

MKT3434 21067011 Furkan Karstarlı

Homework 3

- **Python 3.10 is used.**
- **Examples conducted with datasets as “
MINST, CIFAR-10 and IMDB Reviews”**
- **DONT FORGET TO LOOK AT
README.md FILE!!!**
- **Some tasks may take up time, be
patient about to get the result.**
- **Pre-Trained option not Works very
well.**
- **You should add Pool and Conv2D
options before the Dense!**

What I have done so far:

Over the past development cycle, the GUI has been upgraded from a five-tab classical-ML demonstrator into a full-featured six-tab environment that now supports interactive neural-network design, training, and evaluation. The new “Neural Networks” tab lets users load built-in datasets (MNIST, CIFAR-10, IMDB), construct architectures dynamically (Dense, Conv2D, MaxPool, LSTM/GRU, Dropout) with drag-and-drop ordering, choose optimisers and learning-rate schedules, and monitor real-time logs and training curves. Robust guards now prevent illegal layer orderings (e.g., Conv2D after Dense) and auto-insert Flatten layers where needed; the code also resets models when datasets or architectures change to eliminate shape-mismatch errors. Transfer-learning is enabled through one-click loading and fine-tuning of ImageNet backbones (VGG16, ResNet50, MobileNetV2) with automatic grayscale-to-RGB conversion. Users can save models in the modern .keras or legacy .h5 formats, reload them with their architecture reconstructed in the GUI, and visualize gradient histograms for diagnostic insight. Additional UX improvements include layer move-up/move-down controls, dataset placeholders to avoid attribute errors, expanded status messaging, and a cleaner results plot layout. Collectively these enhancements transform the tool into a versatile classroom platform for both classical and deep-learning experiments.

New tab added as “Neural Network”

Regression Classification SVM Naive Bayes Dim. Reduction Clustering **Neural Networks**

Neural Network Designer Trainer

Built-in Dataset: MNIST Load Dataset

Architecture (top – bottom):

Add Dense Add Conv2D Add Pool Add LSTM Add GRU Add Dropout Remove Move ▲ Move ▼

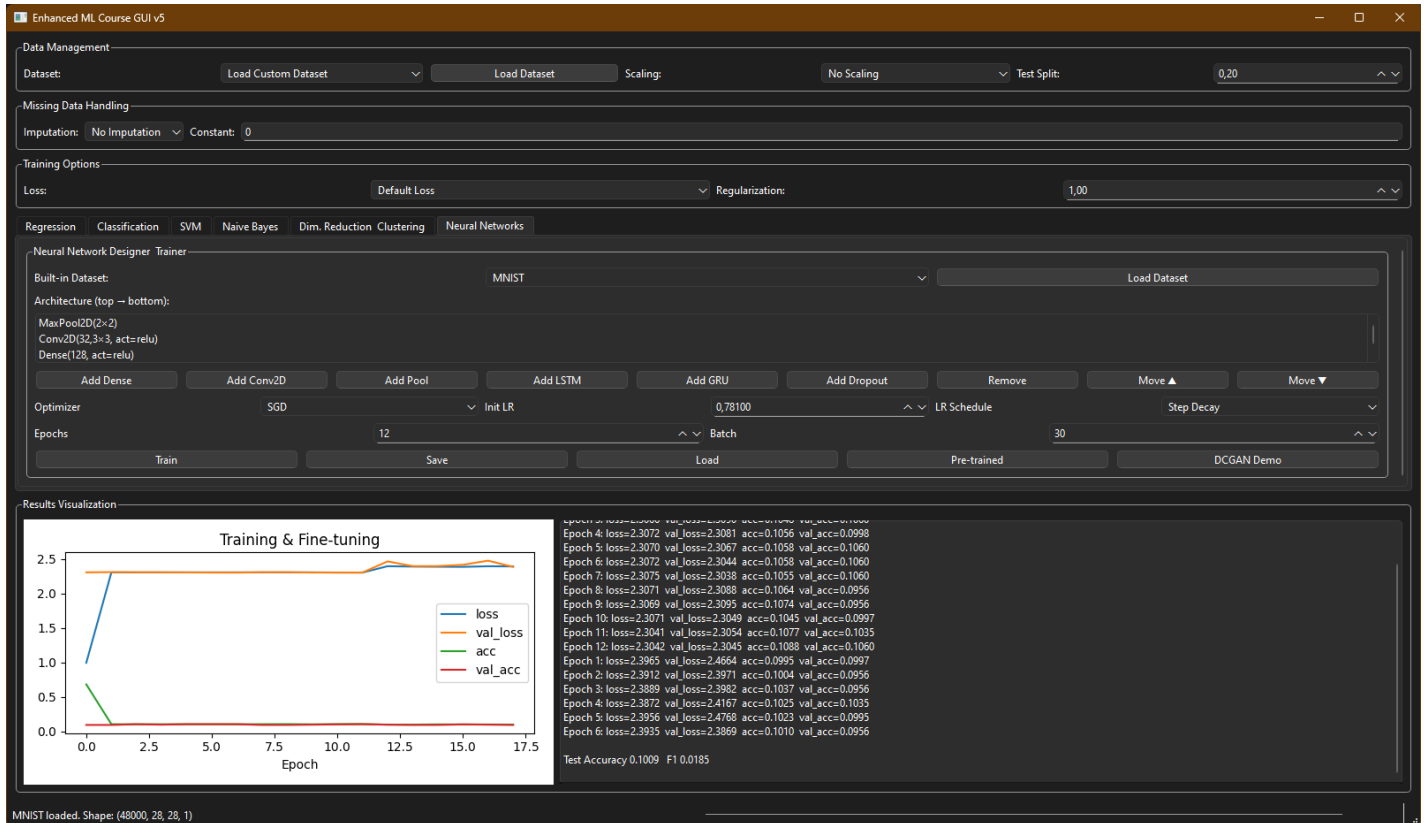
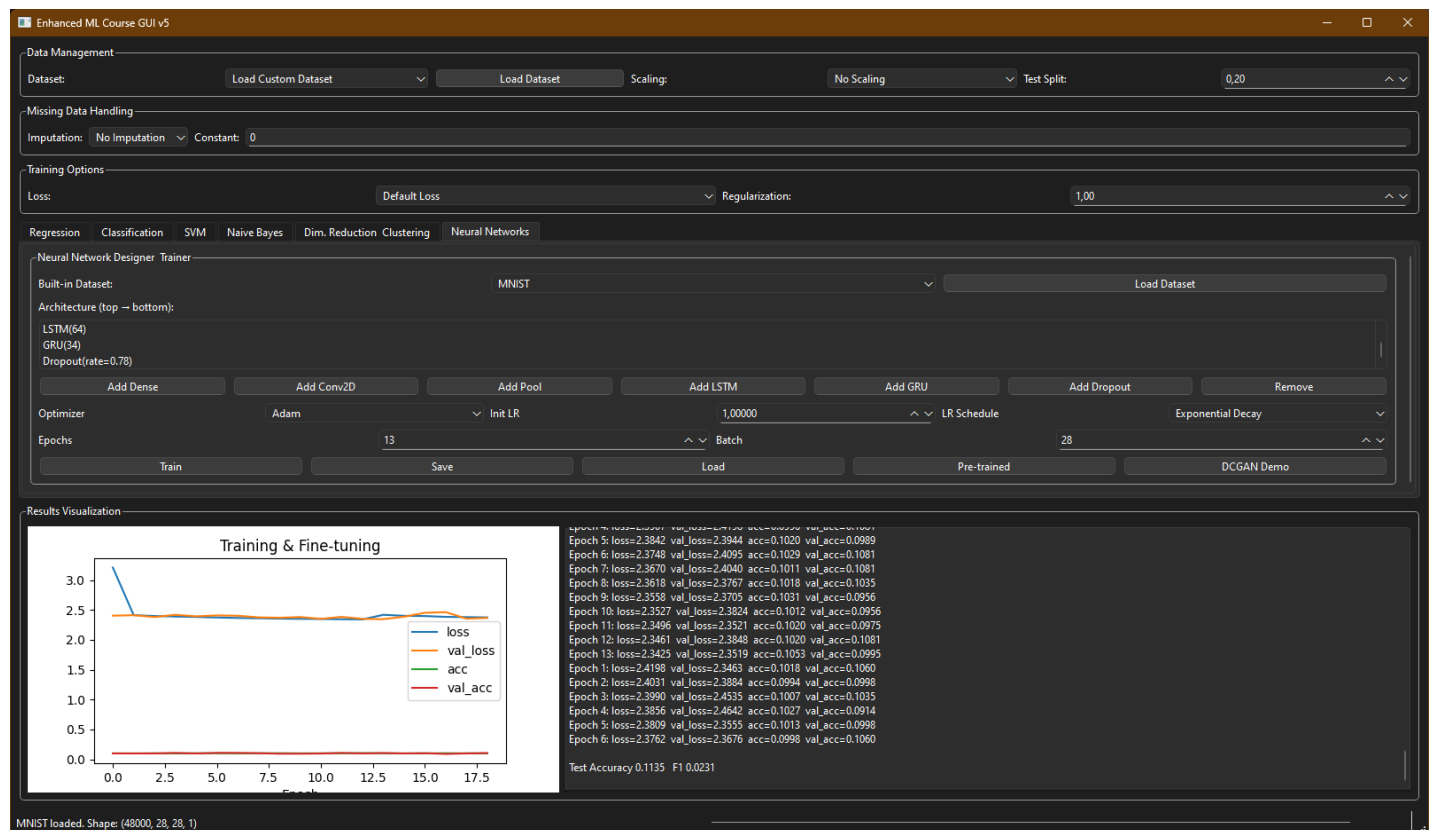
Optimizer Adam Init LR 0.00100 LR Schedule None

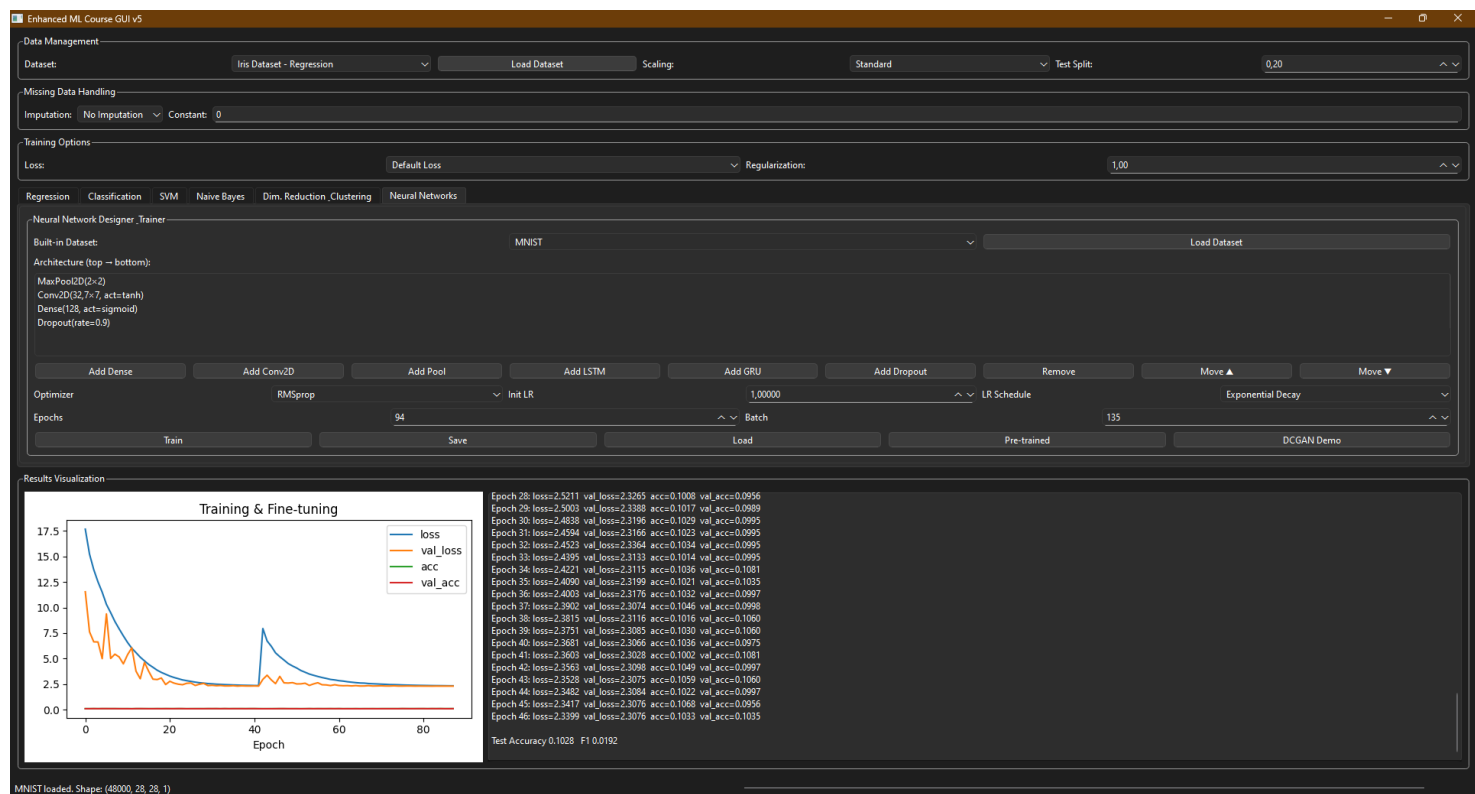
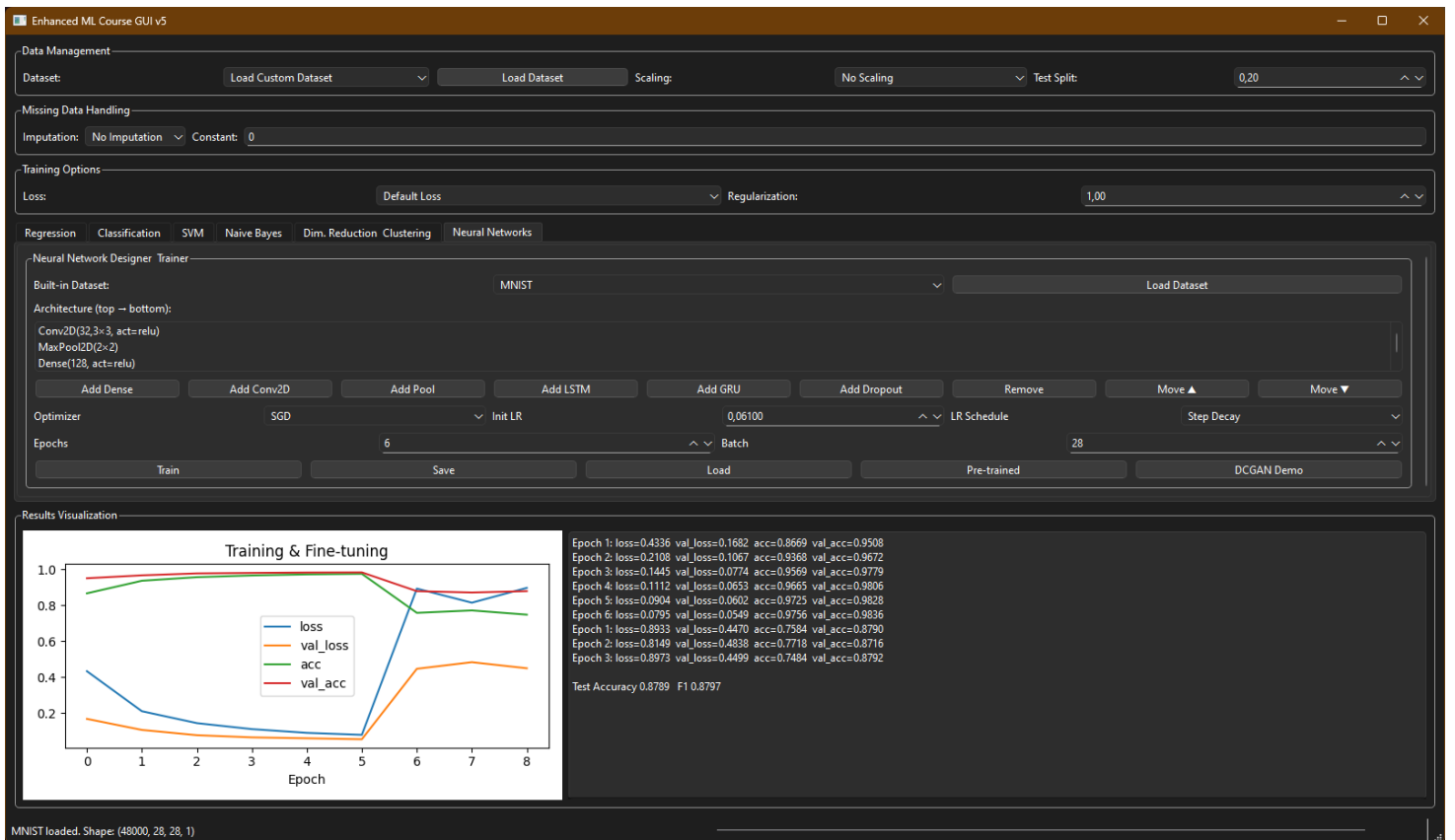
Epochs 10 Batch 32

Train Save Load Pre-trained DCGAN Demo

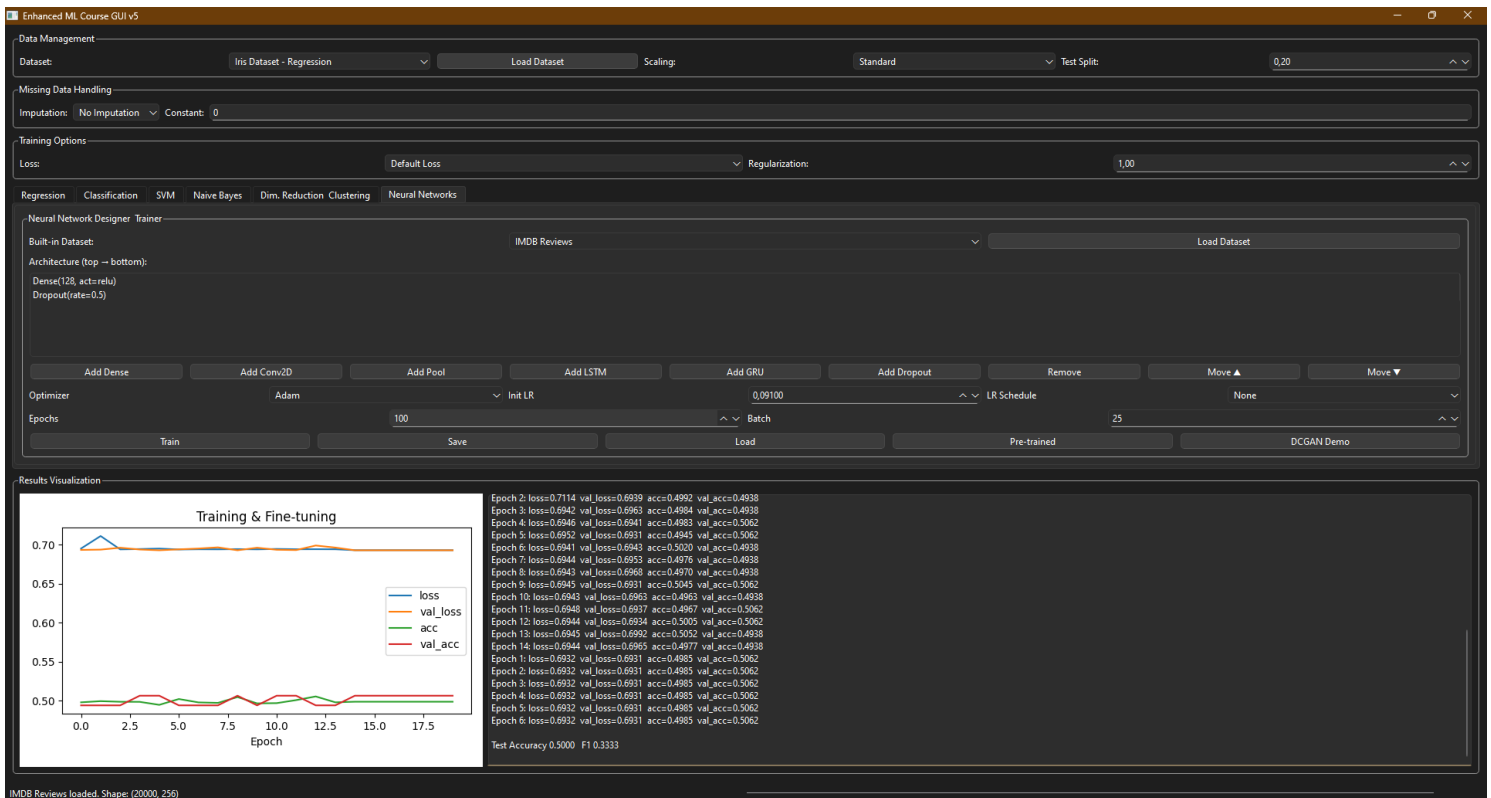
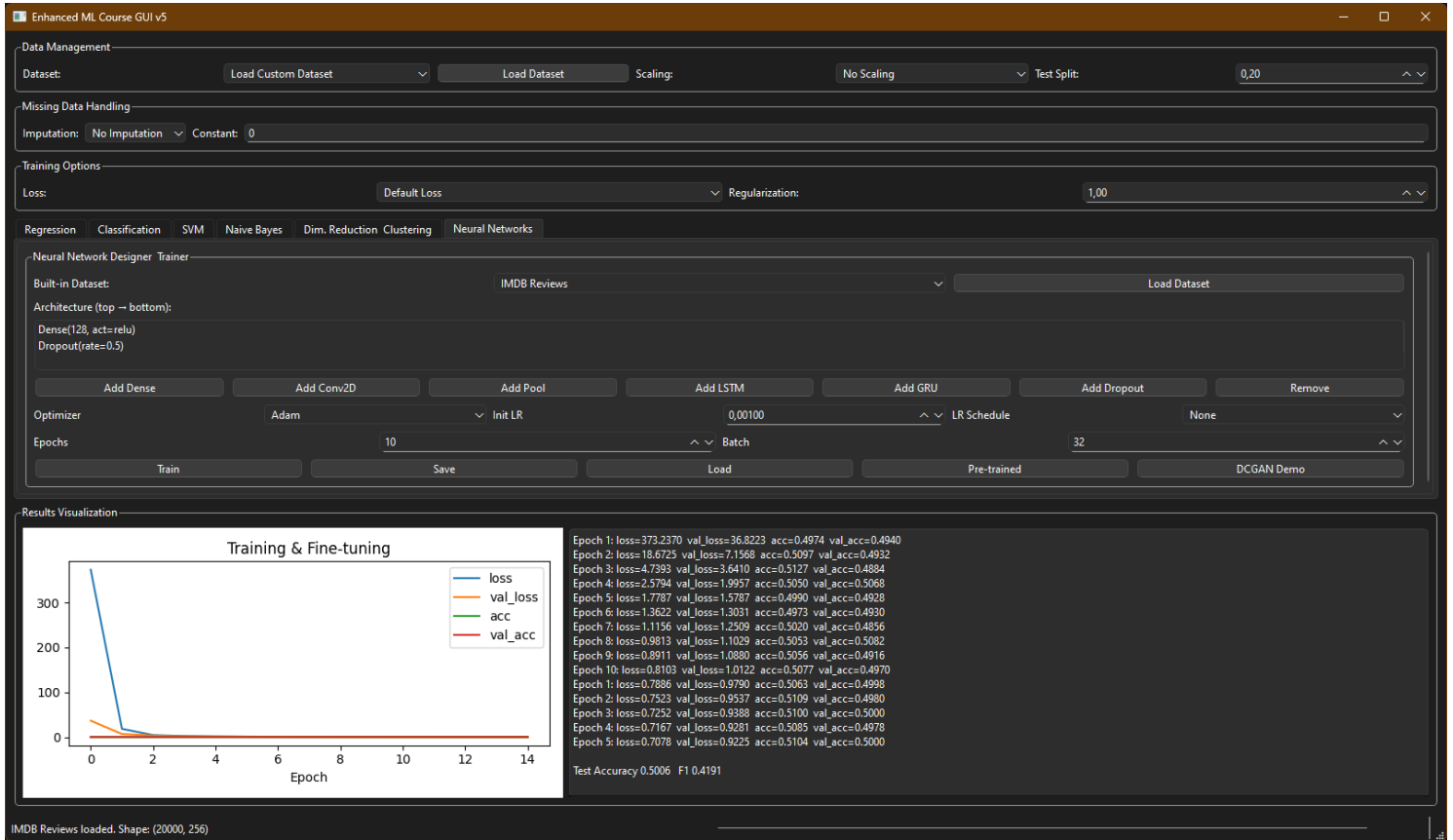
Here is the various outputs from various datasets!

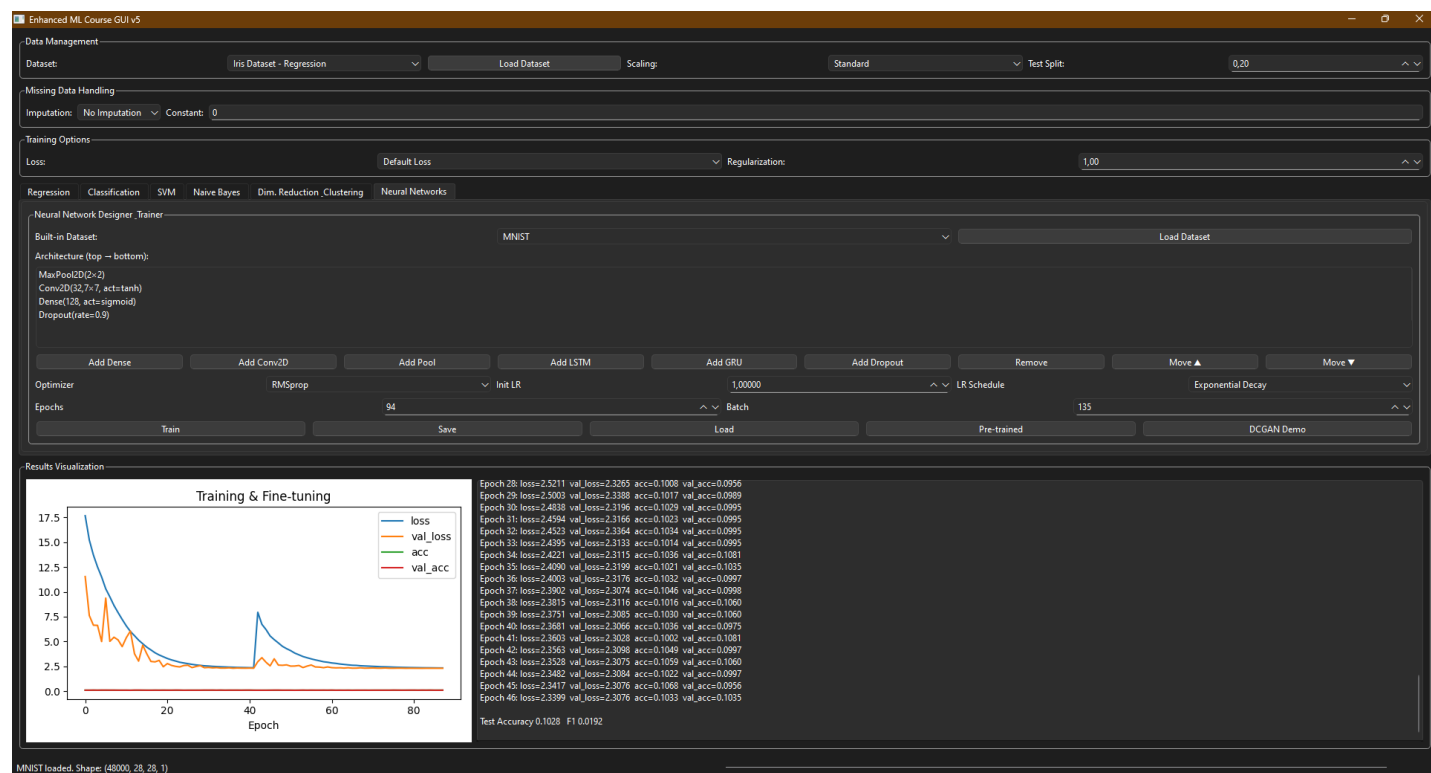
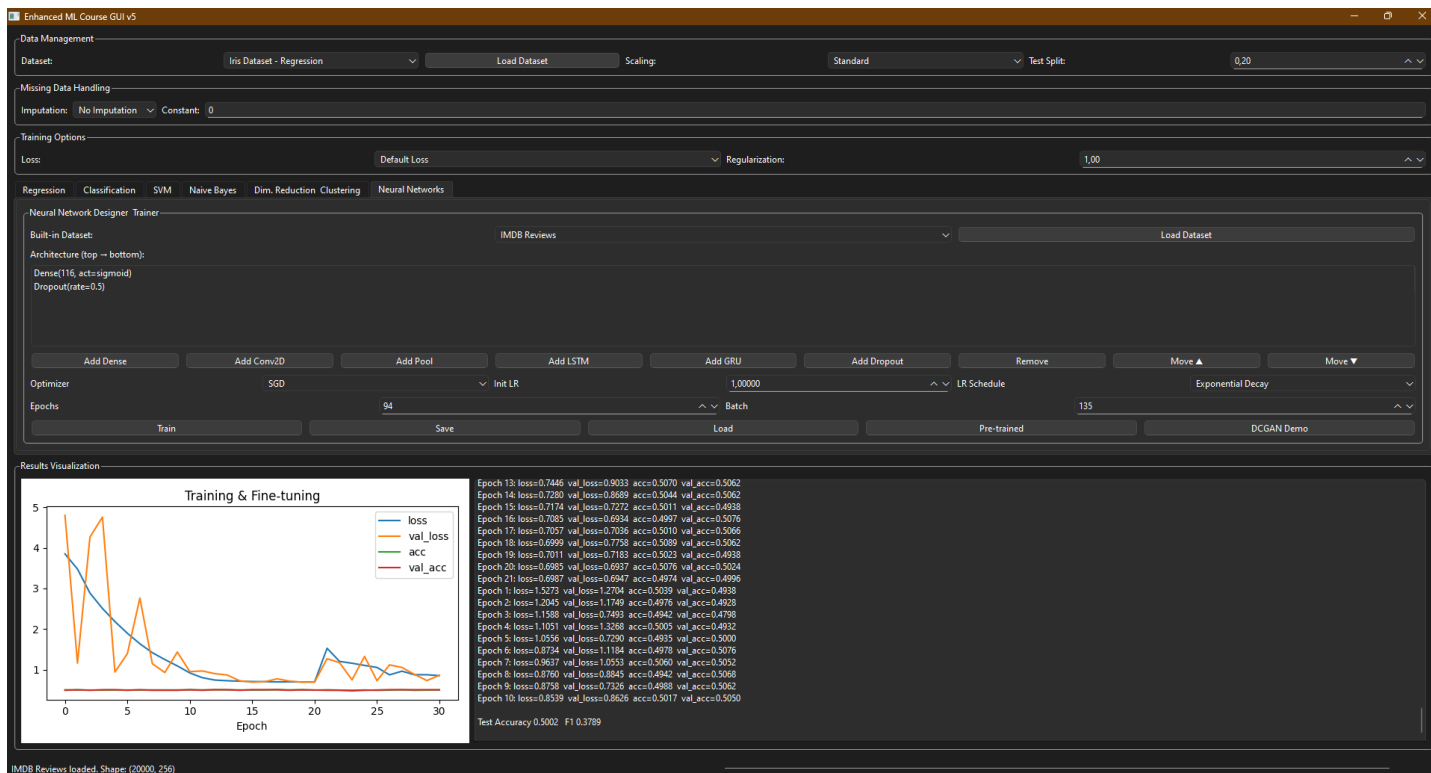
MINST



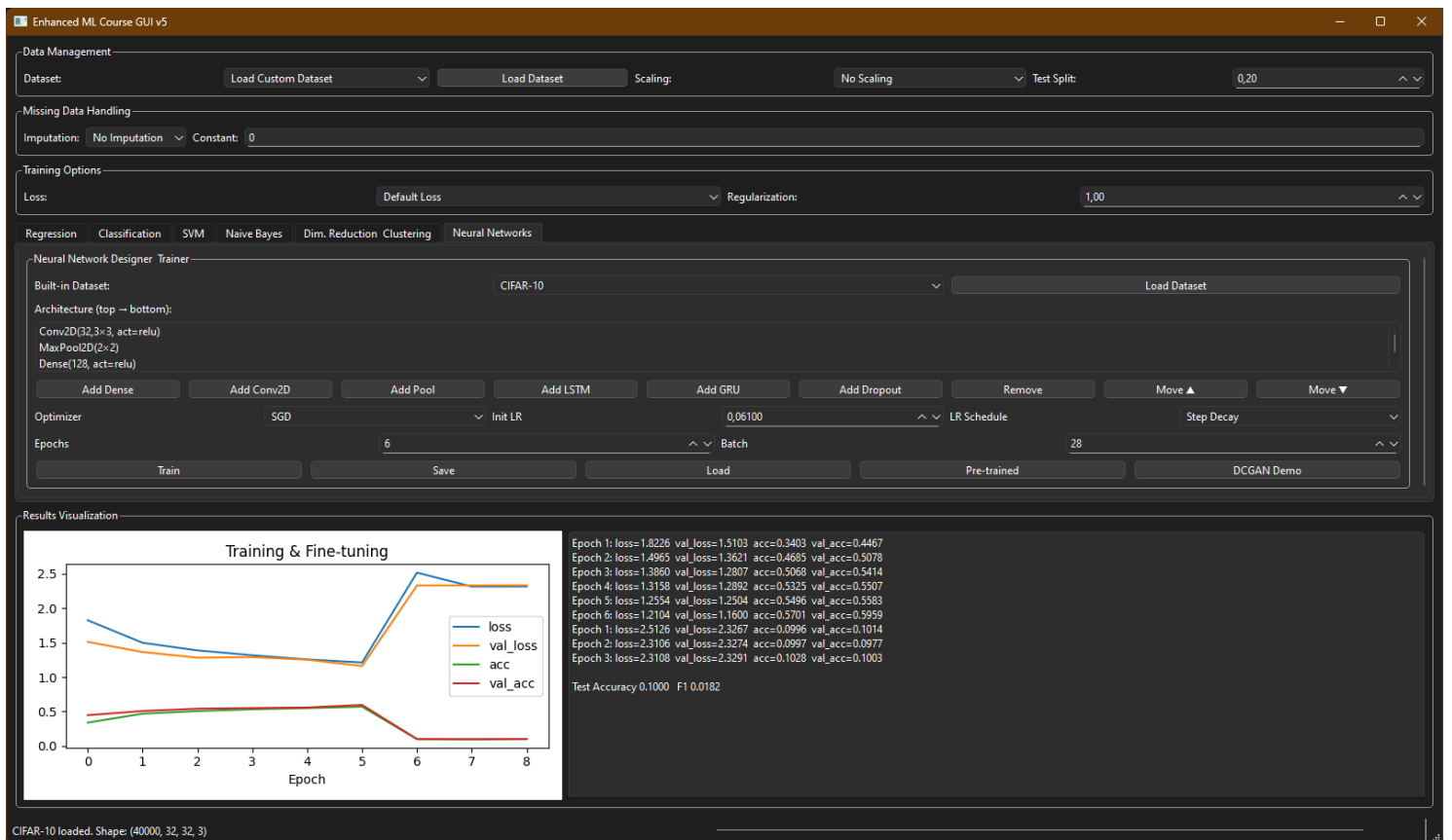
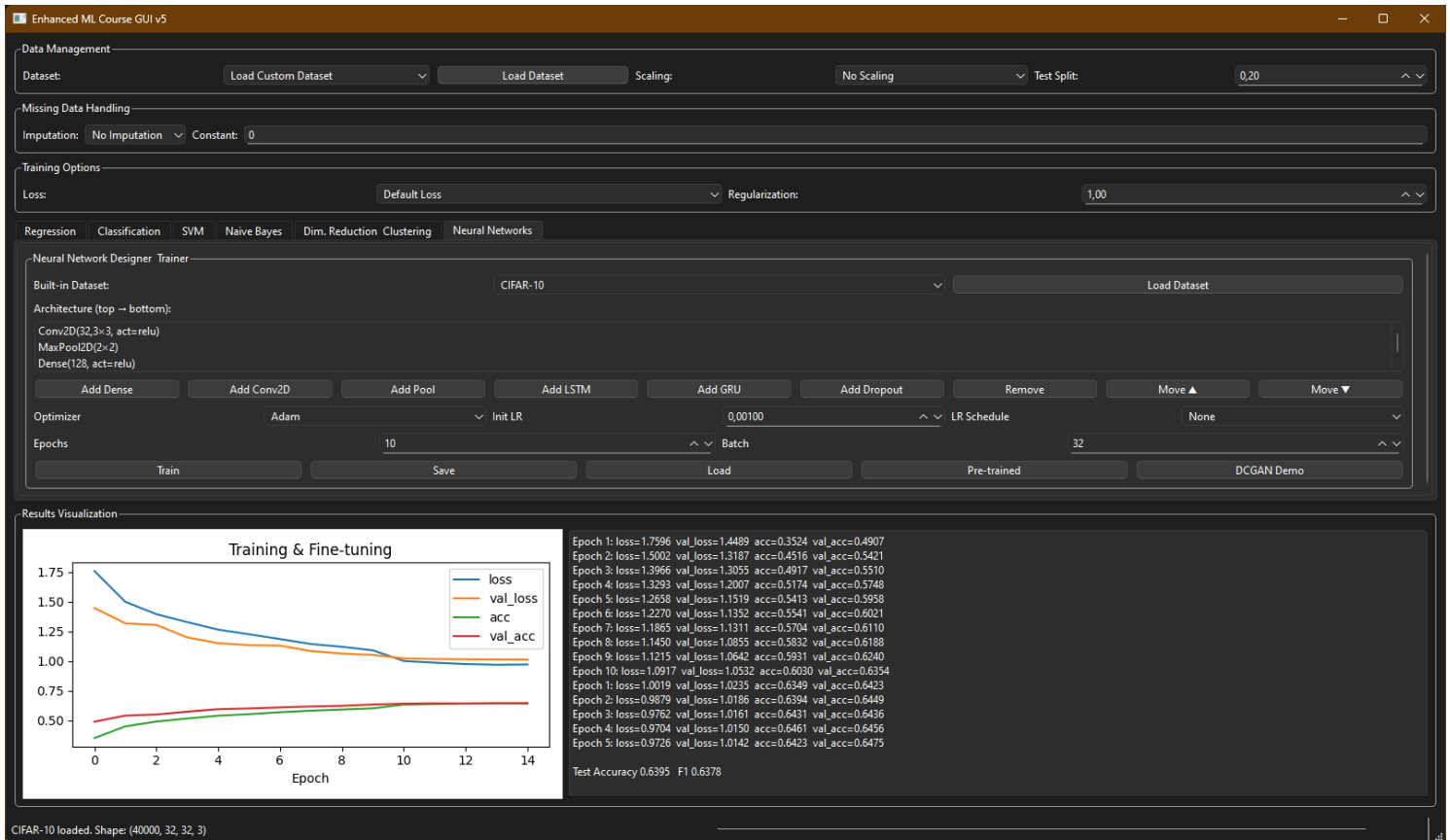


IMDB Reviews





CIFAR-10



Enhanced ML Course GUI v5

Data Management

Dataset: Iris Dataset - RegressionLoad DatasetScaling: StandardTest Split: 0,20

Missing Data Handling

Imputation: No ImputationConstant: 0

Training Options

Loss: Default LossRegularization: 1,00

RegressionClassificationSVMNaive BayesDim. ReductionClusteringNeural Networks

Neural Network Designer Trainer

Built-in Dataset: CIFAR-10Load Dataset

Architecture (top → bottom):

MaxPool2D(2×2)
Conv2D(32,7×7, act=tanh)
Dense(128, act=sigmoid)
Dropout(rate=0.9)

Add DenseAdd Conv2DAdd PoolAdd LSTMAdd GRUAdd DropoutRemoveMove▲Move▼

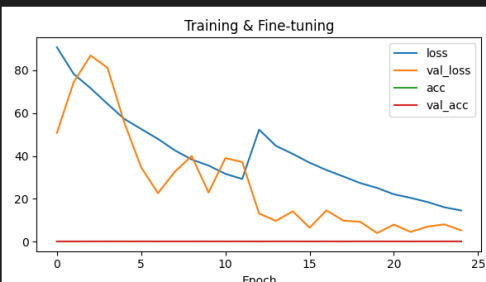
Optimizer: RMSpropInit LR: 1,00000LR Schedule: Exponential Decay

Epochs: 94Batch: 135

TrainSaveLoadPre-trainedDCGAN Demo

Results Visualization

Training & Fine-tuning



Epoch	loss	val_loss	acc	val_acc
Epoch 7: loss=47.9743 val_loss=22.6266 acc=0.0984 val_acc=0.0980	47.9743	22.6266	0.0984	0.0980
Epoch 8: loss=42.6352 val_loss=32.6817 acc=0.0997 val_acc=0.1022	42.6352	32.6817	0.0997	0.1022
Epoch 9: loss=38.3541 val_loss=40.0100 acc=0.0997 val_acc=0.1022	38.3541	40.0100	0.0997	0.1022
Epoch 10: loss=35.5391 val_loss=22.9344 acc=0.1017 val_acc=0.1014	35.5391	22.9344	0.1017	0.1014
Epoch 11: loss=31.6674 val_loss=39.0176 acc=0.1010 val_acc=0.0977	31.6674	39.0176	0.1010	0.0977
Epoch 12: loss=29.2689 val_loss=37.1958 acc=0.0996 val_acc=0.1022	29.2689	37.1958	0.0996	0.1022
Epoch 1: loss=52.3013 val_loss=13.1422 acc=0.0999 val_acc=0.0952	52.3013	13.1422	0.0999	0.0952
Epoch 2: loss=44.7456 val_loss=9.7056 acc=0.0976 val_acc=0.1022	44.7456	9.7056	0.0976	0.1022
Epoch 3: loss=40.9893 val_loss=14.1868 acc=0.1030 val_acc=0.0980	40.9893	14.1868	0.1030	0.0980
Epoch 4: loss=36.8653 val_loss=6.3158 acc=0.1009 val_acc=0.0952	36.8653	6.3158	0.1009	0.0952
Epoch 5: loss=33.4362 val_loss=14.8180 acc=0.0887 val_acc=0.1003	33.4362	14.8180	0.0887	0.1003
Epoch 6: loss=30.4512 val_loss=9.8378 acc=0.0991 val_acc=0.0952	30.4512	9.8378	0.0991	0.0952
Epoch 7: loss=27.3677 val_loss=9.2756 acc=0.1002 val_acc=0.1014	27.3677	9.2756	0.1002	0.1014
Epoch 8: loss=25.1062 val_loss=4.0105 acc=0.0995 val_acc=0.1003	25.1062	4.0105	0.0995	0.1003
Epoch 9: loss=22.1228 val_loss=7.9660 acc=0.0992 val_acc=0.1016	22.1228	7.9660	0.0992	0.1016
Epoch 10: loss=20.4337 val_loss=4.5522 acc=0.0972 val_acc=0.0980	20.4337	4.5522	0.0972	0.0980
Epoch 11: loss=18.5121 val_loss=7.0380 acc=0.0991 val_acc=0.1003	18.5121	7.0380	0.0991	0.1003
Epoch 12: loss=16.0513 val_loss=8.0731 acc=0.0986 val_acc=0.1016	16.0513	8.0731	0.0986	0.1016
Epoch 13: loss=14.5646 val_loss=5.2740 acc=0.1032 val_acc=0.0997	14.5646	5.2740	0.1032	0.0997

Test Accuracy 0.1000 F1 0.0182

CIFAR-10 loaded. Shape: (40000, 32, 32, 3)

Enhanced ML Course GUI v5

Data Management

Dataset: Load Custom DatasetLoad DatasetScaling: No ScalingTest Split: 0,20

Missing Data Handling

Imputation: No ImputationConstant: 0

Training Options

Loss: Default LossRegularization: 1,00

RegressionClassificationSVMNaive BayesDim. ReductionClusteringNeural Networks

Neural Network Designer Trainer

Built-in Dataset: CIFAR-10Load Dataset

Architecture (top → bottom):

MaxPool2D(4×4)
Conv2D(28,4×4, act=sigmoid)
Dense(121, act=tanh)
Dropout(rate=0.7)

Add DenseAdd Conv2DAdd PoolAdd LSTMAdd GRUAdd DropoutRemoveMove▲Move▼

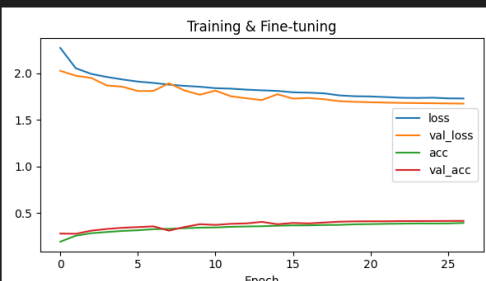
Optimizer: RMSpropInit LR: 0,00700LR Schedule: None

Epochs: 18Batch: 35

TrainSaveLoadPre-trainedDCGAN Demo

Results Visualization

Training & Fine-tuning



Epoch	loss	val_loss	acc	val_acc
Epoch 9: loss=1.8636 val_loss=1.8144 acc=0.3363 val_acc=0.3485	1.8636	1.8144	0.3363	0.3485
Epoch 10: loss=1.8337 val_loss=1.7691 acc=0.3421 val_acc=0.3791	1.8337	1.7691	0.3421	0.3791
Epoch 11: loss=1.8386 val_loss=1.8124 acc=0.3442 val_acc=0.3717	1.8386	1.8124	0.3442	0.3717
Epoch 12: loss=1.8336 val_loss=1.7519 acc=0.3512 val_acc=0.3832	1.8336	1.7519	0.3512	0.3832
Epoch 13: loss=1.8227 val_loss=1.7301 acc=0.3548 val_acc=0.3878	1.8227	1.7301	0.3548	0.3878
Epoch 14: loss=1.8156 val_loss=1.7113 acc=0.3574 val_acc=0.4040	1.8156	1.7113	0.3574	0.4040
Epoch 15: loss=1.8094 val_loss=1.7737 acc=0.3627 val_acc=0.3790	1.8094	1.7737	0.3627	0.3790
Epoch 16: loss=1.7942 val_loss=1.7269 acc=0.3663 val_acc=0.3928	1.7942	1.7269	0.3663	0.3928
Epoch 17: loss=1.7905 val_loss=1.7334 acc=0.3666 val_acc=0.3876	1.7905	1.7334	0.3666	0.3876
Epoch 18: loss=1.7833 val_loss=1.7204 acc=0.3703 val_acc=0.3973	1.7833	1.7204	0.3703	0.3973
Epoch 1: loss=1.7611 val_loss=1.6991 acc=0.3723 val_acc=0.4061	1.7611	1.6991	0.3723	0.4061
Epoch 2: loss=1.7519 val_loss=1.6922 acc=0.3782 val_acc=0.4095	1.7519	1.6922	0.3782	0.4095
Epoch 3: loss=1.7498 val_loss=1.6875 acc=0.3802 val_acc=0.4104	1.7498	1.6875	0.3802	0.4104
Epoch 4: loss=1.7430 val_loss=1.6839 acc=0.3832 val_acc=0.4105	1.7430	1.6839	0.3832	0.4105
Epoch 5: loss=1.7357 val_loss=1.6810 acc=0.3852 val_acc=0.4127	1.7357	1.6810	0.3852	0.4127
Epoch 6: loss=1.7336 val_loss=1.6788 acc=0.3873 val_acc=0.4128	1.7336	1.6788	0.3873	0.4128
Epoch 7: loss=1.7365 val_loss=1.6768 acc=0.3868 val_acc=0.4134	1.7365	1.6768	0.3868	0.4134
Epoch 8: loss=1.7292 val_loss=1.6749 acc=0.3875 val_acc=0.4140	1.7292	1.6749	0.3875	0.4140
Epoch 9: loss=1.7280 val_loss=1.6731 acc=0.3926 val_acc=0.4149	1.7280	1.6731	0.3926	0.4149

Test Accuracy 0.4181 F1 0.4112

CIFAR-10 loaded. Shape: (40000, 32, 32, 3)