The constructed dataset is made from images of different datasets from multiple hospitals and radiologists and is the largest public dataset to the best of our knowledge. Next, we designed and trained an individual CNN and also investigated the results of ImageNet-pretrained models. Then, a Dense Net-based model is designed and fine-tuned with weights initially set from the Chex Net model. Comparing model visualization over a batch of samples as well as accuracy scores, Throughout the process of developing the CNN model for Pneumonia prediction, we have built a model from scratch which consists of 5 layers and follows with a fully connected neural network.a beginner to obtain an overview of how to build a model to solve a real-world problem. It is no doubt that the predictive model can be improved even better by performing data augmentation or implementing a transfer learning concept which facilitates the model a room for improvement. Therefore, this will be added as further enhancement in the upcoming stories.

6. RESULTS:

It suggests that radiomic features can provide additional strengths over the image features extracted by the CNN model. Compared Retentate with Rest-Net and RestNetAtteRadi with Reentered, we observed that the attention mechanism could effectively boost the classification accuracy. It proves our hypothesis that pneumonia is often related to some specific ROI of chest X-rays. Hence, the attention mechanism makes it easier for the CNN model to focus on those regions.

7. REFRENCES:

- Douarre, R. Schielein, C. Frindel, S. Gerth, and D. Rousseau, “Transfer learning from synthetic data applied to soil-root segmentation in X-ray tomography images,” Journal of Imaging, vol. 4, no. 5, p. 65, 2018.
- P. Kingma, J. Ba, A. Adam: A method for stochastic optimization. CoRR, abs/1412.6980, 2014.
- Using deep learning for classification of lung nodules on computed tomography images.
- Journal of healthcare engineering (2017), Article 8314740, 10.1155/2017/8314740