

D7047E, Advanced deep learning - *Project Assignment 1*

Group 08

Akshay Malviya,
Ashish Kumar Srivastava,
Syed Muhammad Junaid Ul Mohsin,
Wassim Akachi

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1 The Project Topic

We are going to work on the project **Pneumonia Detection with Chest X-Ray Images**. We are interested in this project as we will get the chance to work with real X-ray image data.

2 Intended approach towards the project

2.1 Problem Type

The task of classifying X-ray images of 'Pneumonia' or 'Normal' is a binary classification problem in the field of medical image analysis. This involves analyzing image data to detect patterns that distinguish between infected and healthy states.

2.2 Suitable Architectures

For this type of image classification task, we believe that Convolutional Neural Networks (CNNs) will be the best choice. This is due to their ability to extract multiple features from images effectively. The integration of advanced frameworks like PyTorch alongside tools such as TensorBoard, Weights and Biases, will not only facilitate robust model development but also ensure comprehensive performance analysis and visualization.

2.3 Evaluation

We will use the Confusion Matrix to calculate the Accuracy and F1-Score of the trained model.

2.4 Initial Plan

We will begin with data augmentation (like rotation, zoom, and horizontal flipping) to increase dataset diversity and size, helping the model generalize better. The dataset contains more than 5000 images, containing labelled images for Pneumonia-infected or normal lungs. We will split the data into training, validation and testing sets to avoid overfitting. We plan to experiment with different learning rates, optimizers (like Adam and SGD), and batch sizes to find the best combination for this specific dataset.

We will implement the model using pyTorch. this allows us to take advantage of libraries that support extensive experimentation and are equipped with built-in functions for the metrics and loss functions discussed. This initial approach is flexible and can evolve based on intermediate results and findings during the project. We want to keep a robust experimental approach where different parameters can be systematically tested and compared.

3 Conclusion

With this project, we aim to learn how to solve real-world medical problems (here, Pneumonia Detection with Chest X-ray images) using supervised machine-learning algorithms.