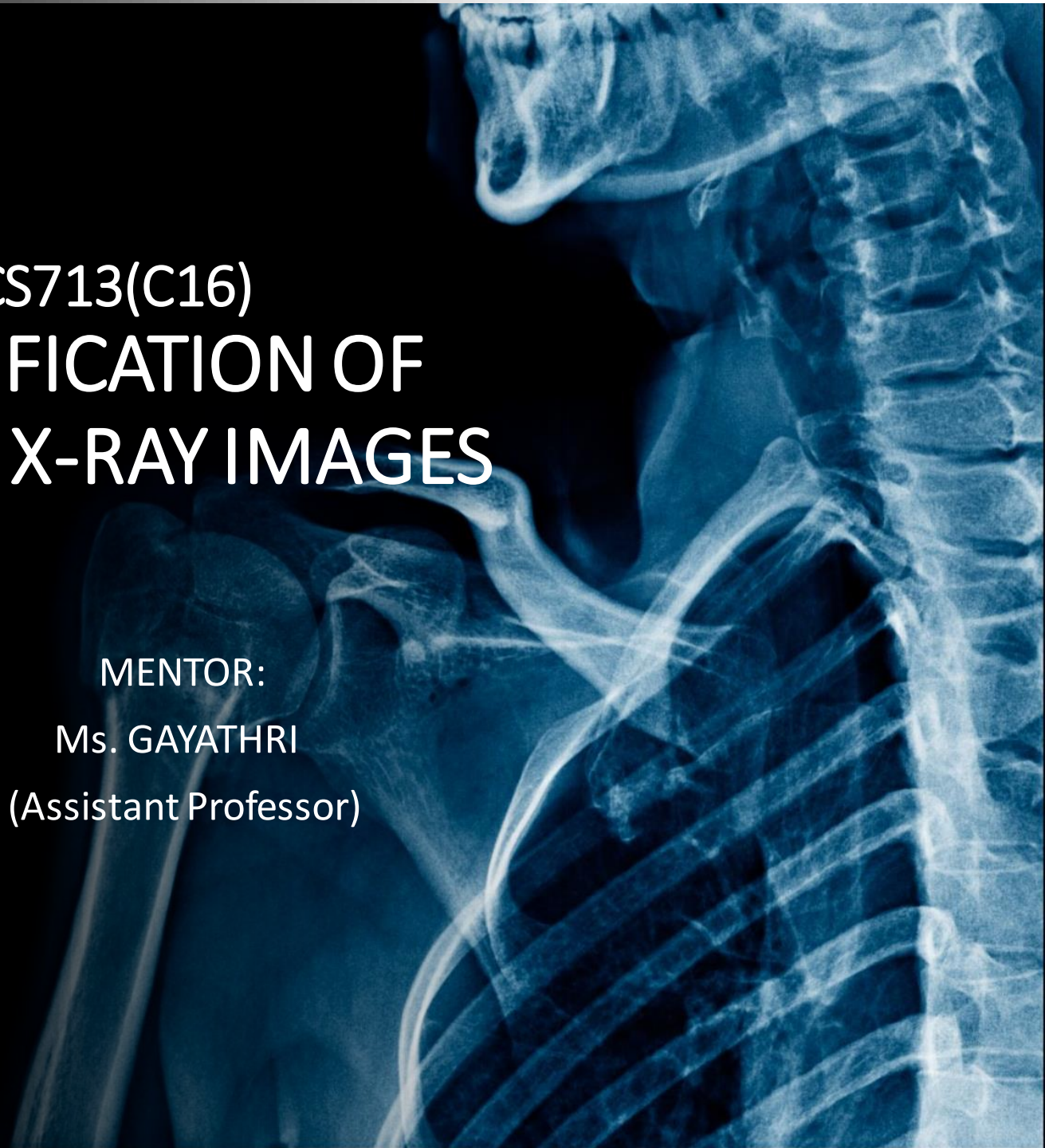
PROJECTPHASE 1-20CS713(C16)

DETECTION & CLASSIFICATION OF PNEUMONIA IN CHEST X-RAY IMAGES



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ABSTRACT

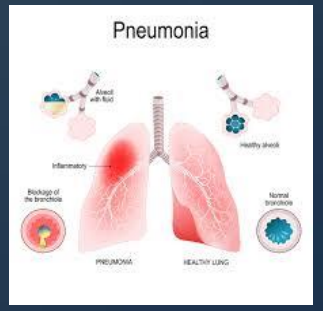
Pneumonia is a respiratory infection caused by bacteria or viruses; it affects many individuals, especially in developing and underdeveloped nations, where high levels of pollution, unhygienic living conditions, and overcrowding are relatively common, together with inadequate medical infrastructure. 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 got 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.

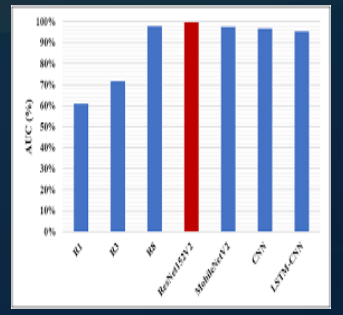
OBJECTIVE

´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.



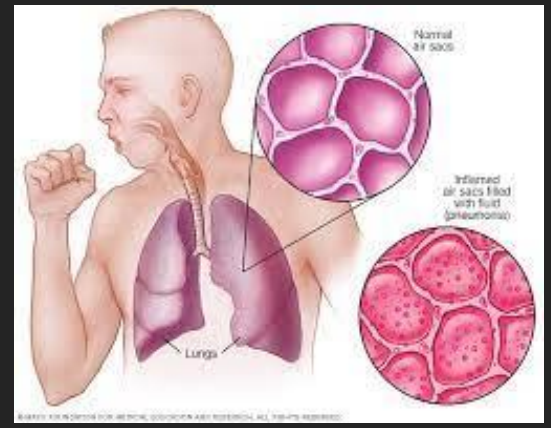
´**Data:** The study will use publicly available chest X-ray datasets, ensuring diversity in terms of age, gender, and ethnicity. Data augmentation and preprocessing techniques will be applied to improve model performance.



´**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.



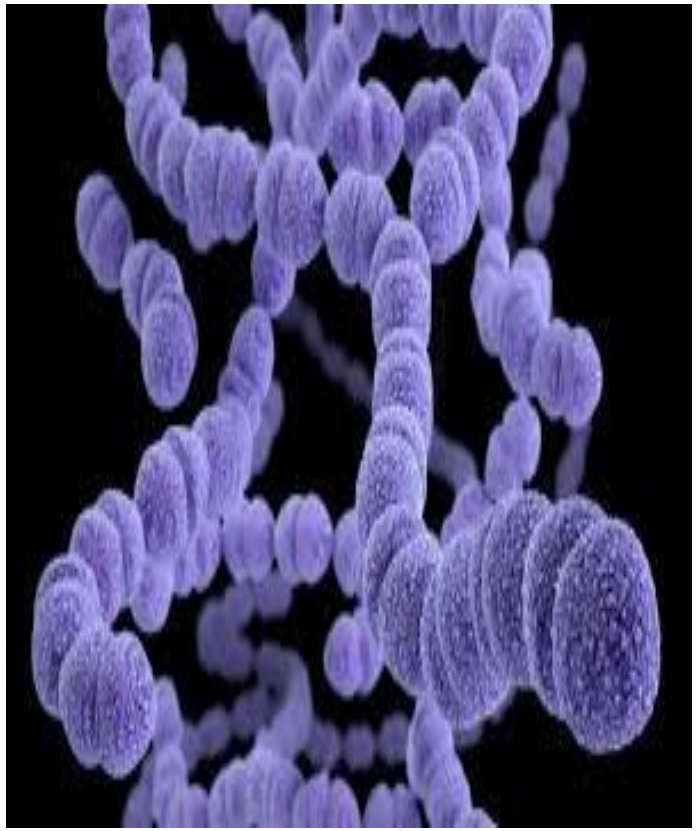
MOTIVATION

The motivation for undertaking the project on the detection and classification of pneumonia in chest X-ray images using deep learning techniques is rooted in the critical need to improve the efficiency and accuracy of pneumonia diagnosis. Pneumonia is a prevalent respiratory disease that can be life-threatening if not identified and treated promptly. Traditional methods of diagnosis through visual examination of chest X-rays by radiologists are not only time-consuming but also subject to human error and subjectivity. Additionally, the global healthcare system faces challenges such as a shortage of skilled radiologists and the demand for timely diagnosis, especially during disease outbreaks. Deep learning, with its potential for automation and precision, offers an opportunity to address these challenges and revolutionize pneumonia diagnosis, ultimately saving lives and improving healthcare outcomes.

SCOPE

The scope of this project encompasses several key aspects. Firstly, it involves the development and fine-tuning of deep learning models, such as Convolutional Neural Networks (CNNs), to accurately detect pneumonia in chest X-ray images. Furthermore, the project extends to the classification of pneumonia cases into bacterial and viral types, aiding in treatment decisions. Data collection and preprocessing play a vital role in ensuring the quality and diversity of the dataset, which is crucial for model training and evaluation. The project's scope also involves the evaluation of model performance using various metrics like accuracy, sensitivity, and specificity. Interpretability techniques will be explored to enhance trust and understanding of the model's predictions. Ultimately, the project aims to provide a practical software solution that can be used by healthcare professionals for automated pneumonia detection and classification, thereby improving patient care and reducing the workload on radiologists.

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 form 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., Damasˇevičius 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

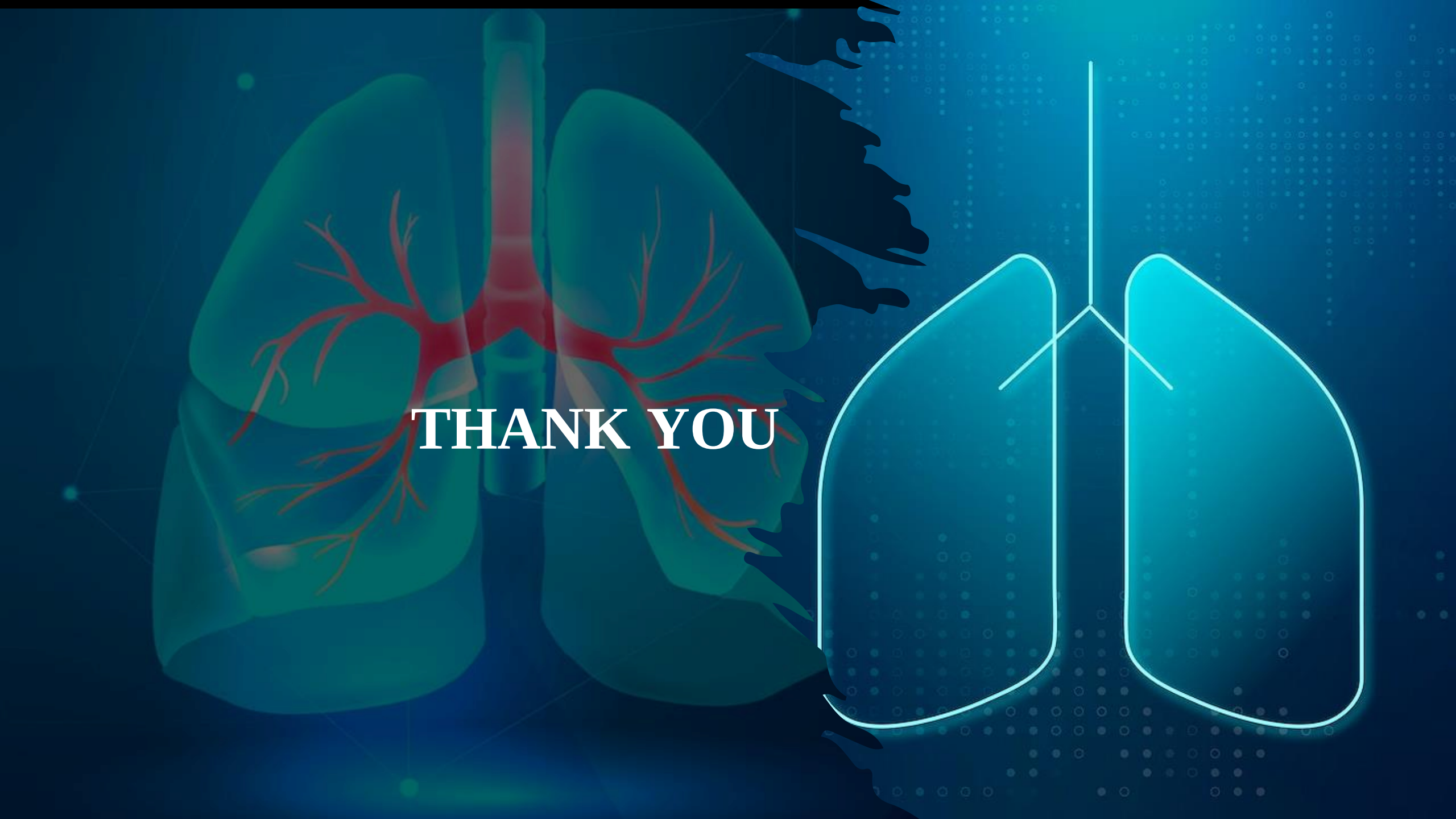
Programming Language : Python

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


THANK YOU