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1. LITERATURE REVIEW

***"Feature Extraction and Classification of Chest X-Ray Images Using CNN to Detect Pneumonia,"***

***H. Sharma, J. S. Jain, P. Bansal and S. Gupta[1]***

In this study, we propose several deep convolution neural network (CNN) architectures to extract characteristics from pictures of chest X-rays and categorize the images to predict whether a person has pneumonia. We train the suggested CNNs using both the original and the augmented dataset, and the results are provided in order to assess the impact of dataset size on the performance of CNN.

***"Detection of pneumonia clouds in chest X-ray using image processing approach,"***

***A. Sharma, D. Raju and S. Ranjan[2]***

In this work, a novel method for identifying pneumonia clouds in chest X-rays (CXR) utilizing solely image processing techniques is presented. For this, we worked with 40 analogue chest CXRs from individuals who were both healthy and who had pneumonia. Native algorithms have been created to crop the photos and extract the lung area from them. We have employed Otsu thresholding to identify pneumonia clouds, which will separate the healthy lung tissue from the cloudy pneumonia-infected areas. To arrive at a conclusion, we suggest calculating the ratio of the healthy lung region's area to the entire lung region.Python and OpenCV were utilized to complete the work since they are free, open-source software that anybody may use without facing any expense or legal repercussions.

***“Machine Learning Classification Model for Pneumonia Detection”***

[***Sajid Ali***](https://www.researchgate.net/profile/Sajid-Ali-59) ***Mahdi Yazdian-Dehkordi [3]***

In this study, they have evaluated how well pre-trained CNN models perform when used as feature-extractors, followed by various classifiers, to categorize abnormal and typical chest X-rays. For this, we use analysis to choose the best CNN model. The analysis of chest X-ray images, particularly the detection of pneumonia, can be greatly aided by the use of pretrained CNN models in combination with supervised classifier algorithms, according to statistical findings.

***“Pneumonia Detection on Chest X-Ray Using Machine Learning Paradigm”***

[***Tej Bahadur Chandra***](https://link.springer.com/chapter/10.1007/978-981-32-9088-4_3#auth-Tej_Bahadur-Chandra) ***&*** [***Kesari Verma***](https://link.springer.com/chapter/10.1007/978-981-32-9088-4_3#auth-Kesari-Verma) ***[4]***

# This study describes a machine learning paradigm for the automated identification of pneumonia on segmented lungs. The characteristics of the lung segmented ROI limited area are retrieved because the study concentrates on pixels in the lung segmented ROI (Region of Interest) that are more contributing towards pneumonia identification than the surrounding areas. Five benchmark classifiers—Multilayer Perceptron, Random Forest, Sequential Minimal Optimization (SMO), Logistic Regression, and Classification via Regression—have been used to test the proposed methodology. The ChestX-ray14 dataset, which consists of a total of 412 chest X-ray pictures with 206 normal and 206 pneumonic patients, is utilized in the studies. Using benchmarked classifiers, the performance of the new technique is compared to the conventional method.With an accuracy of 95.63% with the Logistic Regression classifier and 95.39% with the Multilayer Perceptron, experimental findings show that the suggested technique outperformed the current method.

***“kNN-SVM with Deep Features for COVID-19 Pneumonia Detection from Chest X-ray”***

[***Aman Bahuguna***](https://link.springer.com/chapter/10.1007/978-981-19-9307-7_9#auth-Aman-Bahuguna)***,*** [***Deepak Yadav***](https://link.springer.com/chapter/10.1007/978-981-19-9307-7_9#auth-Deepak-Yadav)***,*** [***Apurbalal Senapati***](https://link.springer.com/chapter/10.1007/978-981-19-9307-7_9#auth-Apurbalal-Senapati) ***&*** [***Baidya Nath Saha***](https://link.springer.com/chapter/10.1007/978-981-19-9307-7_9#auth-Baidya-Nath_Saha) ***[5]***

This study suggests a brand-new frontal chest X-ray technique called the kNN-regularized Support Vector Machine (kNN-SVM) for detecting COVID-induced pneumonia. (CXR). On the basic VGG16 model, we applied transfer learning to calculate the deep features. Then, dimensionality reduction is accomplished using the autoencoder method. Finally, a brand-new, kNN-regularized Support Vector Machine algorithm is created and put into practice. It effectively classifies three classes on a benchmark chest X-ray dataset: Normal, Pneumonia, and COVID-19. The characteristics of two well-known formalisms, k-Nearest Neighbors (kNN) and Support Vector Machines (SVM), are combined in kNN-SVM. (SVMs). Our method expands the total-margin SVM, which weighs each point according to its k closest neighbors and takes into account how far each point is from the margin.

***"Detection of Pneumonia from X-ray Images using Eigen Decomposition and Machine Learning techniques"***

***S. Kabi, D. Patra and G. Panda[6]***

In the current inquiry an attempt has been made to create and evaluate k-nearest neighbor (k-NN), random forest (RF), and light gradient boosting machine (LGBM) based pneumonia diagnosis models employing unique eigen domain generated features from the X-ray pictures of patients. By conducting simulation-based tests on the generated models utilising publically accessible standard data set, the various performance matrices have been collected and compared. The analysis of the data shows that, in comparison to other reported models, the proposed LGBM with eigen domain features offers the best classification performance.

***“Progressive and Combined Deep Transfer Learning for pneumonia diagnosis in chest X-ray images”***

***Mamar Khaled, Djamel Gaceb, Fayçal Touazi, Ahmed Otsmane and Farouk Boutoutaou [7]***

Using a dataset of 5247 CXR images, this research seeks to streamline the process of diagnosing and classifying pneumonia for both professionals and patients. Five different pre trained CNNs: AlexNet, VGG16, ResNet50, DenseNet121 and Incepti onV3 were used separately or together for transfer learning in a progressive way. They are first taught on the ImageNet dataset, and then on a radiographic image of a different disease. (available in medium size with a nature close to our base). These models are improved using various fine-tuning techniques. To combine their weighted predictions, a weighted classifier with tuning levels and a based approach is proposed. The results obtained show the possibility of moving easily from the classification of a disease to another using a progressive transfer learning, which has a limited number of images by taking advantage of the knowledge already acquired on another very large base Keywords Deep learning, gradual transfer learning, and pneumonia.

***“Classification of Pneumonia from Chest X-ray Image using Machine Learning Models”***

***D. S. Rao, S. Anu H. Nair, T. V. Narayana Rao, and K. P. S. Kumar [8]***

Sorting out the various types of pneumonia is the most significant aspect of this study's conclusion. Each training picture is stripped of its combined Scale Invariant Fourier Transform (SIFT) and Local Binary Pattern (LBP) characteristics before being put into machine learning models like the Random Forest (RF), Artificial Neural Network (ANN), and Decision Tree (DT) model. After that, the classification model was constructed and evaluated on a set of test photos. With an accuracy of 91.29%, RF was able to accurately categorize all of the patients who had been diagnosed with pneumonia. Based on these findings, it can be concluded that the suggested approach presented in this study may aid in diagnosing patients with typical

pneumonia.

***“Review on Pneumonia Image Detection: A Machine Learning Approach”***

[***Amer Kareem***](https://www.researchgate.net/scientific-contributions/Amer-Kareem-2220667936)[***Haiming Liu***](https://www.researchgate.net/scientific-contributions/Haiming-Liu-2220665051)[***Paul Sant***](https://www.researchgate.net/profile/Paul-Sant) ***[9]***

This paper surveys and examines how computer-aided techniques can be deployed in

detecting pneumonia. It also suggests a hybrid model that can effectively detect

pneumonia while using the real-time medical image data in a privacy-preserving manner.

This study will investigate the different preprocessing methods, such as X-rays, that can

identify and categorize various diseases.

The study also investigates how various machine learning technologies like convolution

neural network (CNN), k-nearest neighbor (KNN), RESNET, CheXNet, DECNET and

artificial neural network (ANN) can be used in detecting pneumonia. In this article, we

have conducted a thorough literature review to determine how we can combine hospitals

and medical facilities to train the machine learning models from their datasets so that the

ML algorithms can identify disease more accurately and efficiently. We have suggested

future research using federated knowledge and transfer learning that could assist hospitals

and medical institutions in developing a coordinated strategy for conducting medical

image detection using real-time datasets. We have also looked into the solution's

limitations, scope, and future work.

***“Identification and Classification of Pneumonia using CNN Model with Chest X- ray Image”***

***Suraj Kumar, Shiva Prakash[10]***

In this study, we used CXR images to train a CNN model to identify and categorize Pneumonia disease in the lungs. We also show how training accuracy, validation accuracy, training loss, and validation loss change when the input image's size is changed. The Kaggle CXR dataset is utilized, which\was already developed and pre-processed. In order to improve classification accuracy, as well as training and validation accuracy, as well as characterize the precision of the Convolutional Neural Network model and achieve various results, the Convolutional Neural Network method is used in the research in close collaboration with some other data augmentation frameworks.Our model's accuracy during training and validation is 0.9757 and 0.9568, but its loss during training and validation is 0.0857 and 0.1399, respectively.