Practice Exercise: CNN and Transfer Learning

Q1 In practice, very few people train an entire Convolutional Neural Network from scratch (with random initialisation), because it is relatively rare to have a dataset of sufficient size. Instead, it is common to pretrain a CNN on a very large dataset (e.g. ImageNet LSVRC version, which contains 1.2 million images with 1000 categories), and then use the trained CNN classifier either as an initialisation or a fixed feature extractor for the task of interest.

Train a CNN classifier on the Indoor Scene Recognition dataset with ResNet-34 as the Convolutional Neural Network model. The `resnet34()` class within `torchvision.models` could be used to get a PyTorch instance of the ResNet34 model, which could be initialised with the `IMAGENET1K_V1` weights by setting the flag `weights='IMAGENET1K_V1'`.

Since the 'Indoor Scene Recognition' dataset is not available within the dataset collection of `torchvision`, you are required to implement a custom dataset class in PyTorch for it. For that, please have a look on the `'TUBerlin'` custom dataset implemented in the 'Workshop 04: Convolutional Neural Networks and Transfer Learning Tutorial'. For training the model, use the 5360 images listed in the `'TrainImages.txt'` file and test the model on the 1340 images listed in the `'TestImages.txt'` file.