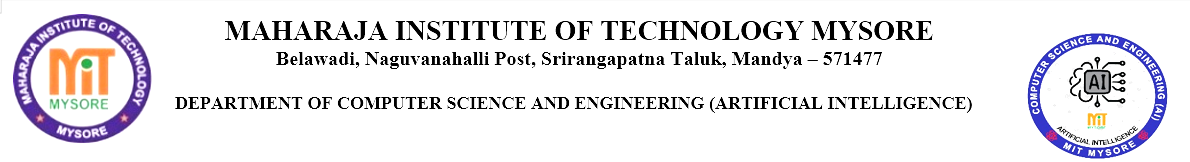
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**Mini Project Approval Letter**  From: Date: 19/11/2024

Manya B J

4MH22CA023

5th Sem

Dept. of CSE-AI

MIT Mysore

Through:

Mr. Shashanka H P

Assistant Professor

Dept. of CSE-AI

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Batch No: 09

To:

Dr. Victor Agughasi I

Mini Project Coordinator,

Dept of CSE-AI, MIT Mysore.

Respected Sir,

**Sub:** Requisition for the finalization of Mini Project Topic

The topic titled **“Pneumonia detection using CNN”** is finalized in consultation with the guide. The synopsis is attached herewith.

Please do the needful.

Guide’s Name with Signature Student’s Names with Signature

1.Manya B J  
 2. Sanjana M  
 3. Syed Inam  
 4. Ayush H

**SYNOPSIS**

**TITLE OF THE PROJECT: PNEUMONIA DETECTION USING CNN**

**1.Introduction**

Pneumonia is a serious lung infection that affects millions of people across the globe every year. It can be mild or severe, and if not managed, it can have negative health consequences, and in certain situations, death. Time is of the essence in diagnosis since young children, the elderly, and individuals with weak immunity are more likely to suffer from various complications. Usually, the diagnosis of pneumonia has to go through a labor-intensive process where chest x-rays have to be examined by trained personnel. This activity is very important in areas that have an abundance of medically trained personnel, but unfortunately, it is not the case for many areas. For instance, rural or low-income areas may not have diagnostic facilities, aggravating the clinical condition of the patients for a very long period.

This project aims to overcome these limitations through the use of a Convolutional Neural Network (CNN) model which detects pneumonia from chest X-ray images automatically. CNNs are deep learning models that have considerable capability in visual and image-related tasks. They achieve this by learning features of the images without supervision which is appropriate for the task of classifying images. Recently, however, CNNs have extended quite a remarkable impact across various fields including facial recognition, self-driving cars, and most notably, medical images. It is quite evident that having a large, adequately-annotated dataset of chest X-ray images, enables a CNN model to detect traces of pneumonia with precision.

This project utilizes the programming language Python and the existing popular technologies characterized by deep learning frameworks like TensorFlow or Pytorch which offer tools for designing, training and testing CNN models. Furthermore, methods like image processing transformations will be employed to enhance the performance and generalization of the model on new data as a way of reducing overfitting consequently enhancing the diagnostic performance of the model. This system for the detection of pneumonia using CNNs can be of significant help to radiologists and health care professionals in improving their diagnosis efficacy especially in areas with a shortage of health care providers. With the creation of an effective automated detection tool, this proposal intends to facilitate faster pneumonia detection. This will enhance healthcare provisions and possibly avert loss of lives.

**2.Motivation/Rationale**

Pneumonia is a major respiratory infection, which can be serious and risky for human life as it may affect children, old people and weak immune systems. Timely and correct diagnosis of pneumonia is critical to effective treatment in many cases, and even life-saving. On the other hand, in underserved regions or isolated areas access to radiologist and physicians for immediate diagnosis may be limited. These discrepancies highlight an immediate demand for automated solutions to assist healthcare professionals in accurately diagnosing pneumonia at a quicker pace.

Advanced artificial intelligence and medical imaging techniques can be harnessed to tackle this issue, such as using Convolutional Neural Networks (CNNs) for pneumonia identification. Convolutional neural networks (CNNs) have shown a positive impact on image classification, which makes them a suitable tool for interpreting chest X-ray . This project intends to contribute the healthcare professionals with a CNN based model in order to diagnose cases of pneumonia as efficiently as possible, thereby saving lives at risk and ease pressure on medical resources.

**3.Objectives**

**1. High Accuracy and Robustness**

Achieve high accuracy in detecting pneumonia while minimizing false positives and negatives, ensuring the model can generalize well across diverse datasets, imaging equipment, and patient demographics.

**2. Real-time and Efficient Performance**

Develop a fast, lightweight model capable of processing medical images in real-time or near real-time, even on resource-limited devices, to assist in timely diagnosis.

**3. Interpretability and Trust**

Provide interpretability of model predictions using techniques like Class Activation Mapping (CAM) to enhance the trust of healthcare professionals in the model’s decision-making process, ensuring transparency and reliability.

**4.** **Reducing Misdiagnoses**

Minimize false positives and negatives by improving the precision of diagnostic systems, ensuring appropriate treatment is administered.

**5. Scalable and Accessible Solutions**

Develop affordable and user-friendly diagnostic methods to make pneumonia detection accessible in low-resource settings, enhancing global healthcare equity.

**4.Literature Review:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| S/No. | Author(s), Journal Name, Year of Publication (YOP) | Title | Problem Identified | Dataset used/ Description | Methodology Used | Observations (Strengths, Limitations) |
| [1] | Dr.T.Praveen Blessingtonetal  Journal name:JETIR  YOP:2023 | Pneumonia Detection Using CNN | Traditional methods are time-consuming and prone to human error  Chest X-ray images (pneumonia-positive and pneumonia-negative) | | CNN model | High accuracy (96%), but needs real-world validation |
| [2] | Amer Kareem  Journal name: Springer  YOP:2022 | Review on Pneumonia Image Detection: A MachineLearning Approach | Need for efficient and accurate pneumonia detection | Various datasets from hospitals and medical institutions | Hybrid model combining CNN with other ML techniques | Comprehensive review,but lacks specific accuracy metrics |
| [3] | Er. Neetu Bala  Journal name: SSRN  YOP:2024 | Deep Learning Techniques for Pneumonia Detection: A Review of CNN Applications | Traditional diagnostic methods are time-consuming | Publicly available pneumonia datasets | CNN models with various architectures | Highlights challenges in real-world implementation |
| [4] | Various Authors  Journal name: Springer  YOP:2023 | A Systematic Literature Review on Deep Learning Approaches for Pneumonia Detection | Need for advanced techniques in pneumonia detection | Various datasets | Systematic review of deep learning techniques | Provides a broad overview, but lacks specific findings |

**Table 1.1 Literature Review**

**5. Feasibility Study**

It would be possible to implement pneumonia detection using CNNs from large datasets, such as the chests X-ray image repositories, for example NIH Chest X-rays and Kaggle datasets. CNNs have been only recently proved to be potential entities in the arena of medical image analysis with high accuracy in related classification tasks. This project could technologically be realized with existing deep learning tools and libraries, such as TensorFlow and Keras. With the proper computational resource-in this case, GPUs or cloud services, the system design and implementation are feasible within the constraints.

This project is significant because it addresses critical challenges in healthcare, such as diagnostic accuracy, early detection, and accessibility. By implementing a CNN-based solution, healthcare providers can benefit from a reliable diagnostic aid, enabling quicker decision-making and better resource allocation. This system can be particularly impactful in remote or under-resourced areas, where access to expert radiologists is limited. Furthermore, it can contribute to the broader adoption of AI in healthcare, paving the way for advancements in medical diagnostics.

**6. References**

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