Assignment 3:

To perform literature review of proposed system.

1. Title: Pneumonia Detection Using CNN based Feature Extraction

- **Authors**: Dimpy Varshni, Rahul Nijhawan ,Kartik Thakral, Ankush Mittal ,Lucky Agarwal
- **Literature Review**: The paper investigates the use of Convolutional Neural Networks (CNNs) for automatic pneumonia detection in chest X-ray images. It addresses the limitations of manual analysis by radiologists, particularly in remote areas, and seeks to develop a reliable automated system. The authors leverage transfer learning, where pre-trained CNN models like DenseNet-169, ResNet, and VGGNet, initially trained on large datasets (such as ImageNet), are fine-tuned for pneumonia detection. These models are used to extract deep features, which are then fed into classifiers like Support Vector Machines (SVM), Random Forest, and K-Nearest Neighbors. The study finds that DenseNet-169 combined with SVM achieves the best performance, providing higher accuracy and Area Under the Curve (AUC) scores compared to other models. The experiments also include hyperparameter tuning to optimize the SVM classifier for better detection rates. This combination allows the system to accurately classify chest X-rays, reducing misdiagnoses and improving accessibility to early pneumonia detection

2. Title: Detection of pneumonia using convolutional neural networks and deep learning

- **Authors**: Patrik Szepesi, Laszlo Szilagyi
- **Literature Review**: This research focuses on improving pneumonia detection using a novel CNN architecture that integrates dropout in the convolutional layers, rather than the fully connected layers, which is typical in many CNN models. The dataset used is from Kaggle, containing over 5,800 labeled pediatric chest X-ray images. The authors note that pneumonia, which often manifests subtly in medical images, can be difficult

to detect accurately. The proposed model, trained without transfer learning or pre-trained weights, achieves impressive results, surpassing previous state-of-the-art models with an accuracy of 97.2%, recall of 97.3%, and precision of 97.4%. The use of dropout in the convolutional layers is highlighted as a key innovation that reduces overfitting and improves generalization, making the model robust even with a smaller dataset. The paper also compares the proposed method with other popular CNN architectures like VGG-16 and ResNet, showing that it performs better on key metrics.

3. Title: Detection of Pneumonia Infection by Using Deep Learning on a Mobile Platform

- **Authors**: Alhazmi Lamia and Alassery Fawaz
- **Literature Review**: The paper presents a mobile application prototype designed to detect pneumonia from chest X-ray images using deep learning. The study is motivated by the lack of access to medical experts in remote or underdeveloped regions. Using Create ML, a high-level machine learning tool by Apple, the authors build a convolutional neural network (CNN) model that can be deployed on mobile devices. The dataset includes over 5,000 real chest X-ray images, and the model was trained to classify them into two categories: normal and pneumonia. The paper emphasizes the ease of use provided by Create ML, allowing the model to be built without needing specialized machine learning knowledge. The trained model achieves an accuracy of 86%, with normal cases being identified correctly 90% of the time and pneumonia cases 84% of the time. The study suggests that such mobile applications could be an effective tool for early detection of pneumonia, particularly in areas with limited healthcare infrastructure.

4. Title: A Deep Learning based model for the Detection of Pneumonia from Chest X-Ray Images using VGG-16 and Neural Networks

- **Authors**: Shagun Sharma and Kalpna Guleria
- **Literature Review**: This paper discusses the application of the VGG-16 convolutional neural network for pneumonia detection from chest X-ray

images. The researchers evaluated the model on two datasets, demonstrating high classification performance. The VGG-16 model, coupled with a neural network classifier, achieved 92.15% accuracy on the first dataset and 95.4% on the second, which also contained COVID-19 cases, making it more complex.

The authors compared the VGG-16 model's performance to that of traditional machine learning models, such as Support Vector Machine (SVM), K-nearest neighbors (KNN), Random Forest (RF), and Naïve Bayes (NB). The deep learning model outperformed these traditional methods in terms of accuracy, precision, and recall. The research highlighted the superiority of CNN-based models over classical approaches in medical image analysis, particularly for pneumonia detection.

This study makes a valuable contribution to medical diagnostics by showing that deep learning models can significantly improve diagnostic accuracy and speed. The VGG-16 model's ability to handle complex datasets demonstrates its utility for real-world healthcare applications, particularly in automating diagnosis and reducing reliance on specialist radiologists.

- Key Findings:

  1.VGG-16 achieved 95.4% accuracy on complex datasets.

  2.Outperformed traditional machine learning models like SVM and KNN.

  3.Demonstrates the potential of deep learning for automating medical diagnostics.

5. Title: A Deep Convolutional Neural Network for Pneumonia Detection in X-ray Images with Attention Ensemble

- **Authors**: Qiuyu An , Wei Chen and Wei Shao
- **Literature Review**: This paper, authored by An, Chen, and Shao (2024), presents an advanced deep convolutional neural network (CNN) model to detect pneumonia from chest X-ray images. The authors combined EfficientNetB0 and DenseNet121 models, enhancing them with multi-head self-attention mechanisms and channel-attention-based feature fusion to

improve the accuracy of feature extraction. The use of these mechanisms allows the model to focus more on the critical areas of X-ray images, significantly improving diagnostic accuracy.

The study utilized a dataset consisting of X-rays from both healthy individuals and pneumonia patients. The model achieved outstanding performance, with an accuracy of 95.19%, precision of 98.38%, recall of 93.84%, and specificity of 97.43%. The results outperformed other CNN models such as VGG16, ResNet50, and InceptionV3.

The authors addressed several challenges faced by existing models, such as data imbalance, inconsistent imaging standards, and the difficulty of distinguishing pneumonia from other lung conditions. The attention mechanisms enabled the model to extract more relevant features, thus improving overall accuracy. This research demonstrates significant potential for clinical application, particularly in environments with limited access to radiological expertise, and underscores the growing role of AI in healthcare diagnostics.

- Key Findings:

1.High performance with 95.19% accuracy and 98.38% precision.

2.Effective use of EfficientNetB0 and DenseNet121 models, combined with attention mechanisms.

3.The potential for real-world clinical use, especially in resource-constrained Area.