

PROJECTPHASE 1-20CS713(C16) DETECTION & CLASSIFICATION OF PNEUMONIA IN CHEST X-RAY IMAGES

Submitted By:

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ABSTRACT

Pneumonia is a respiratory infection caused by bacteria or viruses; it affects many individuals, especially in developing and underdeveloped nations, where high levels of pollution, unhygienic living conditions, and overcrowding are relatively common, together with inadequate medical infrastructure. Pneumonia causes pleural effusion, a condition in which fluids fill the lung, causing respiratory difficulty. Early diagnosis of pneumonia is crucial to ensure curative treatment and increase survival rates. Chest X-ray imaging is the most frequently used method for diagnosing pneumonia. However, the examination of chest X-rays is a challenging task and is prone to subjective variability. In this study, we developed a computer-aided diagnosis system for automatic pneumonia detection using chest X-ray images. We employed deep transfer learning to handle the scarcity of available data and designed a Convolutional Neural Network (CNN) model along with the four transfer learning methods: CovXNet, RNN and VGG16. Where, in the existing methods ResNet 50 is used that which did not get the proper accuracy and that tend to be improved. Hence the present method with other transfer learning methods are proposed. The proposed approach was evaluated on publicly available pneumonia X-ray dataset.

Keywords: Pneumonia, Chest X-ray images. Deep Learning, CNN, CovXNet, RNN, VGG16.

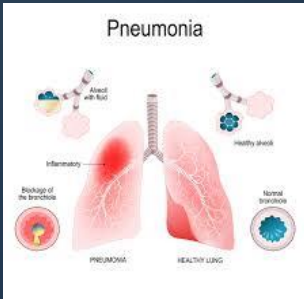
OBJECTIVE:



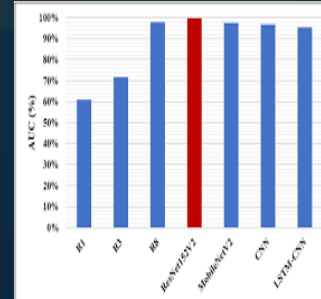
'The scope of this research encompasses the development and evaluation of deep learning models for the detection and classification of pneumonia in chest X-ray images. It includes the following aspects:



'**Algorithm Selection:** This research focuses on four deep learning algorithms: CNN, CovXNet, Mobilenet, and VGG16, to identify the most suitable approach for pneumonia detection and classification.



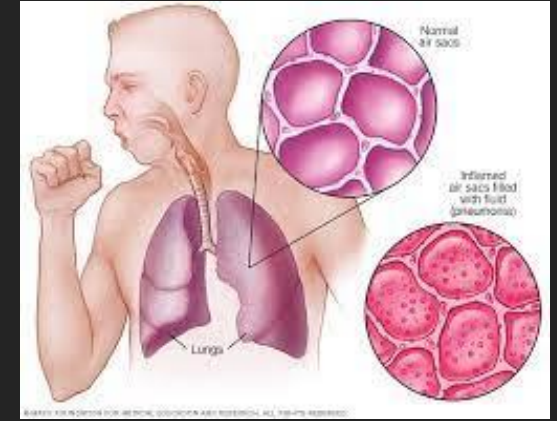
'**Data:** The study will use publicly available chest X-ray datasets, ensuring diversity in terms of age, gender, and ethnicity. Data augmentation and preprocessing techniques will be applied to improve model performance.



'**Performance Metrics:** The research will evaluate the models based on metrics such as accuracy, sensitivity, specificity, and ROC curves to provide a comprehensive assessment of their capabilities.

PROBLEM STATEMENT:

The problem at hand is the detection and classification of pneumonia in chest X-ray images using deep learning techniques. Pneumonia is a common respiratory disease, and its early diagnosis is critical for effective treatment. However, the manual interpretation of chest X-rays is time-consuming and can be prone to errors, leading to delayed treatment and misdiagnosis. This research addresses the need for an automated system that can accurately and quickly detect pneumonia in chest X-ray images. Additionally, it aims to classify the detected cases into bacterial and viral pneumonia, further assisting healthcare professionals in tailoring treatment plans.



LITERATURE REVIEW



S. No	Journal Type with year	Authors	Title	Outcomes
1	Journal of Hospital Medicine. 7, 294–298 (2012) https://doi.org/10.1002/jhm.955 PMID: 22009855	Neuman M., Lee E., Bixby S., Diperna S., Hellinger J., Markowitz R	Variability in the interpretation of chest radiographs for the diagnosis of pneumonia in children.	Diagnosis of pneumonia in children from chest radiographs
2	Pediatric Pulmonology. 48, 1195–1200 (2013) https://doi.org/10.1002/ppul.22806 PMID: 23997040	Williams G., Macaskill P., Kerr M., Fitzgerald D., Isaacs D., Codarini M	Variability and accuracy in interpretation of consolidation on chest radiography for diagnosing pneumonia in children under 5 years of age.	Accuracy in interpretation of consolidation on chest radiography
3	(Mendeley, 2018)	Kermany D., Zhang K. & Goldbaum M	Labeled Optical Coherence Tomography (OCT) and Chest X-ray Images for Classification	Chest X-ray Images for Classification
4	Sensors. 21, 3922 (2021) https://doi.org/10.3390/s21113922 PMID: 34200216	Lal S., Rehman S., Shah J., Meraj T., Rauf H., Damas̃evičius R.	Adversarial Attack and Defence through Adversarial Training and Feature Fusion for Diabetic Retinopathy Recognition.	Feature Fusion for Diabetic Retinopathy Recognition.

TECHNOLOGY STACK



SOFTWARE REQUIREMENTS:



Operating System : Windows 7/8/10



Server side Script : HTML, CSS, Bootstrap & JS



Programming Language : Python

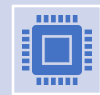


Libraries : Flask, Pandas, Mysql.connector, Os, Smtplib, Numpy



IDE/Workbench : PyCharm

HARDWARE REQUIREMENTS



Processor
Processor

- I3/Intel



RAM

- 4GB (min)



Hard Disk

- 128 GB



Key Board
Windows Keyboard

- Standard



Mouse
Three Button Mouse

- Two or



Monitor

- Any

The image features a dark blue background with a subtle pattern of small white dots. On the left, there is a detailed anatomical illustration of human lungs in a teal color, with a network of red branching vessels (bronchi and pulmonary arteries) visible. On the right, a stylized white outline of the letter 'H' is superimposed over the lung illustration. The 'H' is composed of two vertical bars and a horizontal crossbar, with thin white lines extending from the top and bottom of the vertical bars. Centered over the lungs is the text 'THANK YOU' in a white, bold, sans-serif font.

THANK YOU