**README**

**# Pneumonia Detection using InceptionV3**

**## Objective**

The goal of this project is to fine-tune a pre-trained InceptionV3 model to classify chest X-ray images as either pneumonia or normal. The model is trained and evaluated using the PneumoniaMNIST dataset.

**## Dataset**

- \*\*Name\*\*: PneumoniaMNIST (part of the MedMNIST collection)

- \*\*Format\*\*: `. npz` file containing pre-split train, validation, and test sets

- \*\*Preprocessing\*\*:

- Grayscale images are converted to RGB

- Resized from 28x28 to 75x75 to match InceptionV3 input requirements

**## Task Description**

**### Model**

- Pre-trained InceptionV3 (ImageNet weights) used as the base model

- Custom classification head added:

- Global Average Pooling layer

- Dropout (rate = 0.5)

- Dense layer with ReLU activation

- Output layer with sigmoid activation for binary classification

**### Evaluation Strategy**

**1. \*\*Evaluation Metrics\*\*:**

- Accuracy: Measures overall correctness

- F1 Score: Balances precision and recall, useful for imbalanced data

- ROC-AUC: Evaluates how well the model separates the two classes

**2. \*\*Class Imbalance Handling\*\*:**

- Checked the distribution of pneumonia vs. normal cases

- Used `class\_weight` from `sklearn` to assign higher weight to the minority class

- Applied image augmentation techniques during training to improve generalization

**3. \*\*Overfitting Prevention\*\*:**

- Dropout layer used in the model

- Image augmentation included rotation, shifting, zooming, and horizontal flipping

**## Results**

|  |  |
| --- | --- |
| **Metric** | **Score** |
| **Accuracy** | **89%** |
| **F1 Score** | **0.915** |
| **ROC-AUC** | **0.875** |

**Visualizations such as the confusion matrix, ROC curve, and metric bar plots are generated as part of the output.**

**## Requirements**

**Install dependencies using the following command:**

**```bash**

**pip install -r requirements.txt**