Fiche TP4 : Transfer Learning.

1- Load the Chest X-rays dataset from https://www.kaggle.com/datasets/tawsifurrahman/covid19-radiography-database and perform pre-processing: data normalization (divide on 255).
2- By using the stratified hold out strategy split the dataset into 70% for training and 30% for validation.
3- Import one of these architectures with ImageNet pretrained weights: MobileNet, MobileNetV2 (x0.25, x0.5, x0.75, and x1.0), EfficientNet-B0, ShuffleNetV2(x0.5, x0.1, x1.5, and x2.0), ShuffleNetV2b (x0.5, x0.1, x1.5, and x2.0), MnasNet-B, MnasNet-A .
4- Load the pretrained weights from ImageNet (you can use the kerascv library).
5- Remove and replace the last fully connected layers by three fully connected layers composed of 1024, 512, and c (Number of classes) neurons.
6- Specify the total number of parameters of the new architecture.
7- Print the new architecture (the layers associated to their number of parameters).
8- Retrain the last (two convolutional layers + the last three fully connected), (one convolutional layers + the last three fully connected), and (the last three fully connected) using: the transfer learning strategy for 20 epochs with a batch size of 64 and the Adam optimizer with a learning rate of 0.001.
9- Presents and compare the obtained results in terms of Accuracy, recall, precision, F1-score, and sensitivity on the validation set, print the convergence curves on both training and validation sets. Presents the training time.
10- All results must be presented in a report. You can Work in groups of no more than 3 students.