

EN2550 Exercise 11 on CNNs and Transfer Learning

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1. Implement the LeNet5 network, as discussed in class, for MNIST.
2. Implement a CNN for CIFAR10.
3. For the MINST dataset, implement the following network (call it `model_base`):
C 3×3 , 32
M 2×2
C 3×3 , 64
M 2×2
C 3×3 , 64
F
D 64
D 10
C: convolution layer, M: max pooling, F: flatttening, D: dense layer. All activations are ReLu. The last layer has no activation function. All strides are 1, except in M, where the stride is 2. Train this network for 2 epochs and save the weights.
4. Create a second network with exactly the same structure as in 3. Call this `model_lw`. Load the weights saved in 3. Train for two epochs.
5. Load this model using `keras.models.load_model`. Call this `model_ld`
6. Transfer learning: Load the saved model except the last layer. Connect a fresh dense layer of 10 output nodes. Train for two epochs.
7. Fine tuning: Load the saved model. Make the loaded layers non-trainable. Repeat the process in 6.
8. Load a pre-trained ResNet model, e.g., `keras.applications.resnet_v2.ResNet50V2`. Connect an output layer of 5 nodes. Feed arrays of random numbers as input images and transfer learn.