**VGG MNIST dataset – Original**

Training loss: 2.302, training acc: 11.163, Validation loss: 2.302, validation acc: 11.350, Learning rate: 0.001 Time: 00:00:36

--------------------------------------------------

[INFO][2024-05-09 20:02:03.201070]: Epoch 2 of 10

Training loss: 2.302, training acc: 11.237, Validation loss: 2.301, validation acc: 11.350, Learning rate: 0.001 Time: 00:00:35

--------------------------------------------------

[INFO][2024-05-09 20:02:38.524236]: Epoch 3 of 10

Training loss: 2.301, training acc: 11.237, Validation loss: 2.301, validation acc: 11.350, Learning rate: 0.001 Time: 00:00:35

--------------------------------------------------

[INFO][2024-05-09 20:03:14.178546]: Epoch 4 of 10

Training loss: 2.301, training acc: 11.237, Validation loss: 2.301, validation acc: 11.350, Learning rate: 0.001 Time: 00:00:34

--------------------------------------------------

[INFO][2024-05-09 20:03:48.278995]: Epoch 5 of 10

Training loss: 2.301, training acc: 11.237, Validation loss: 2.301, validation acc: 11.350, Learning rate: 0.001 Time: 00:00:35

--------------------------------------------------

[INFO][2024-05-09 20:04:23.591667]: Epoch 6 of 10

Training loss: 2.301, training acc: 11.237, Validation loss: 2.301, validation acc: 11.350, Learning rate: 0.001 Time: 00:00:36

--------------------------------------------------

[INFO][2024-05-09 20:04:59.880559]: Epoch 7 of 10

Training loss: 2.301, training acc: 11.237, Validation loss: 2.301, validation acc: 11.350, Learning rate: 0.001 Time: 00:00:35

--------------------------------------------------

[INFO][2024-05-09 20:05:35.554332]: Epoch 8 of 10

Training loss: 2.301, training acc: 11.237, Validation loss: 2.301, validation acc: 11.350, Learning rate: 0.001 Time: 00:00:36

--------------------------------------------------

[INFO][2024-05-09 20:06:12.201585]: Epoch 9 of 10

Training loss: 2.301, training acc: 11.237, Validation loss: 2.301, validation acc: 11.350, Learning rate: 0.001 Time: 00:00:35

--------------------------------------------------

[INFO][2024-05-09 20:06:47.913275]: Epoch 10 of 10

Training loss: 2.301, training acc: 11.237, Validation loss: 2.301, validation acc: 11.350, Learning rate: 0.0005 Time: 00:00:36

--------------------------------------------------

Final time taken to run total is::00:05:57

Training loss::[2.3021157697828087, 2.3015425642416165, 2.3013217164509334, 2.3012435507418503, 2.3012058038447205, 2.3011968944118477, 2.3011973158382912, 2.3011891201360903, 2.3011924117358764, 2.3011959702221314]

Validation loss::[2.301588665080976, 2.3013360017462623, 2.301295829724662, 2.3010696791395358, 2.3010733550107934, 2.3009839812411537, 2.300986320157594, 2.3010487103764015, 2.301056786428524, 2.3011445063578932]

Training Accuracy::[11.163333333333334, 11.236666666666666, 11.236666666666666, 11.236666666666666, 11.236666666666666, 11.236666666666666, 11.236666666666666, 11.236666666666666, 11.236666666666666, 11.236666666666666]

Validation Accuracy::[11.35, 11.35, 11.35, 11.35, 11.35, 11.35, 11.35, 11.35, 11.35, 11.35]

Accuracy of the network on the 10000 test images: 11.35 %

Accuracy of 0 - zero : 0.00 %

Accuracy of 1 - one : 100.00 %

Accuracy of 2 - two : 0.00 %

Accuracy of 3 - three : 0.00 %

Accuracy of 4 - four : 0.00 %

Accuracy of 5 - five : 0.00 %

Accuracy of 6 - six : 0.00 %

Accuracy of 7 - seven : 0.00 %

Accuracy of 8 - eight : 0.00 %

Accuracy of 9 - nine : 0.00 %

Accuracy Rate per batch = 10.9375%

**VGG-19 MNIST – Modified**

[INFO][2024-05-09 20:11:06.508986]: Epoch 1 of 20

Training loss: 2.243, training acc: 18.493, Validation loss: 1.851, validation acc: 21.060, Learning rate: 0.001 Time: 00:00:39

--------------------------------------------------

[INFO][2024-05-09 20:11:46.428909]: Epoch 2 of 20

Training loss: 1.356, training acc: 43.890, Validation loss: 0.669, validation acc: 79.780, Learning rate: 0.001 Time: 00:00:39

--------------------------------------------------

[INFO][2024-05-09 20:12:25.679045]: Epoch 3 of 20

Training loss: 0.335, training acc: 90.310, Validation loss: 0.164, validation acc: 95.100, Learning rate: 0.001 Time: 00:00:40

--------------------------------------------------

[INFO][2024-05-09 20:13:05.750312]: Epoch 4 of 20

Training loss: 0.123, training acc: 96.902, Validation loss: 0.124, validation acc: 96.110, Learning rate: 0.001 Time: 00:00:39

--------------------------------------------------

[INFO][2024-05-09 20:13:45.080216]: Epoch 5 of 20

Training loss: 0.075, training acc: 97.952, Validation loss: 0.076, validation acc: 97.880, Learning rate: 0.001 Time: 00:00:39

--------------------------------------------------

[INFO][2024-05-09 20:14:24.521935]: Epoch 6 of 20

Training loss: 0.054, training acc: 98.570, Validation loss: 0.066, validation acc: 98.180, Learning rate: 0.001 Time: 00:00:39

--------------------------------------------------

[INFO][2024-05-09 20:15:03.640378]: Epoch 7 of 20

Training loss: 0.042, training acc: 98.852, Validation loss: 0.064, validation acc: 98.270, Learning rate: 0.001 Time: 00:00:39

--------------------------------------------------

[INFO][2024-05-09 20:15:42.826654]: Epoch 8 of 20

Training loss: 0.035, training acc: 99.037, Validation loss: 0.050, validation acc: 98.630, Learning rate: 0.001 Time: 00:00:39

--------------------------------------------------

[INFO][2024-05-09 20:16:22.283960]: Epoch 9 of 20

Training loss: 0.027, training acc: 99.245, Validation loss: 0.047, validation acc: 98.740, Learning rate: 0.001 Time: 00:00:38

--------------------------------------------------

[INFO][2024-05-09 20:17:00.986240]: Epoch 10 of 20

Training loss: 0.024, training acc: 99.323, Validation loss: 0.052, validation acc: 98.570, Learning rate: 0.001 Time: 00:00:39

--------------------------------------------------

[INFO][2024-05-09 20:17:40.028623]: Epoch 11 of 20

Training loss: 0.022, training acc: 99.403, Validation loss: 0.046, validation acc: 98.870, Learning rate: 0.001 Time: 00:00:39

--------------------------------------------------

[INFO][2024-05-09 20:18:19.404303]: Epoch 12 of 20

Training loss: 0.017, training acc: 99.515, Validation loss: 0.054, validation acc: 98.690, Learning rate: 0.001 Time: 00:00:38

--------------------------------------------------

[INFO][2024-05-09 20:18:57.934940]: Epoch 13 of 20

Training loss: 0.015, training acc: 99.562, Validation loss: 0.045, validation acc: 98.850, Learning rate: 0.001 Time: 00:00:39

--------------------------------------------------

[INFO][2024-05-09 20:19:36.978397]: Epoch 14 of 20

Training loss: 0.013, training acc: 99.658, Validation loss: 0.053, validation acc: 98.790, Learning rate: 0.001 Time: 00:00:39

--------------------------------------------------

[INFO][2024-05-09 20:20:16.121039]: Epoch 15 of 20

Training loss: 0.012, training acc: 99.715, Validation loss: 0.043, validation acc: 98.970, Learning rate: 0.001 Time: 00:00:38

--------------------------------------------------

[INFO][2024-05-09 20:20:55.090463]: Epoch 16 of 20

Training loss: 0.009, training acc: 99.737, Validation loss: 0.048, validation acc: 98.720, Learning rate: 0.001 Time: 00:00:38

--------------------------------------------------

[INFO][2024-05-09 20:21:33.578657]: Epoch 17 of 20

Training loss: 0.010, training acc: 99.742, Validation loss: 0.051, validation acc: 98.870, Learning rate: 0.001 Time: 00:00:39

--------------------------------------------------

[INFO][2024-05-09 20:22:12.601617]: Epoch 18 of 20

Training loss: 0.008, training acc: 99.805, Validation loss: 0.042, validation acc: 98.980, Learning rate: 0.001 Time: 00:00:39

--------------------------------------------------

[INFO][2024-05-09 20:22:51.626632]: Epoch 19 of 20

Training loss: 0.007, training acc: 99.780, Validation loss: 0.047, validation acc: 98.860, Learning rate: 0.001 Time: 00:00:41

--------------------------------------------------

[INFO][2024-05-09 20:23:32.669204]: Epoch 20 of 20

Training loss: 0.007, training acc: 99.818, Validation loss: 0.038, validation acc: 99.110, Learning rate: 0.001 Time: 00:00:43

--------------------------------------------------

Final time taken to run total is::00:13:09

Training loss::[2.242588421937499, 1.3564431383919868, 0.33490323232435215, 0.12282561422633465, 0.07509525271573428, 0.05360390621422133, 0.04212245038513944, 0.0353034000971845, 0.027100602282024523, 0.024311588680955457, 0.022051400131434758, 0.01677462020725099, 0.015005601822698453, 0.012820149566466882, 0.011513610757060293, 0.008977329560882175, 0.009514426338677006, 0.007724029281839871, 0.00737253839940901, 0.006891660087283697]

Validation loss::[1.8513778614092478, 0.6690770199027243, 0.16430941261822665, 0.12411073368938663, 0.07603036381209953, 0.06609266118111112, 0.0637833867634682, 0.05041093775955371, 0.04692879353084047, 0.051507022150768605, 0.04579801944856638, 0.05365299468099646, 0.04453131421822819, 0.05258102794885164, 0.04349725325282404, 0.04763022990738148, 0.05093252248654976, 0.04157974064067195, 0.04720430753523148, 0.03762935426880464]

Training Accuracy::[18.493333333333332, 43.89, 90.31, 96.90166666666667, 97.95166666666667, 98.57000000000001, 98.85166666666667, 99.03666666666666, 99.245, 99.32333333333332, 99.40333333333334, 99.515, 99.56166666666667, 99.65833333333333, 99.715, 99.73666666666666, 99.74166666666666, 99.80499999999999, 99.78, 99.81833333333333]

Validation Accuracy::[21.060000000000002, 79.78, 95.1, 96.11, 97.88, 98.18, 98.27, 98.63, 98.74000000000001, 98.57000000000001, 98.87, 98.69, 98.85000000000001, 98.79, 98.97, 98.72, 98.87, 98.98, 98.86, 99.11]

Accuracy of the network on the 10000 test images: 99.05 %

Accuracy of 0 - zero : 99.69 %

Accuracy of 1 - one : 99.56 %

Accuracy of 2 - two : 98.06 %

Accuracy of 3 - three : 98.91 %

Accuracy of 4 - four : 99.69 %

Accuracy of 5 - five : 98.21 %

Accuracy of 6 - six : 98.85 %

Accuracy of 7 - seven : 99.12 %

Accuracy of 8 - eight : 99.38 %

Accuracy of 9 - nine : 98.91 %

Accuracy Rate per batch = 99.21875%

**ResNet34 – MNIST – Original**

[INFO][2024-05-09 20:29:57.470653]: Epoch 1 of 20

/opt/conda/lib/python3.10/site-packages/torch/nn/modules/conv.py:456: UserWarning: Applied workaround for CuDNN issue, install nvrtc.so (Triggered internally at ../aten/src/ATen/native/cudnn/Conv\_v8.cpp:80.)

return F.conv2d(input, weight, bias, self.stride,

Training loss: 0.354, training acc: 89.063, Validation loss: 0.175, validation acc: 94.210, Learning rate: 0.001 Time: 00:01:11

--------------------------------------------------

[INFO][2024-05-09 20:31:08.992321]: Epoch 2 of 20

Training loss: 0.067, training acc: 98.043, Validation loss: 0.062, validation acc: 97.950, Learning rate: 0.001 Time: 00:01:10

--------------------------------------------------

[INFO][2024-05-09 20:32:19.469165]: Epoch 3 of 20

Training loss: 0.042, training acc: 98.747, Validation loss: 0.060, validation acc: 98.080, Learning rate: 0.001 Time: 00:01:09

--------------------------------------------------

[INFO][2024-05-09 20:33:29.375079]: Epoch 4 of 20

Training loss: 0.029, training acc: 99.148, Validation loss: 0.071, validation acc: 97.720, Learning rate: 0.001 Time: 00:01:04

--------------------------------------------------

[INFO][2024-05-09 20:34:33.817139]: Epoch 5 of 20

Training loss: 0.021, training acc: 99.388, Validation loss: 0.048, validation acc: 98.340, Learning rate: 0.001 Time: 00:01:04

--------------------------------------------------

[INFO][2024-05-09 20:35:38.601034]: Epoch 6 of 20

Training loss: 0.016, training acc: 99.575, Validation loss: 0.048, validation acc: 98.520, Learning rate: 0.001 Time: 00:01:05

--------------------------------------------------

[INFO][2024-05-09 20:36:44.580599]: Epoch 7 of 20

Training loss: 0.012, training acc: 99.682, Validation loss: 0.041, validation acc: 98.590, Learning rate: 0.001 Time: 00:01:05

--------------------------------------------------

[INFO][2024-05-09 20:37:49.693794]: Epoch 8 of 20

Training loss: 0.009, training acc: 99.775, Validation loss: 0.041, validation acc: 98.680, Learning rate: 0.001 Time: 00:01:08

--------------------------------------------------

[INFO][2024-05-09 20:38:58.487749]: Epoch 9 of 20

Training loss: 0.008, training acc: 99.805, Validation loss: 0.036, validation acc: 98.840, Learning rate: 0.001 Time: 00:01:07

--------------------------------------------------

[INFO][2024-05-09 20:40:05.819500]: Epoch 10 of 20

Training loss: 0.005, training acc: 99.880, Validation loss: 0.029, validation acc: 99.080, Learning rate: 0.001 Time: 00:01:05

--------------------------------------------------

[INFO][2024-05-09 20:41:10.825223]: Epoch 11 of 20

Training loss: 0.004, training acc: 99.923, Validation loss: 0.044, validation acc: 98.740, Learning rate: 0.001 Time: 00:01:04

--------------------------------------------------

[INFO][2024-05-09 20:42:15.467699]: Epoch 12 of 20

Training loss: 0.003, training acc: 99.937, Validation loss: 0.029, validation acc: 99.110, Learning rate: 0.001 Time: 00:01:02

--------------------------------------------------

[INFO][2024-05-09 20:43:17.898445]: Epoch 13 of 20

Training loss: 0.002, training acc: 99.973, Validation loss: 0.034, validation acc: 99.020, Learning rate: 0.001 Time: 00:01:07

--------------------------------------------------

[INFO][2024-05-09 20:44:25.630892]: Epoch 14 of 20

Training loss: 0.001, training acc: 99.993, Validation loss: 0.030, validation acc: 99.140, Learning rate: 0.001 Time: 00:01:08

--------------------------------------------------

[INFO][2024-05-09 20:45:34.328352]: Epoch 15 of 20

Training loss: 0.001, training acc: 99.990, Validation loss: 0.028, validation acc: 99.120, Learning rate: 0.001 Time: 00:01:07

--------------------------------------------------

[INFO][2024-05-09 20:46:41.628672]: Epoch 16 of 20

Training loss: 0.001, training acc: 99.998, Validation loss: 0.036, validation acc: 99.150, Learning rate: 0.001 Time: 00:01:07

--------------------------------------------------

[INFO][2024-05-09 20:47:49.567733]: Epoch 17 of 20

Training loss: 0.001, training acc: 99.997, Validation loss: 0.028, validation acc: 99.170, Learning rate: 0.001 Time: 00:01:07

--------------------------------------------------

[INFO][2024-05-09 20:48:57.513116]: Epoch 18 of 20

Training loss: 0.000, training acc: 100.000, Validation loss: 0.029, validation acc: 99.170, Learning rate: 0.001 Time: 00:01:05

--------------------------------------------------

[INFO][2024-05-09 20:50:03.436053]: Epoch 19 of 20

Training loss: 0.000, training acc: 99.998, Validation loss: 0.026, validation acc: 99.170, Learning rate: 0.001 Time: 00:01:03

--------------------------------------------------

[INFO][2024-05-09 20:51:07.405905]: Epoch 20 of 20

Training loss: 0.000, training acc: 100.000, Validation loss: 0.026, validation acc: 99.200, Learning rate: 0.001 Time: 00:01:04

--------------------------------------------------

Final time taken to run total is::00:22:14

Training loss::[0.3535147304219732, 0.06698603350232278, 0.041710546793245366, 0.02901730593144973, 0.02057635057037438, 0.015783657563347885, 0.012016060018687567, 0.009199512220406806, 0.007589198557088084, 0.005188166411182255, 0.003766836994271755, 0.0034685162615764745, 0.001910183011577266, 0.0011982655554547159, 0.0011253646569298471, 0.0006679604463251944, 0.0007117437553247744, 0.0004680166547371597, 0.0004514842439055153, 0.0003352036639862606]

Validation loss::[0.17505353311949137, 0.06151713117296937, 0.06035714913631165, 0.07141479611385, 0.04780365087834623, 0.04797131925396904, 0.04059614024207562, 0.04141973205576828, 0.03614066443936546, 0.029337916063451316, 0.044081554408450435, 0.029076772345940263, 0.03387468887339759, 0.030053613673898544, 0.027786605278839787, 0.03580438102561615, 0.027891938905990565, 0.02940883527271235, 0.026274414715368913, 0.02636571878882691]

Training Accuracy::[89.06333333333333, 98.04333333333334, 98.74666666666667, 99.14833333333334, 99.38833333333334, 99.575, 99.68166666666667, 99.775, 99.80499999999999, 99.88, 99.92333333333333, 99.93666666666667, 99.97333333333333, 99.99333333333334, 99.99, 99.99833333333333, 99.99666666666667, 100.0, 99.99833333333333, 100.0]

Validation Accuracy::[94.21000000000001, 97.95, 98.08, 97.72, 98.34, 98.52, 98.59, 98.68, 98.83999999999999, 99.08, 98.74000000000001, 99.11, 99.02, 99.14, 99.11999999999999, 99.15, 99.17, 99.17, 99.17, 99.2]

Accuracy of the network on the 10000 test images: 99.18 %

Accuracy of 0 - zero : 99.69 %

Accuracy of 1 - one : 99.91 %

Accuracy of 2 - two : 98.74 %

Accuracy of 3 - three : 99.21 %

Accuracy of 4 - four : 99.59 %

Accuracy of 5 - five : 98.43 %

Accuracy of 6 - six : 98.23 %

Accuracy of 7 - seven : 99.32 %

Accuracy of 8 - eight : 99.79 %

Accuracy of 9 - nine : 98.81 %

Accuracy Rate per batch = 99.21875%

**ResNet34 – MNIST – Modified**

[INFO][2024-05-09 20:52:44.565613]: Epoch 1 of 20

Training loss: 0.410, training acc: 87.065, Validation loss: 0.089, validation acc: 97.230, Learning rate: 0.001 Time: 00:01:06

--------------------------------------------------

[INFO][2024-05-09 20:53:50.813253]: Epoch 2 of 20

Training loss: 0.073, training acc: 97.782, Validation loss: 0.058, validation acc: 98.150, Learning rate: 0.001 Time: 00:01:05

--------------------------------------------------

[INFO][2024-05-09 20:54:56.015596]: Epoch 3 of 20

Training loss: 0.048, training acc: 98.550, Validation loss: 0.049, validation acc: 98.410, Learning rate: 0.001 Time: 00:01:13

--------------------------------------------------

[INFO][2024-05-09 20:56:09.031089]: Epoch 4 of 20

Training loss: 0.036, training acc: 98.945, Validation loss: 0.043, validation acc: 98.540, Learning rate: 0.001 Time: 00:01:06

--------------------------------------------------

[INFO][2024-05-09 20:57:15.903494]: Epoch 5 of 20

Training loss: 0.028, training acc: 99.187, Validation loss: 0.034, validation acc: 98.810, Learning rate: 0.001 Time: 00:01:07

--------------------------------------------------

[INFO][2024-05-09 20:58:23.164240]: Epoch 6 of 20

Training loss: 0.021, training acc: 99.430, Validation loss: 0.038, validation acc: 98.830, Learning rate: 0.001 Time: 00:01:08

--------------------------------------------------

[INFO][2024-05-09 20:59:32.145144]: Epoch 7 of 20

Training loss: 0.016, training acc: 99.550, Validation loss: 0.038, validation acc: 98.850, Learning rate: 0.001 Time: 00:01:09

--------------------------------------------------

[INFO][2024-05-09 21:00:41.516227]: Epoch 8 of 20

Training loss: 0.013, training acc: 99.602, Validation loss: 0.035, validation acc: 98.890, Learning rate: 0.001 Time: 00:01:05

--------------------------------------------------

[INFO][2024-05-09 21:01:46.665322]: Epoch 9 of 20

Training loss: 0.010, training acc: 99.753, Validation loss: 0.035, validation acc: 99.000, Learning rate: 0.001 Time: 00:01:04

--------------------------------------------------

[INFO][2024-05-09 21:02:51.018040]: Epoch 10 of 20

Training loss: 0.009, training acc: 99.738, Validation loss: 0.034, validation acc: 99.000, Learning rate: 0.001 Time: 00:01:03

--------------------------------------------------

[INFO][2024-05-09 21:03:54.157062]: Epoch 11 of 20

Training loss: 0.007, training acc: 99.820, Validation loss: 0.035, validation acc: 98.880, Learning rate: 0.001 Time: 00:01:01

--------------------------------------------------

[INFO][2024-05-09 21:04:55.274419]: Epoch 12 of 20

Training loss: 0.007, training acc: 99.807, Validation loss: 0.034, validation acc: 98.910, Learning rate: 0.001 Time: 00:01:01

--------------------------------------------------

[INFO][2024-05-09 21:05:57.032924]: Epoch 13 of 20

Training loss: 0.006, training acc: 99.855, Validation loss: 0.034, validation acc: 98.950, Learning rate: 0.001 Time: 00:01:04

--------------------------------------------------

[INFO][2024-05-09 21:07:01.096486]: Epoch 14 of 20

Training loss: 0.005, training acc: 99.853, Validation loss: 0.036, validation acc: 98.850, Learning rate: 0.001 Time: 00:01:02

--------------------------------------------------

[INFO][2024-05-09 21:08:03.442817]: Epoch 15 of 20

Training loss: 0.003, training acc: 99.937, Validation loss: 0.031, validation acc: 99.140, Learning rate: 0.001 Time: 00:01:04

--------------------------------------------------

[INFO][2024-05-09 21:09:08.183683]: Epoch 16 of 20

Training loss: 0.003, training acc: 99.950, Validation loss: 0.031, validation acc: 99.160, Learning rate: 0.001 Time: 00:01:05

--------------------------------------------------

[INFO][2024-05-09 21:10:14.054643]: Epoch 17 of 20

Training loss: 0.002, training acc: 99.952, Validation loss: 0.034, validation acc: 99.020, Learning rate: 0.001 Time: 00:01:08

--------------------------------------------------

[INFO][2024-05-09 21:11:22.428794]: Epoch 18 of 20

Training loss: 0.002, training acc: 99.955, Validation loss: 0.034, validation acc: 99.040, Learning rate: 0.001 Time: 00:01:08

--------------------------------------------------

[INFO][2024-05-09 21:12:31.364743]: Epoch 19 of 20

Training loss: 0.001, training acc: 99.982, Validation loss: 0.031, validation acc: 99.080, Learning rate: 0.001 Time: 00:01:09

--------------------------------------------------

[INFO][2024-05-09 21:13:40.494856]: Epoch 20 of 20

Training loss: 0.001, training acc: 99.980, Validation loss: 0.035, validation acc: 99.050, Learning rate: 0.001 Time: 00:01:09

--------------------------------------------------

Final time taken to run total is::00:22:04

Training loss::[0.4104268740235107, 0.07289392274242443, 0.047855995059299314, 0.035721749483323746, 0.02778938095937215, 0.020890252613551867, 0.016185755554987774, 0.01349835408425062, 0.009720955791050144, 0.009298351191943372, 0.007066360780726502, 0.006792330248308664, 0.005726911832078564, 0.005441727383726978, 0.003104557507520746, 0.002693912725749069, 0.002278588061226653, 0.002148274021947494, 0.001482770755231854, 0.0012717197837611126]

Validation loss::[0.08862179461159284, 0.057708882549895514, 0.04918302160605222, 0.04290240477399217, 0.0340647032230951, 0.03790075483118903, 0.03773925408921382, 0.03544078062600132, 0.03456654663115174, 0.033681410227023964, 0.03511439607641881, 0.03363357640101421, 0.03373158141186673, 0.03595641529249452, 0.0313690553849034, 0.030565703718752092, 0.033597945228301555, 0.03399227474741726, 0.031295541615322636, 0.03514138146604211]

Training Accuracy::[87.065, 97.78166666666667, 98.55000000000001, 98.94500000000001, 99.18666666666667, 99.42999999999999, 99.55000000000001, 99.60166666666666, 99.75333333333334, 99.73833333333333, 99.82, 99.80666666666667, 99.855, 99.85333333333334, 99.93666666666667, 99.95, 99.95166666666667, 99.955, 99.98166666666667, 99.98]

Validation Accuracy::[97.23, 98.15, 98.41, 98.54, 98.81, 98.83, 98.85000000000001, 98.89, 99.0, 99.0, 98.88, 98.91, 98.95, 98.85000000000001, 99.14, 99.16, 99.02, 99.03999999999999, 99.08, 99.05000000000001]

Accuracy of the network on the 10000 test images: 99.06 %

Accuracy of 0 - zero : 99.80 %

Accuracy of 1 - one : 99.82 %

Accuracy of 2 - two : 98.35 %

Accuracy of 3 - three : 99.21 %

Accuracy of 4 - four : 99.39 %

Accuracy of 5 - five : 97.76 %

Accuracy of 6 - six : 98.23 %

Accuracy of 7 - seven : 99.12 %

Accuracy of 8 - eight : 99.69 %

Accuracy of 9 - nine : 99.01 %

Accuracy Rate per batch = 100.0%

**DenseNet MNIST dataset**

[2024-05-08 18:13:40.494856]:

[INFO]: Epoch 1 of 15

/opt/conda/lib/python3.10/site-packages/torch/nn/modules/conv.py:456: UserWarning: Applied workaround for CuDNN issue, install nvrtc.so (Triggered internally at ../aten/src/ATen/native/cudnn/Conv\_v8.cpp:80.)

return F.conv2d(input, weight, bias, self.stride,

Training loss: 0.417, training acc: 89.375, Validation loss: 0.135, validation acc: 96.000, Learning rate: 0.001 Time: 00:03:06

--------------------------------------------------

[INFO]: Epoch 2 of 15

Training loss: 0.088, training acc: 97.458, Validation loss: 0.065, validation acc: 97.980, Learning rate: 0.001 Time: 00:03:07

--------------------------------------------------

[INFO]: Epoch 3 of 15

Training loss: 0.062, training acc: 98.208, Validation loss: 0.060, validation acc: 98.170, Learning rate: 0.001 Time: 00:03:18

--------------------------------------------------

[INFO]: Epoch 4 of 15

Training loss: 0.049, training acc: 98.562, Validation loss: 0.050, validation acc: 98.450, Learning rate: 0.001 Time: 00:03:19

--------------------------------------------------

[INFO]: Epoch 5 of 15

Training loss: 0.042, training acc: 98.742, Validation loss: 0.043, validation acc: 98.660, Learning rate: 0.001 Time: 00:03:19

--------------------------------------------------

[INFO]: Epoch 6 of 15

Training loss: 0.035, training acc: 98.947, Validation loss: 0.039, validation acc: 98.730, Learning rate: 0.001 Time: 00:03:23

--------------------------------------------------

[INFO]: Epoch 7 of 15

Training loss: 0.031, training acc: 99.080, Validation loss: 0.041, validation acc: 98.730, Learning rate: 0.001 Time: 00:03:19

--------------------------------------------------

[INFO]: Epoch 8 of 15

Training loss: 0.027, training acc: 99.188, Validation loss: 0.038, validation acc: 98.900, Learning rate: 0.001 Time: 00:03:10

--------------------------------------------------

[INFO]: Epoch 9 of 15

Training loss: 0.025, training acc: 99.248, Validation loss: 0.034, validation acc: 98.820, Learning rate: 0.001 Time: 00:03:10

--------------------------------------------------

[INFO]: Epoch 10 of 15

Training loss: 0.020, training acc: 99.397, Validation loss: 0.035, validation acc: 98.890, Learning rate: 0.001 Time: 00:03:10

--------------------------------------------------

[INFO]: Epoch 11 of 15

Training loss: 0.018, training acc: 99.467, Validation loss: 0.031, validation acc: 99.030, Learning rate: 0.001 Time: 00:03:08

--------------------------------------------------

[INFO]: Epoch 12 of 15

Training loss: 0.017, training acc: 99.480, Validation loss: 0.044, validation acc: 98.660, Learning rate: 0.001 Time: 00:03:10

--------------------------------------------------

[INFO]: Epoch 13 of 15

Training loss: 0.016, training acc: 99.533, Validation loss: 0.036, validation acc: 99.000, Learning rate: 0.001 Time: 00:03:01

--------------------------------------------------

[INFO]: Epoch 14 of 15

Training loss: 0.014, training acc: 99.603, Validation loss: 0.028, validation acc: 99.150, Learning rate: 0.001 Time: 00:03:05

--------------------------------------------------

[INFO]: Epoch 15 of 15

Training loss: 0.011, training acc: 99.687, Validation loss: 0.032, validation acc: 98.990, Learning rate: 0.001 Time: 00:04:02

--------------------------------------------------

Final time taken to run total is::00:48:53

Training loss::[0.4171118959466786, 0.08832587044972029, 0.06200157287570316, 0.048843180580409186, 0.041502033002120554, 0.03469792482997182, 0.03068087277124757, 0.026687030413516683, 0.024772481094035053, 0.020324093743606206, 0.0183459286009451, 0.017118357459586092, 0.015610904630416556, 0.013915456542464743, 0.011313404400937453]

Validation loss::[0.13472969768343457, 0.06530677711080973, 0.0600497277934033, 0.04961130039463899, 0.04286058540722937, 0.038641825308697, 0.04102267490278716, 0.03768329515943458, 0.03420609938111275, 0.034951435309348355, 0.030941956954604832, 0.044102293975313143, 0.0355646239805323, 0.027803359908025096, 0.032080422770446995]

Training Accuracy::[89.375, 97.45833333333334, 98.20833333333333, 98.56166666666667, 98.74166666666667, 98.94666666666667, 99.08, 99.18833333333333, 99.24833333333333, 99.39666666666666, 99.46666666666667, 99.48, 99.53333333333333, 99.60333333333334, 99.68666666666667]

Validation Accuracy::[96.0, 97.98, 98.17, 98.45, 98.66, 98.72999999999999, 98.72999999999999, 98.9, 98.82, 98.89, 99.03, 98.66, 99.0, 99.15, 98.99]

Accuracy of the network on the 10000 test images: 98.96 %

Accuracy of 0 - zero : 99.90 %

Accuracy of 1 - one : 99.56 %

Accuracy of 2 - two : 99.03 %

Accuracy of 3 - three : 99.01 %

Accuracy of 4 - four : 99.39 %

Accuracy of 5 - five : 96.08 %

Accuracy of 6 - six : 98.54 %

Accuracy of 7 - seven : 99.61 %

Accuracy of 8 - eight : 99.69 %

Accuracy of 9 - nine : 98.41 %

Accuracy Rate per batch = 98.4375%

**VGG CIFAR-10**

[INFO][2024-05-09 21:21:48.602844]: Epoch 1 of 50

/opt/conda/lib/python3.10/site-packages/torch/nn/modules/conv.py:456: UserWarning: Applied workaround for CuDNN issue, install nvrtc.so (Triggered internally at ../aten/src/ATen/native/cudnn/Conv\_v8.cpp:80.)

return F.conv2d(input, weight, bias, self.stride,

Training loss: 2.204, training acc: 13.552, Validation loss: 1.914, validation acc: 19.730, Learning rate: 0.001 Time: 00:00:52

--------------------------------------------------

[INFO][2024-05-09 21:22:40.913817]: Epoch 2 of 50

Training loss: 1.801, training acc: 25.536, Validation loss: 1.613, validation acc: 36.330, Learning rate: 0.001 Time: 00:00:52

--------------------------------------------------

[INFO][2024-05-09 21:23:33.324267]: Epoch 3 of 50

Training loss: 1.561, training acc: 39.140, Validation loss: 1.383, validation acc: 46.960, Learning rate: 0.001 Time: 00:00:51

--------------------------------------------------

[INFO][2024-05-09 21:24:24.780986]: Epoch 4 of 50

Training loss: 1.325, training acc: 51.018, Validation loss: 1.198, validation acc: 57.000, Learning rate: 0.001 Time: 00:00:51

--------------------------------------------------

[INFO][2024-05-09 21:25:16.704710]: Epoch 5 of 50

Training loss: 1.124, training acc: 59.854, Validation loss: 1.032, validation acc: 63.160, Learning rate: 0.001 Time: 00:00:53

--------------------------------------------------

[INFO][2024-05-09 21:26:10.092392]: Epoch 6 of 50

Training loss: 0.966, training acc: 65.760, Validation loss: 0.912, validation acc: 68.080, Learning rate: 0.001 Time: 00:00:57

--------------------------------------------------

[INFO][2024-05-09 21:27:07.956241]: Epoch 7 of 50

Training loss: 0.855, training acc: 69.912, Validation loss: 0.817, validation acc: 71.230, Learning rate: 0.001 Time: 00:00:58

--------------------------------------------------

[INFO][2024-05-09 21:28:06.889305]: Epoch 8 of 50

Training loss: 0.770, training acc: 73.062, Validation loss: 0.748, validation acc: 73.940, Learning rate: 0.001 Time: 00:00:58

--------------------------------------------------

[INFO][2024-05-09 21:29:04.975987]: Epoch 9 of 50

Training loss: 0.705, training acc: 75.538, Validation loss: 0.762, validation acc: 74.250, Learning rate: 0.001 Time: 00:00:57

--------------------------------------------------

[INFO][2024-05-09 21:30:02.835576]: Epoch 10 of 50

Training loss: 0.649, training acc: 77.644, Validation loss: 0.685, validation acc: 76.430, Learning rate: 0.001 Time: 00:00:57

--------------------------------------------------

[INFO][2024-05-09 21:30:59.884791]: Epoch 11 of 50

Training loss: 0.598, training acc: 79.544, Validation loss: 0.589, validation acc: 80.020, Learning rate: 0.001 Time: 00:00:56

--------------------------------------------------

[INFO][2024-05-09 21:31:56.715856]: Epoch 12 of 50

Training loss: 0.562, training acc: 80.902, Validation loss: 0.570, validation acc: 80.860, Learning rate: 0.001 Time: 00:00:56

--------------------------------------------------

[INFO][2024-05-09 21:32:53.173274]: Epoch 13 of 50

Training loss: 0.534, training acc: 81.834, Validation loss: 0.527, validation acc: 81.980, Learning rate: 0.001 Time: 00:00:54

--------------------------------------------------

[INFO][2024-05-09 21:33:47.875753]: Epoch 14 of 50

Training loss: 0.498, training acc: 83.144, Validation loss: 0.560, validation acc: 80.980, Learning rate: 0.001 Time: 00:00:51

--------------------------------------------------

[INFO][2024-05-09 21:34:39.078302]: Epoch 15 of 50

Training loss: 0.469, training acc: 84.294, Validation loss: 0.531, validation acc: 82.360, Learning rate: 0.001 Time: 00:00:53

--------------------------------------------------

[INFO][2024-05-09 21:35:32.155952]: Epoch 16 of 50

Training loss: 0.446, training acc: 84.984, Validation loss: 0.524, validation acc: 82.320, Learning rate: 0.001 Time: 00:00:52

--------------------------------------------------

[INFO][2024-05-09 21:36:24.423246]: Epoch 17 of 50

Training loss: 0.418, training acc: 85.784, Validation loss: 0.562, validation acc: 81.800, Learning rate: 0.001 Time: 00:00:54

--------------------------------------------------

[INFO][2024-05-09 21:37:18.735014]: Epoch 18 of 50

Training loss: 0.404, training acc: 86.430, Validation loss: 0.481, validation acc: 84.110, Learning rate: 0.001 Time: 00:00:56

--------------------------------------------------

[INFO][2024-05-09 21:38:15.581297]: Epoch 19 of 50

Training loss: 0.380, training acc: 86.918, Validation loss: 0.490, validation acc: 84.100, Learning rate: 0.001 Time: 00:00:54

--------------------------------------------------

[INFO][2024-05-09 21:39:09.889188]: Epoch 20 of 50

Training loss: 0.365, training acc: 87.626, Validation loss: 0.480, validation acc: 84.130, Learning rate: 0.001 Time: 00:00:55

--------------------------------------------------

[INFO][2024-05-09 21:40:05.017593]: Epoch 21 of 50

Training loss: 0.345, training acc: 88.136, Validation loss: 0.472, validation acc: 84.930, Learning rate: 0.001 Time: 00:00:54

--------------------------------------------------

[INFO][2024-05-09 21:40:59.292752]: Epoch 22 of 50

Training loss: 0.332, training acc: 88.742, Validation loss: 0.460, validation acc: 85.200, Learning rate: 0.001 Time: 00:00:51

--------------------------------------------------

[INFO][2024-05-09 21:41:50.466117]: Epoch 23 of 50

Training loss: 0.322, training acc: 89.222, Validation loss: 0.429, validation acc: 85.990, Learning rate: 0.001 Time: 00:00:52

--------------------------------------------------

[INFO][2024-05-09 21:42:43.198003]: Epoch 24 of 50

Training loss: 0.307, training acc: 89.604, Validation loss: 0.440, validation acc: 85.720, Learning rate: 0.001 Time: 00:00:53

--------------------------------------------------

[INFO][2024-05-09 21:43:36.373929]: Epoch 25 of 50

Training loss: 0.292, training acc: 90.170, Validation loss: 0.424, validation acc: 86.190, Learning rate: 0.001 Time: 00:00:51

--------------------------------------------------

[INFO][2024-05-09 21:44:28.081624]: Epoch 26 of 50

Training loss: 0.278, training acc: 90.446, Validation loss: 0.477, validation acc: 85.180, Learning rate: 0.001 Time: 00:00:52

--------------------------------------------------

[INFO][2024-05-09 21:45:20.562081]: Epoch 27 of 50

Training loss: 0.267, training acc: 91.044, Validation loss: 0.455, validation acc: 85.950, Learning rate: 0.001 Time: 00:00:54

--------------------------------------------------

[INFO][2024-05-09 21:46:15.454682]: Epoch 28 of 50

Training loss: 0.253, training acc: 91.364, Validation loss: 0.418, validation acc: 86.720, Learning rate: 0.001 Time: 00:00:53

--------------------------------------------------

[INFO][2024-05-09 21:47:08.471639]: Epoch 29 of 50

Training loss: 0.250, training acc: 91.436, Validation loss: 0.455, validation acc: 86.110, Learning rate: 0.001 Time: 00:00:53

--------------------------------------------------

[INFO][2024-05-09 21:48:02.234630]: Epoch 30 of 50

Training loss: 0.238, training acc: 91.746, Validation loss: 0.433, validation acc: 86.520, Learning rate: 0.001 Time: 00:00:53

--------------------------------------------------

[INFO][2024-05-09 21:48:55.430969]: Epoch 31 of 50

Training loss: 0.229, training acc: 92.194, Validation loss: 0.403, validation acc: 87.060, Learning rate: 0.001 Time: 00:00:53

--------------------------------------------------

[INFO][2024-05-09 21:49:48.462560]: Epoch 32 of 50

Training loss: 0.220, training acc: 92.390, Validation loss: 0.423, validation acc: 87.120, Learning rate: 0.001 Time: 00:00:54

--------------------------------------------------

[INFO][2024-05-09 21:50:42.820777]: Epoch 33 of 50

Training loss: 0.213, training acc: 92.776, Validation loss: 0.434, validation acc: 86.850, Learning rate: 0.001 Time: 00:00:54

--------------------------------------------------

[INFO][2024-05-09 21:51:36.912470]: Epoch 34 of 50

Training loss: 0.204, training acc: 93.054, Validation loss: 0.405, validation acc: 87.640, Learning rate: 0.001 Time: 00:00:54

--------------------------------------------------

[INFO][2024-05-09 21:52:31.410804]: Epoch 35 of 50

Training loss: 0.195, training acc: 93.478, Validation loss: 0.420, validation acc: 87.080, Learning rate: 0.001 Time: 00:00:54

--------------------------------------------------

[INFO][2024-05-09 21:53:25.683302]: Epoch 36 of 50

Training loss: 0.186, training acc: 93.738, Validation loss: 0.455, validation acc: 86.690, Learning rate: 0.001 Time: 00:00:54

--------------------------------------------------

[INFO][2024-05-09 21:54:19.884830]: Epoch 37 of 50

Training loss: 0.182, training acc: 93.764, Validation loss: 0.422, validation acc: 87.360, Learning rate: 0.001 Time: 00:00:55

--------------------------------------------------

[INFO][2024-05-09 21:55:15.561652]: Epoch 38 of 50

Training loss: 0.176, training acc: 94.046, Validation loss: 0.431, validation acc: 87.100, Learning rate: 0.001 Time: 00:00:54

--------------------------------------------------

[INFO][2024-05-09 21:56:10.363909]: Epoch 39 of 50

Training loss: 0.171, training acc: 94.140, Validation loss: 0.414, validation acc: 87.610, Learning rate: 0.001 Time: 00:00:55

--------------------------------------------------

[INFO][2024-05-09 21:57:05.623885]: Epoch 40 of 50

Training loss: 0.161, training acc: 94.454, Validation loss: 0.412, validation acc: 87.850, Learning rate: 0.001 Time: 00:00:55

--------------------------------------------------

[INFO][2024-05-09 21:58:01.581208]: Epoch 41 of 50

Training loss: 0.158, training acc: 94.548, Validation loss: 0.402, validation acc: 88.270, Learning rate: 0.001 Time: 00:00:55

--------------------------------------------------

[INFO][2024-05-09 21:58:57.131063]: Epoch 42 of 50

Training loss: 0.148, training acc: 95.020, Validation loss: 0.405, validation acc: 88.030, Learning rate: 0.001 Time: 00:00:56

--------------------------------------------------

[INFO][2024-05-09 21:59:53.280233]: Epoch 43 of 50

Training loss: 0.149, training acc: 94.876, Validation loss: 0.417, validation acc: 87.630, Learning rate: 0.001 Time: 00:00:54

--------------------------------------------------

[INFO][2024-05-09 22:00:47.616868]: Epoch 44 of 50

Training loss: 0.145, training acc: 95.076, Validation loss: 0.465, validation acc: 86.610, Learning rate: 0.001 Time: 00:00:53

--------------------------------------------------

[INFO][2024-05-09 22:01:41.610696]: Epoch 45 of 50

Training loss: 0.134, training acc: 95.340, Validation loss: 0.431, validation acc: 87.710, Learning rate: 0.001 Time: 00:00:54

--------------------------------------------------

[INFO][2024-05-09 22:02:36.113236]: Epoch 46 of 50

Training loss: 0.133, training acc: 95.484, Validation loss: 0.445, validation acc: 87.630, Learning rate: 0.001 Time: 00:00:52

--------------------------------------------------

[INFO][2024-05-09 22:03:28.913640]: Epoch 47 of 50

Training loss: 0.130, training acc: 95.542, Validation loss: 0.418, validation acc: 88.390, Learning rate: 0.001 Time: 00:00:53

--------------------------------------------------

[INFO][2024-05-09 22:04:22.823929]: Epoch 48 of 50

Training loss: 0.122, training acc: 95.838, Validation loss: 0.486, validation acc: 86.850, Learning rate: 0.001 Time: 00:00:58

--------------------------------------------------

[INFO][2024-05-09 22:05:21.266764]: Epoch 49 of 50

Training loss: 0.121, training acc: 95.908, Validation loss: 0.416, validation acc: 88.310, Learning rate: 0.001 Time: 00:00:59

--------------------------------------------------

[INFO][2024-05-09 22:06:20.608537]: Epoch 50 of 50

Training loss: 0.119, training acc: 95.914, Validation loss: 0.450, validation acc: 87.540, Learning rate: 0.001 Time: 00:00:58

--------------------------------------------------

Final time taken to run total is::00:45:30

Training loss::[2.2039760416730894, 1.8008232439875298, 1.5605351537694712, 1.3251771993954162, 1.1236508385757047, 0.9663551795818007, 0.8554383910754148, 0.7696059953678599, 0.7047016588623262, 0.6487178851652633, 0.5983866702031602, 0.561740866402531, 0.5338566314495737, 0.4979115165484226, 0.46862443934773546, 0.4464981181504172, 0.4179699312504905, 0.40363984614077125, 0.3798557064398323, 0.36509652357653277, 0.3454208493213672, 0.33170545942452556, 0.32189936063173785, 0.30692276774960403, 0.29177080770320907, 0.27823528943731046, 0.26700022606574514, 0.2534276455393075, 0.24988500984942974, 0.2380053962073515, 0.22883165158007457, 0.22019309644846966, 0.21300727518661247, 0.20439539232369883, 0.19531260344111706, 0.1860490709786182, 0.18180912099969204, 0.17599727756455733, 0.17064868763346425, 0.16053499816142766, 0.15835569443328834, 0.1484900188853826, 0.14879679796345474, 0.1447705128766082, 0.13446788024395476, 0.13266786613294382, 0.13048547777511618, 0.12155442178735267, 0.1207362814518192, 0.11855116237164534]

Validation loss::[1.9139515472825166, 1.6132962696111885, 1.3826948601728792, 1.1982669720224515, 1.0322099700095548, 0.9119649229535631, 0.8170456555998249, 0.7476152789061237, 0.7623589143251918, 0.6847469622542144, 0.588965706574689, 0.5701945830302634, 0.526522933867327, 0.5603613802202189, 0.5310458222012611, 0.5236470883439301, 0.5624984910913334, 0.48132114624901184, 0.48979957240402316, 0.47976478174993187, 0.47174118810398563, 0.46049078368836904, 0.42867533027366467, 0.44000282551452613, 0.42445026077092834, 0.47732511808158484, 0.4549451199876275, 0.41843052260625135, 0.45474936713458625, 0.43276480518898386, 0.40277451627953037, 0.42320667477739843, 0.4339222309126216, 0.4045410028593555, 0.4201293232714295, 0.4554769256786936, 0.42213270751533993, 0.4309807042502294, 0.41356972054501245, 0.4122344680177938, 0.40176132202717907, 0.4050913626553526, 0.41742320823821294, 0.46471664736604995, 0.4309825183479649, 0.44487486926803166, 0.417747592755184, 0.485532267410664, 0.41556969223318585, 0.4503178829030626]

Training Accuracy::[13.552, 25.535999999999998, 39.14, 51.017999999999994, 59.854, 65.75999999999999, 69.91199999999999, 73.06200000000001, 75.53800000000001, 77.644, 79.544, 80.902, 81.83399999999999, 83.14399999999999, 84.294, 84.98400000000001, 85.784, 86.42999999999999, 86.91799999999999, 87.626, 88.13600000000001, 88.742, 89.22200000000001, 89.604, 90.16999999999999, 90.446, 91.044, 91.364, 91.43599999999999, 91.74600000000001, 92.194, 92.39, 92.776, 93.054, 93.47800000000001, 93.738, 93.76400000000001, 94.04599999999999, 94.14, 94.45400000000001, 94.548, 95.02000000000001, 94.876, 95.07600000000001, 95.34, 95.48400000000001, 95.542, 95.838, 95.908, 95.914]

Validation Accuracy::[19.73, 36.33, 46.96, 56.99999999999999, 63.160000000000004, 68.08, 71.23, 73.94, 74.25, 76.42999999999999, 80.02, 80.86, 81.98, 80.97999999999999, 82.36, 82.32000000000001, 81.8, 84.11, 84.1, 84.13000000000001, 84.93, 85.2, 85.99, 85.72, 86.19, 85.18, 85.95, 86.72, 86.11, 86.52, 87.06, 87.12, 86.85000000000001, 87.64, 87.08, 86.69, 87.36, 87.1, 87.61, 87.85, 88.27000000000001, 88.03, 87.63, 86.61, 87.71, 87.63, 88.39, 86.85000000000001, 88.31, 87.53999999999999]

Accuracy of the network on the 10000 test images: 87.54 %

Accuracy of airplane : 87.60 %

Accuracy of automobile : 92.40 %

Accuracy of bird : 87.00 %

Accuracy of cat : 80.50 %

Accuracy of deer : 87.40 %

Accuracy of dog : 75.50 %

Accuracy of frog : 92.60 %

Accuracy of horse : 82.60 %

Accuracy of ship : 95.50 %

Accuracy of truck : 94.30 %

Accuracy Rate per batch = 95.3125%

<Figure size 2500x400 with 0 Axes>

**ResNet CIFAR – Original**

[2024-05-05 13:11:30.295876]:

Training loss: 1.524, training acc: 43.778, Validation loss: 1.240, validation acc: 56.880, Learning rate: 0.001 Time: 00:00:58

--------------------------------------------------

[INFO]: Epoch 2 of 50

Training loss: 1.053, training acc: 62.356, Validation loss: 0.947, validation acc: 66.470, Learning rate: 0.001 Time: 00:00:57

--------------------------------------------------

[INFO]: Epoch 3 of 50

Training loss: 0.824, training acc: 70.856, Validation loss: 0.795, validation acc: 72.310, Learning rate: 0.001 Time: 00:00:58

--------------------------------------------------

[INFO]: Epoch 4 of 50

Training loss: 0.676, training acc: 76.352, Validation loss: 0.695, validation acc: 76.520, Learning rate: 0.001 Time: 00:00:57

--------------------------------------------------

[INFO]: Epoch 5 of 50

Training loss: 0.588, training acc: 79.692, Validation loss: 0.643, validation acc: 78.550, Learning rate: 0.001 Time: 00:00:55

--------------------------------------------------

[INFO]: Epoch 6 of 50

Training loss: 0.515, training acc: 82.098, Validation loss: 0.598, validation acc: 80.590, Learning rate: 0.001 Time: 00:00:55

--------------------------------------------------

[INFO]: Epoch 7 of 50

Training loss: 0.465, training acc: 83.864, Validation loss: 0.512, validation acc: 82.920, Learning rate: 0.001 Time: 00:00:59

--------------------------------------------------

[INFO]: Epoch 8 of 50

Training loss: 0.420, training acc: 85.366, Validation loss: 0.555, validation acc: 81.690, Learning rate: 0.001 Time: 00:00:57

--------------------------------------------------

[INFO]: Epoch 9 of 50

Training loss: 0.383, training acc: 86.714, Validation loss: 0.457, validation acc: 85.000, Learning rate: 0.001 Time: 00:00:58

--------------------------------------------------

[INFO]: Epoch 10 of 50

Training loss: 0.350, training acc: 87.874, Validation loss: 0.442, validation acc: 85.560, Learning rate: 0.001 Time: 00:00:58

--------------------------------------------------

[INFO]: Epoch 11 of 50

Training loss: 0.325, training acc: 88.704, Validation loss: 0.409, validation acc: 86.880, Learning rate: 0.001 Time: 00:01:00

--------------------------------------------------

[INFO]: Epoch 12 of 50

Training loss: 0.302, training acc: 89.466, Validation loss: 0.446, validation acc: 85.940, Learning rate: 0.001 Time: 00:01:00

--------------------------------------------------

[INFO]: Epoch 13 of 50

Training loss: 0.279, training acc: 90.104, Validation loss: 0.438, validation acc: 85.950, Learning rate: 0.001 Time: 00:01:01

--------------------------------------------------

[INFO]: Epoch 14 of 50

Training loss: 0.260, training acc: 90.970, Validation loss: 0.420, validation acc: 86.710, Learning rate: 0.001 Time: 00:01:00

--------------------------------------------------

[INFO]: Epoch 15 of 50

Training loss: 0.246, training acc: 91.410, Validation loss: 0.478, validation acc: 85.120, Learning rate: 0.001 Time: 00:01:00

--------------------------------------------------

[INFO]: Epoch 16 of 50

Training loss: 0.229, training acc: 91.998, Validation loss: 0.420, validation acc: 86.570, Learning rate: 0.001 Time: 00:01:01

--------------------------------------------------

[INFO]: Epoch 17 of 50

Training loss: 0.213, training acc: 92.568, Validation loss: 0.383, validation acc: 88.080, Learning rate: 0.001 Time: 00:00:59

--------------------------------------------------

[INFO]: Epoch 18 of 50

Training loss: 0.196, training acc: 93.096, Validation loss: 0.496, validation acc: 85.200, Learning rate: 0.001 Time: 00:01:00

--------------------------------------------------

[INFO]: Epoch 19 of 50

Training loss: 0.190, training acc: 93.280, Validation loss: 0.442, validation acc: 87.390, Learning rate: 0.001 Time: 00:00:59

--------------------------------------------------

[INFO]: Epoch 20 of 50

Training loss: 0.172, training acc: 94.086, Validation loss: 0.351, validation acc: 89.440, Learning rate: 0.001 Time: 00:00:59

--------------------------------------------------

[INFO]: Epoch 21 of 50

Training loss: 0.167, training acc: 94.136, Validation loss: 0.375, validation acc: 88.660, Learning rate: 0.001 Time: 00:00:59

--------------------------------------------------

[INFO]: Epoch 22 of 50

Training loss: 0.158, training acc: 94.452, Validation loss: 0.377, validation acc: 88.960, Learning rate: 0.001 Time: 00:00:59

--------------------------------------------------

[INFO]: Epoch 23 of 50

Training loss: 0.146, training acc: 94.862, Validation loss: 0.353, validation acc: 89.490, Learning rate: 0.001 Time: 00:00:59

--------------------------------------------------

[INFO]: Epoch 24 of 50

Training loss: 0.135, training acc: 95.344, Validation loss: 0.381, validation acc: 89.110, Learning rate: 0.001 Time: 00:00:58

--------------------------------------------------

[INFO]: Epoch 25 of 50

Training loss: 0.134, training acc: 95.354, Validation loss: 0.372, validation acc: 89.440, Learning rate: 0.001 Time: 00:00:58

--------------------------------------------------

[INFO]: Epoch 26 of 50

Training loss: 0.124, training acc: 95.686, Validation loss: 0.425, validation acc: 88.410, Learning rate: 0.001 Time: 00:00:59

--------------------------------------------------

[INFO]: Epoch 27 of 50

Training loss: 0.120, training acc: 95.724, Validation loss: 0.373, validation acc: 89.530, Learning rate: 0.001 Time: 00:01:00

--------------------------------------------------

[INFO]: Epoch 28 of 50

Training loss: 0.108, training acc: 96.176, Validation loss: 0.386, validation acc: 89.030, Learning rate: 0.001 Time: 00:00:58

--------------------------------------------------

[INFO]: Epoch 29 of 50

Training loss: 0.103, training acc: 96.290, Validation loss: 0.439, validation acc: 88.420, Learning rate: 0.001 Time: 00:00:58

--------------------------------------------------

[INFO]: Epoch 30 of 50

Training loss: 0.105, training acc: 96.318, Validation loss: 0.421, validation acc: 88.590, Learning rate: 0.001 Time: 00:00:58

--------------------------------------------------

[INFO]: Epoch 31 of 50

Training loss: 0.097, training acc: 96.510, Validation loss: 0.413, validation acc: 89.330, Learning rate: 0.001 Time: 00:00:58

--------------------------------------------------

[INFO]: Epoch 32 of 50

Training loss: 0.091, training acc: 96.854, Validation loss: 0.409, validation acc: 89.550, Learning rate: 0.001 Time: 00:00:58

--------------------------------------------------

[INFO]: Epoch 33 of 50

Training loss: 0.090, training acc: 96.906, Validation loss: 0.415, validation acc: 88.700, Learning rate: 0.001 Time: 00:00:59

--------------------------------------------------

[INFO]: Epoch 34 of 50

Training loss: 0.081, training acc: 97.226, Validation loss: 0.399, validation acc: 89.730, Learning rate: 0.001 Time: 00:00:59

--------------------------------------------------

[INFO]: Epoch 35 of 50

Training loss: 0.084, training acc: 97.052, Validation loss: 0.411, validation acc: 89.500, Learning rate: 0.001 Time: 00:00:59

--------------------------------------------------

[INFO]: Epoch 36 of 50

Training loss: 0.076, training acc: 97.374, Validation loss: 0.410, validation acc: 89.370, Learning rate: 0.001 Time: 00:01:00

--------------------------------------------------

[INFO]: Epoch 37 of 50

Training loss: 0.073, training acc: 97.406, Validation loss: 0.418, validation acc: 90.150, Learning rate: 0.001 Time: 00:01:03

--------------------------------------------------

[INFO]: Epoch 38 of 50

Training loss: 0.069, training acc: 97.546, Validation loss: 0.392, validation acc: 90.040, Learning rate: 0.001 Time: 00:01:03

--------------------------------------------------

[INFO]: Epoch 39 of 50

Training loss: 0.069, training acc: 97.546, Validation loss: 0.401, validation acc: 90.190, Learning rate: 0.001 Time: 00:01:03

--------------------------------------------------

[INFO]: Epoch 40 of 50

Training loss: 0.062, training acc: 97.850, Validation loss: 0.385, validation acc: 90.240, Learning rate: 0.001 Time: 00:01:03

--------------------------------------------------

[INFO]: Epoch 41 of 50

Training loss: 0.061, training acc: 97.808, Validation loss: 0.419, validation acc: 90.230, Learning rate: 0.001 Time: 00:01:03

--------------------------------------------------

[INFO]: Epoch 42 of 50

Training loss: 0.058, training acc: 97.942, Validation loss: 0.391, validation acc: 90.320, Learning rate: 0.001 Time: 00:01:03

--------------------------------------------------

[INFO]: Epoch 43 of 50

Training loss: 0.058, training acc: 97.924, Validation loss: 0.445, validation acc: 89.650, Learning rate: 0.001 Time: 00:01:03

--------------------------------------------------

[INFO]: Epoch 44 of 50

Training loss: 0.051, training acc: 98.226, Validation loss: 0.383, validation acc: 90.580, Learning rate: 0.001 Time: 00:01:03

--------------------------------------------------

[INFO]: Epoch 45 of 50

Training loss: 0.050, training acc: 98.238, Validation loss: 0.389, validation acc: 90.950, Learning rate: 0.001 Time: 00:01:04

--------------------------------------------------

[INFO]: Epoch 46 of 50

Training loss: 0.051, training acc: 98.226, Validation loss: 0.412, validation acc: 90.550, Learning rate: 0.001 Time: 00:01:03

--------------------------------------------------

[INFO]: Epoch 47 of 50

Training loss: 0.047, training acc: 98.436, Validation loss: 0.388, validation acc: 90.950, Learning rate: 0.001 Time: 00:01:01

--------------------------------------------------

[INFO]: Epoch 48 of 50

Training loss: 0.046, training acc: 98.356, Validation loss: 0.364, validation acc: 91.450, Learning rate: 0.001 Time: 00:01:00

--------------------------------------------------

[INFO]: Epoch 49 of 50

Training loss: 0.048, training acc: 98.342, Validation loss: 0.385, validation acc: 90.670, Learning rate: 0.001 Time: 00:00:59

--------------------------------------------------

[INFO]: Epoch 50 of 50

Training loss: 0.045, training acc: 98.454, Validation loss: 0.428, validation acc: 90.010, Learning rate: 0.001 Time: 00:01:02

--------------------------------------------------

Final time taken to run total is::00:50:06

Training loss::[1.5235006941858764, 1.0530989551940537, 0.8244970571202086, 0.6764170451618522, 0.5879579109456533, 0.5146103782955643, 0.46522580938952046, 0.4195623173547523, 0.3834956146567069, 0.3498279657548346, 0.32491257065511725, 0.3019965503202832, 0.2792709436258087, 0.25953515991092185, 0.24624354856284073, 0.2285503113447019, 0.2131352027463715, 0.19598917204819982, 0.18974267651834298, 0.17248465039807817, 0.16655059388893492, 0.1581081046968165, 0.14604984011853595, 0.13461590613312352, 0.13366382579793176, 0.12403816932245441, 0.11963947663379028, 0.10778875666958711, 0.10265968316782485, 0.10455780910790119, 0.09701376158596418, 0.09083948691811441, 0.08954230891993208, 0.08128049654369254, 0.08446522784012053, 0.0759042029779957, 0.0725178930591649, 0.06946370571427753, 0.06891970874567795, 0.06221586520410836, 0.06084304614751207, 0.058175639182988965, 0.05848539561269057, 0.05101940229408862, 0.049998278372034986, 0.05103491852893625, 0.046752532301268176, 0.04606151522945284, 0.048443076516384895, 0.04549236853783855]

Validation loss::[1.2402378324490444, 0.9468773789466567, 0.7952884680526272, 0.6954191966800932, 0.6426188890721388, 0.598030179359351, 0.512480507515798, 0.5552181710672986, 0.45736081850756505, 0.4422920896748828, 0.4092462930330046, 0.4461366369086466, 0.4382309444770692, 0.4203970594580766, 0.4778699657055223, 0.41997609418004184, 0.38280359840696787, 0.4957961708686914, 0.4418817270713247, 0.3513965583910608, 0.3750488461487612, 0.3773468213666017, 0.3529503120785686, 0.3809919120969286, 0.3724986714827027, 0.425474343429895, 0.37253827345409213, 0.38593846001917387, 0.4393179760000129, 0.42125218727026775, 0.41285635094354106, 0.409336952931562, 0.4146656662605371, 0.3992659592182393, 0.41123724477306295, 0.4102499652416653, 0.41782979330249653, 0.39156653111352685, 0.4008579295199768, 0.38464067985487593, 0.41902846968762436, 0.39055857945020034, 0.4450667322536183, 0.3831250759636521, 0.38863600803106124, 0.4121593512642156, 0.38784377522481855, 0.3636929682295793, 0.38543297212784455, 0.42827157013690703]

Training Accuracy::[43.778, 62.356, 70.856, 76.352, 79.692, 82.098, 83.864, 85.366, 86.714, 87.874, 88.70400000000001, 89.46600000000001, 90.104, 90.97, 91.41, 91.998, 92.568, 93.096, 93.28, 94.086, 94.136, 94.452, 94.862, 95.344, 95.354, 95.686, 95.724, 96.17599999999999, 96.28999999999999, 96.318, 96.50999999999999, 96.854, 96.906, 97.226, 97.052, 97.37400000000001, 97.406, 97.54599999999999, 97.54599999999999, 97.85000000000001, 97.80799999999999, 97.942, 97.924, 98.226, 98.238, 98.226, 98.436, 98.356, 98.342, 98.454]

Validation Accuracy::[56.879999999999995, 66.47, 72.31, 76.52, 78.55, 80.58999999999999, 82.92, 81.69, 85.0, 85.56, 86.88, 85.94000000000001, 85.95, 86.71, 85.11999999999999, 86.57000000000001, 88.08, 85.2, 87.39, 89.44, 88.66000000000001, 88.96, 89.49000000000001, 89.11, 89.44, 88.41, 89.53, 89.03, 88.42, 88.59, 89.33, 89.55, 88.7, 89.73, 89.5, 89.37, 90.14999999999999, 90.03999999999999, 90.19, 90.24, 90.23, 90.32, 89.64999999999999, 90.58, 90.95, 90.55, 90.95, 91.45, 90.67, 90.01]

Accuracy of the network on the 10000 test images: 90.01 %

Accuracy of airplane : 88.70 %

Accuracy of automobile : 97.60 %

Accuracy of bird : 83.10 %

Accuracy of cat : 72.80 %

Accuracy of deer : 94.10 %

Accuracy of dog : 85.70 %

Accuracy of frog : 93.70 %

Accuracy of horse : 95.70 %

Accuracy of ship : 93.50 %

Accuracy of truck : 95.20 %

Accuracy Rate per batch = 89.0625%

**ResNet CIFAR Modified**

[2024-05-05 15:11:30.295876]:

[INFO]: Epoch 1 of 50

Training loss: 1.536, training acc: 43.316, Validation loss: 1.295, validation acc: 54.360, Learning rate: 0.001 Time: 00:00:59

--------------------------------------------------

[INFO]: Epoch 2 of 50

Training loss: 1.087, training acc: 61.226, Validation loss: 1.074, validation acc: 63.210, Learning rate: 0.001 Time: 00:01:04

--------------------------------------------------

[INFO]: Epoch 3 of 50

Training loss: 0.871, training acc: 69.290, Validation loss: 0.766, validation acc: 73.120, Learning rate: 0.001 Time: 00:01:04

--------------------------------------------------

[INFO]: Epoch 4 of 50

Training loss: 0.717, training acc: 75.060, Validation loss: 0.722, validation acc: 75.550, Learning rate: 0.001 Time: 00:01:04

--------------------------------------------------

[INFO]: Epoch 5 of 50

Training loss: 0.617, training acc: 78.602, Validation loss: 0.588, validation acc: 79.700, Learning rate: 0.001 Time: 00:01:04

--------------------------------------------------

[INFO]: Epoch 6 of 50

Training loss: 0.545, training acc: 80.778, Validation loss: 0.590, validation acc: 80.210, Learning rate: 0.001 Time: 00:01:04

--------------------------------------------------

[INFO]: Epoch 7 of 50

Training loss: 0.495, training acc: 82.928, Validation loss: 0.501, validation acc: 82.970, Learning rate: 0.001 Time: 00:01:03

--------------------------------------------------

[INFO]: Epoch 8 of 50

Training loss: 0.448, training acc: 84.364, Validation loss: 0.505, validation acc: 82.590, Learning rate: 0.001 Time: 00:01:04

--------------------------------------------------

[INFO]: Epoch 9 of 50

Training loss: 0.408, training acc: 85.936, Validation loss: 0.434, validation acc: 85.440, Learning rate: 0.001 Time: 00:01:03

--------------------------------------------------

[INFO]: Epoch 10 of 50

Training loss: 0.383, training acc: 86.708, Validation loss: 0.456, validation acc: 84.540, Learning rate: 0.001 Time: 00:01:05

--------------------------------------------------

[INFO]: Epoch 11 of 50

Training loss: 0.354, training acc: 87.696, Validation loss: 0.463, validation acc: 84.660, Learning rate: 0.001 Time: 00:01:04

--------------------------------------------------

[INFO]: Epoch 12 of 50

Training loss: 0.327, training acc: 88.588, Validation loss: 0.429, validation acc: 86.270, Learning rate: 0.001 Time: 00:01:03

--------------------------------------------------

[INFO]: Epoch 13 of 50

Training loss: 0.305, training acc: 89.440, Validation loss: 0.407, validation acc: 87.200, Learning rate: 0.001 Time: 00:01:04

--------------------------------------------------

[INFO]: Epoch 14 of 50

Training loss: 0.289, training acc: 89.902, Validation loss: 0.477, validation acc: 84.930, Learning rate: 0.001 Time: 00:01:02

--------------------------------------------------

[INFO]: Epoch 15 of 50

Training loss: 0.269, training acc: 90.638, Validation loss: 0.418, validation acc: 86.640, Learning rate: 0.001 Time: 00:01:03

--------------------------------------------------

[INFO]: Epoch 16 of 50

Training loss: 0.257, training acc: 91.088, Validation loss: 0.436, validation acc: 86.260, Learning rate: 0.001 Time: 00:01:03

--------------------------------------------------

[INFO]: Epoch 17 of 50

Training loss: 0.240, training acc: 91.674, Validation loss: 0.373, validation acc: 88.390, Learning rate: 0.001 Time: 00:01:04

--------------------------------------------------

[INFO]: Epoch 18 of 50

Training loss: 0.223, training acc: 92.230, Validation loss: 0.425, validation acc: 86.590, Learning rate: 0.001 Time: 00:01:04

--------------------------------------------------

[INFO]: Epoch 19 of 50

Training loss: 0.212, training acc: 92.722, Validation loss: 0.385, validation acc: 88.220, Learning rate: 0.001 Time: 00:01:03

--------------------------------------------------

[INFO]: Epoch 20 of 50

Training loss: 0.201, training acc: 93.024, Validation loss: 0.412, validation acc: 87.870, Learning rate: 0.001 Time: 00:01:03

--------------------------------------------------

[INFO]: Epoch 21 of 50

Training loss: 0.189, training acc: 93.402, Validation loss: 0.406, validation acc: 87.900, Learning rate: 0.001 Time: 00:01:01

--------------------------------------------------

[INFO]: Epoch 22 of 50

Training loss: 0.182, training acc: 93.580, Validation loss: 0.380, validation acc: 88.230, Learning rate: 0.001 Time: 00:01:01

--------------------------------------------------

[INFO]: Epoch 23 of 50

Training loss: 0.169, training acc: 94.248, Validation loss: 0.373, validation acc: 88.720, Learning rate: 0.001 Time: 00:01:02

--------------------------------------------------

[INFO]: Epoch 24 of 50

Training loss: 0.159, training acc: 94.338, Validation loss: 0.363, validation acc: 88.760, Learning rate: 0.001 Time: 00:01:01

--------------------------------------------------

[INFO]: Epoch 25 of 50

Training loss: 0.151, training acc: 94.744, Validation loss: 0.347, validation acc: 89.460, Learning rate: 0.001 Time: 00:01:02

--------------------------------------------------

[INFO]: Epoch 26 of 50

Training loss: 0.145, training acc: 94.890, Validation loss: 0.367, validation acc: 89.510, Learning rate: 0.001 Time: 00:01:02

--------------------------------------------------

[INFO]: Epoch 27 of 50

Training loss: 0.133, training acc: 95.268, Validation loss: 0.358, validation acc: 89.730, Learning rate: 0.001 Time: 00:01:02

--------------------------------------------------

[INFO]: Epoch 28 of 50

Training loss: 0.134, training acc: 95.276, Validation loss: 0.404, validation acc: 88.480, Learning rate: 0.001 Time: 00:01:02

--------------------------------------------------

[INFO]: Epoch 29 of 50

Training loss: 0.128, training acc: 95.484, Validation loss: 0.357, validation acc: 90.120, Learning rate: 0.001 Time: 00:01:03

--------------------------------------------------

[INFO]: Epoch 30 of 50

Training loss: 0.116, training acc: 95.966, Validation loss: 0.432, validation acc: 88.260, Learning rate: 0.001 Time: 00:01:03

--------------------------------------------------

[INFO]: Epoch 31 of 50

Training loss: 0.113, training acc: 95.994, Validation loss: 0.396, validation acc: 89.300, Learning rate: 0.001 Time: 00:01:03

--------------------------------------------------

[INFO]: Epoch 32 of 50

Training loss: 0.109, training acc: 96.278, Validation loss: 0.379, validation acc: 89.390, Learning rate: 0.001 Time: 00:01:04

--------------------------------------------------

[INFO]: Epoch 33 of 50

Training loss: 0.112, training acc: 96.020, Validation loss: 0.338, validation acc: 90.690, Learning rate: 0.001 Time: 00:01:04

--------------------------------------------------

[INFO]: Epoch 34 of 50

Training loss: 0.097, training acc: 96.516, Validation loss: 0.373, validation acc: 89.690, Learning rate: 0.001 Time: 00:01:04

--------------------------------------------------

[INFO]: Epoch 35 of 50

Training loss: 0.093, training acc: 96.692, Validation loss: 0.370, validation acc: 90.100, Learning rate: 0.001 Time: 00:01:04

--------------------------------------------------

[INFO]: Epoch 36 of 50

Training loss: 0.091, training acc: 96.744, Validation loss: 0.384, validation acc: 89.800, Learning rate: 0.001 Time: 00:01:05

--------------------------------------------------

[INFO]: Epoch 37 of 50

Training loss: 0.092, training acc: 96.714, Validation loss: 0.371, validation acc: 90.180, Learning rate: 0.001 Time: 00:01:04

--------------------------------------------------

[INFO]: Epoch 38 of 50

Training loss: 0.080, training acc: 97.216, Validation loss: 0.357, validation acc: 90.590, Learning rate: 0.001 Time: 00:01:04

--------------------------------------------------

[INFO]: Epoch 39 of 50

Training loss: 0.079, training acc: 97.180, Validation loss: 0.457, validation acc: 89.030, Learning rate: 0.001 Time: 00:01:03

--------------------------------------------------

[INFO]: Epoch 40 of 50

Training loss: 0.078, training acc: 97.264, Validation loss: 0.353, validation acc: 90.900, Learning rate: 0.001 Time: 00:01:02

--------------------------------------------------

[INFO]: Epoch 41 of 50

Training loss: 0.069, training acc: 97.518, Validation loss: 0.381, validation acc: 90.090, Learning rate: 0.001 Time: 00:01:01

--------------------------------------------------

[INFO]: Epoch 42 of 50

Training loss: 0.070, training acc: 97.598, Validation loss: 0.372, validation acc: 90.500, Learning rate: 0.001 Time: 00:01:00

--------------------------------------------------

[INFO]: Epoch 43 of 50

Training loss: 0.065, training acc: 97.606, Validation loss: 0.411, validation acc: 89.740, Learning rate: 0.001 Time: 00:00:59

--------------------------------------------------

[INFO]: Epoch 44 of 50

Training loss: 0.067, training acc: 97.644, Validation loss: 0.401, validation acc: 89.790, Learning rate: 0.001 Time: 00:00:58

--------------------------------------------------

[INFO]: Epoch 45 of 50

Training loss: 0.061, training acc: 97.808, Validation loss: 0.417, validation acc: 89.490, Learning rate: 0.001 Time: 00:01:09

--------------------------------------------------

[INFO]: Epoch 46 of 50

Training loss: 0.059, training acc: 97.954, Validation loss: 0.415, validation acc: 89.830, Learning rate: 0.001 Time: 00:01:21

--------------------------------------------------

[INFO]: Epoch 47 of 50

Training loss: 0.059, training acc: 97.880, Validation loss: 0.396, validation acc: 90.480, Learning rate: 0.001 Time: 00:01:21

--------------------------------------------------

[INFO]: Epoch 48 of 50

Training loss: 0.056, training acc: 98.062, Validation loss: 0.375, validation acc: 90.590, Learning rate: 0.001 Time: 00:01:20

--------------------------------------------------

[INFO]: Epoch 49 of 50

Training loss: 0.053, training acc: 98.106, Validation loss: 0.399, validation acc: 90.580, Learning rate: 0.001 Time: 00:01:20

--------------------------------------------------

[INFO]: Epoch 50 of 50

Training loss: 0.055, training acc: 98.120, Validation loss: 0.348, validation acc: 91.180, Learning rate: 0.001 Time: 00:01:20

--------------------------------------------------

Final time taken to run total is::00:54:14

Training loss::[1.5357110570458805, 1.0868795197028334, 0.8712792213615554, 0.717020804505519, 0.616805213682182, 0.5451412461221675, 0.49525158640826145, 0.44815242484859796, 0.4079307553065402, 0.383483763669839, 0.3539884150542719, 0.3268801792026938, 0.3045576352654668, 0.2891459089258443, 0.2690626477722622, 0.25729283494184085, 0.23962006135784147, 0.2230021997981364, 0.21193524480075634, 0.20062120371710157, 0.1891613275508213, 0.1817749431023322, 0.1690736699663579, 0.15908661986346287, 0.15094899805858158, 0.14450873802308842, 0.13324922327037966, 0.13362128029117729, 0.1281540848510078, 0.11629645688378293, 0.11327944238624914, 0.10928068383861228, 0.11176643738061037, 0.0970855850233313, 0.09327366582268035, 0.09059787672155958, 0.0920174656372727, 0.08026535187126196, 0.07943378731279689, 0.07835260575251354, 0.06895512752199208, 0.06991476965639407, 0.06545697494059839, 0.06718059909313231, 0.06138905192918294, 0.05927797032030695, 0.05860381563017836, 0.055673125654916326, 0.05318009774849686, 0.05533879481957477]

Validation loss::[1.2946750977236754, 1.0738344640488837, 0.7663629761167393, 0.7222370672377811, 0.5882996062564242, 0.5898741834862217, 0.5005880142473111, 0.5051402640380677, 0.4344267966640983, 0.45635823174646706, 0.4626410317838572, 0.4288079888577674, 0.4068132359890421, 0.4770006265989534, 0.4176936936416444, 0.4361006945941099, 0.37339387919492784, 0.4246310885449883, 0.38468087393387107, 0.4115616906980041, 0.4055866146827959, 0.3801738045587661, 0.3726227678785658, 0.36267015973853456, 0.34708239142871966, 0.3670762853257975, 0.3577339170963331, 0.40366306132192065, 0.3570818650020156, 0.43207015405604793, 0.39567158480358733, 0.37889992794508387, 0.33768261252505005, 0.3734961326002695, 0.36971994173849465, 0.38417659638224133, 0.3709360859386481, 0.35687723665670223, 0.45710812575498205, 0.35301709969700046, 0.381239344905706, 0.37179003228807145, 0.4108705596322087, 0.40125987773678107, 0.4173664805615783, 0.41521108205056495, 0.39560445494487123, 0.3746437861518875, 0.3989132027242594, 0.3477708516630587]

Training Accuracy::[43.316, 61.226, 69.28999999999999, 75.06, 78.602, 80.778, 82.928, 84.36399999999999, 85.936, 86.708, 87.696, 88.588, 89.44, 89.902, 90.63799999999999, 91.08800000000001, 91.674, 92.23, 92.72200000000001, 93.024, 93.402, 93.58, 94.248, 94.338, 94.744, 94.89, 95.268, 95.27600000000001, 95.48400000000001, 95.966, 95.994, 96.27799999999999, 96.02000000000001, 96.516, 96.69200000000001, 96.744, 96.714, 97.21600000000001, 97.18, 97.264, 97.518, 97.598, 97.60600000000001, 97.64399999999999, 97.80799999999999, 97.954, 97.88, 98.06200000000001, 98.10600000000001, 98.11999999999999]

Validation Accuracy::[54.36, 63.21, 73.11999999999999, 75.55, 79.7, 80.21000000000001, 82.97, 82.59, 85.44, 84.54, 84.66, 86.27, 87.2, 84.93, 86.64, 86.26, 88.39, 86.59, 88.22, 87.87, 87.9, 88.23, 88.72, 88.75999999999999, 89.46, 89.51, 89.73, 88.48, 90.12, 88.26, 89.3, 89.39, 90.69, 89.69, 90.10000000000001, 89.8, 90.18, 90.59, 89.03, 90.9, 90.09, 90.5, 89.74, 89.79, 89.49000000000001, 89.83, 90.48, 90.59, 90.58, 91.18]

Accuracy of the network on the 10000 test images: 91.18 %

Accuracy of airplane : 91.10 %

Accuracy of automobile : 95.30 %

Accuracy of bird : 89.90 %

Accuracy of cat : 82.10 %

Accuracy of deer : 90.00 %

Accuracy of dog : 87.40 %

Accuracy of frog : 91.70 %

Accuracy of horse : 94.50 %

Accuracy of ship : 95.70 %

Accuracy of truck : 94.10 %

Accuracy Rate per batch = 90.625%

**DenseNet CIFAR**

[INFO]: Epoch 1 of 40

/opt/conda/lib/python3.10/site-packages/torch/nn/modules/conv.py:456: UserWarning: Applied workaround for CuDNN issue, install nvrtc.so (Triggered internally at ../aten/src/ATen/native/cudnn/Conv\_v8.cpp:80.)

return F.conv2d(input, weight, bias, self.stride,

Training loss: 1.697, training acc: 37.754, Validation loss: 1.449, validation acc: 47.440, Learning rate: 0.001 Time: 00:01:38

--------------------------------------------------

[INFO]: Epoch 2 of 40

Training loss: 1.265, training acc: 54.432, Validation loss: 1.160, validation acc: 58.660, Learning rate: 0.001 Time: 00:02:02

--------------------------------------------------

[INFO]: Epoch 3 of 40

Training loss: 1.040, training acc: 63.006, Validation loss: 0.936, validation acc: 66.910, Learning rate: 0.001 Time: 00:02:00

--------------------------------------------------

[INFO]: Epoch 4 of 40

Training loss: 0.903, training acc: 68.070, Validation loss: 0.871, validation acc: 69.160, Learning rate: 0.001 Time: 00:01:59

--------------------------------------------------

[INFO]: Epoch 5 of 40

Training loss: 0.796, training acc: 71.970, Validation loss: 0.782, validation acc: 72.860, Learning rate: 0.001 Time: 00:02:00

--------------------------------------------------

[INFO]: Epoch 6 of 40

Training loss: 0.717, training acc: 75.162, Validation loss: 0.716, validation acc: 74.970, Learning rate: 0.001 Time: 00:02:00

--------------------------------------------------

[INFO]: Epoch 7 of 40

Training loss: 0.654, training acc: 77.302, Validation loss: 0.646, validation acc: 77.450, Learning rate: 0.001 Time: 00:02:00

--------------------------------------------------

[INFO]: Epoch 8 of 40

Training loss: 0.604, training acc: 79.092, Validation loss: 0.612, validation acc: 79.370, Learning rate: 0.001 Time: 00:01:59

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[INFO]: Epoch 9 of 40

Training loss: 0.559, training acc: 80.760, Validation loss: 0.612, validation acc: 79.270, Learning rate: 0.001 Time: 00:02:00

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[INFO]: Epoch 10 of 40

Training loss: 0.525, training acc: 81.886, Validation loss: 0.558, validation acc: 81.070, Learning rate: 0.001 Time: 00:02:03

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[INFO]: Epoch 11 of 40

Training loss: 0.497, training acc: 82.984, Validation loss: 0.524, validation acc: 81.930, Learning rate: 0.001 Time: 00:02:01

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[INFO]: Epoch 12 of 40

Training loss: 0.469, training acc: 83.926, Validation loss: 0.528, validation acc: 81.810, Learning rate: 0.001 Time: 00:02:00

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[INFO]: Epoch 13 of 40

Training loss: 0.446, training acc: 84.542, Validation loss: 0.510, validation acc: 83.140, Learning rate: 0.001 Time: 00:02:03

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[INFO]: Epoch 14 of 40

Training loss: 0.427, training acc: 85.240, Validation loss: 0.498, validation acc: 83.600, Learning rate: 0.001 Time: 00:01:36

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[INFO]: Epoch 15 of 40

Training loss: 0.405, training acc: 86.204, Validation loss: 0.564, validation acc: 81.550, Learning rate: 0.001 Time: 00:01:36

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[INFO]: Epoch 16 of 40

Training loss: 0.386, training acc: 86.722, Validation loss: 0.520, validation acc: 83.060, Learning rate: 0.001 Time: 00:01:35

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[INFO]: Epoch 17 of 40

Training loss: 0.373, training acc: 87.148, Validation loss: 0.498, validation acc: 84.060, Learning rate: 0.001 Time: 00:01:35

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[INFO]: Epoch 18 of 40

Training loss: 0.354, training acc: 87.948, Validation loss: 0.502, validation acc: 84.040, Learning rate: 0.001 Time: 00:01:36

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[INFO]: Epoch 19 of 40

Training loss: 0.341, training acc: 88.516, Validation loss: 0.475, validation acc: 84.760, Learning rate: 0.001 Time: 00:01:36

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[INFO]: Epoch 20 of 40

Training loss: 0.329, training acc: 88.718, Validation loss: 0.478, validation acc: 84.600, Learning rate: 0.001 Time: 00:01:36

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[INFO]: Epoch 21 of 40

Training loss: 0.315, training acc: 89.174, Validation loss: 0.473, validation acc: 84.720, Learning rate: 0.001 Time: 00:01:45

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[INFO]: Epoch 22 of 40

Training loss: 0.304, training acc: 89.474, Validation loss: 0.482, validation acc: 84.490, Learning rate: 0.001 Time: 00:02:02

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[INFO]: Epoch 23 of 40

Training loss: 0.295, training acc: 89.974, Validation loss: 0.446, validation acc: 85.300, Learning rate: 0.001 Time: 00:01:59

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[INFO]: Epoch 24 of 40

Training loss: 0.284, training acc: 90.058, Validation loss: 0.444, validation acc: 85.700, Learning rate: 0.001 Time: 00:02:04

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[INFO]: Epoch 25 of 40

Training loss: 0.274, training acc: 90.686, Validation loss: 0.447, validation acc: 85.120, Learning rate: 0.001 Time: 00:02:11

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[INFO]: Epoch 26 of 40

Training loss: 0.267, training acc: 90.846, Validation loss: 0.406, validation acc: 86.670, Learning rate: 0.001 Time: 00:02:10

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[INFO]: Epoch 27 of 40

Training loss: 0.252, training acc: 91.370, Validation loss: 0.435, validation acc: 86.020, Learning rate: 0.001 Time: 00:02:10

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[INFO]: Epoch 28 of 40

Training loss: 0.246, training acc: 91.504, Validation loss: 0.452, validation acc: 85.790, Learning rate: 0.001 Time: 00:02:11

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[INFO]: Epoch 29 of 40

Training loss: 0.239, training acc: 91.830, Validation loss: 0.457, validation acc: 85.780, Learning rate: 0.001 Time: 00:02:10

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[INFO]: Epoch 30 of 40

Training loss: 0.233, training acc: 92.106, Validation loss: 0.441, validation acc: 85.980, Learning rate: 0.001 Time: 00:02:12

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[INFO]: Epoch 31 of 40

Training loss: 0.224, training acc: 92.338, Validation loss: 0.470, validation acc: 85.260, Learning rate: 0.001 Time: 00:02:11

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[INFO]: Epoch 32 of 40

Training loss: 0.222, training acc: 92.430, Validation loss: 0.421, validation acc: 86.410, Learning rate: 0.001 Time: 00:02:05

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[INFO]: Epoch 33 of 40

Training loss: 0.209, training acc: 92.856, Validation loss: 0.416, validation acc: 86.750, Learning rate: 0.001 Time: 00:02:04

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[INFO]: Epoch 34 of 40

Training loss: 0.207, training acc: 92.858, Validation loss: 0.400, validation acc: 87.630, Learning rate: 0.001 Time: 00:02:06

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[INFO]: Epoch 35 of 40

Training loss: 0.202, training acc: 93.042, Validation loss: 0.429, validation acc: 86.660, Learning rate: 0.001 Time: 00:02:04

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[INFO]: Epoch 36 of 40

Training loss: 0.199, training acc: 93.146, Validation loss: 0.423, validation acc: 86.950, Learning rate: 0.001 Time: 00:02:05

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[INFO]: Epoch 37 of 40

Training loss: 0.191, training acc: 93.462, Validation loss: 0.434, validation acc: 87.090, Learning rate: 0.001 Time: 00:02:05

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[INFO]: Epoch 38 of 40

Training loss: 0.180, training acc: 93.766, Validation loss: 0.418, validation acc: 87.630, Learning rate: 0.001 Time: 00:02:04

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[INFO]: Epoch 39 of 40

Training loss: 0.174, training acc: 94.034, Validation loss: 0.474, validation acc: 86.200, Learning rate: 0.001 Time: 00:02:04

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[INFO]: Epoch 40 of 40

Training loss: 0.173, training acc: 93.984, Validation loss: 0.424, validation acc: 87.590, Learning rate: 0.001 Time: 00:02:05

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Final time taken to run total is::01:19:02

Training loss::[1.696927690749888, 1.2651471377486159, 1.04020106007376, 0.9029246828592646, 0.7963765996801274, 0.716916482085767, 0.6544700368590977, 0.6041809384856383, 0.558882695177327, 0.5251205707983593, 0.4974901754494823, 0.4689178524343559, 0.44597933845370624, 0.4269052870438227, 0.4052129436827377, 0.38643428050648526, 0.37299046938872094, 0.3538151588814948, 0.34104320061062, 0.3289400988622852, 0.3153300177486961, 0.3043020511584361, 0.2952231493161615, 0.2840686309653932, 0.27421721379699, 0.26714701332209057, 0.2517058220227509, 0.24607890436563956, 0.2389667329361753, 0.2329183868597002, 0.22447206518229315, 0.22174531599158978, 0.2089169808208485, 0.2066586062054881, 0.20247377493821295, 0.19898231680531178, 0.19100697799716765, 0.1795882590429481, 0.1744190672688815, 0.1726671853257567]

Validation loss::[1.448907339648836, 1.1600249022435232, 0.9357886462454583, 0.8710071121811107, 0.7823471178294746, 0.7155494441272346, 0.6464261797962675, 0.6117765666193263, 0.6123890577797677, 0.5576530871497598, 0.5239493907636897, 0.5283601415005459, 0.5098087843626168, 0.49820776198320327, 0.5635329384807568, 0.520116583556886, 0.4975251857262508, 0.5024053623342211, 0.47452634648912273, 0.47787909095834014, 0.4725218470309191, 0.48204736762745365, 0.44611829576218964, 0.4444568914592646, 0.4470428953030307, 0.4063773079757478, 0.4352312616197167, 0.4524664632548952, 0.4570912136963219, 0.44070676192166697, 0.46997738596360394, 0.4207347643793009, 0.4159588994114262, 0.4004427975245342, 0.4288386910394498, 0.423261095384124, 0.43405032585001296, 0.418175757548232, 0.47359218391453384, 0.42422797137005314]

Training Accuracy::[37.754, 54.432, 63.00599999999999, 68.07, 71.97, 75.16199999999999, 77.302, 79.092, 80.76, 81.88600000000001, 82.98400000000001, 83.926, 84.542, 85.24000000000001, 86.20400000000001, 86.722, 87.148, 87.94800000000001, 88.51599999999999, 88.718, 89.17399999999999, 89.474, 89.974, 90.058, 90.686, 90.846, 91.36999999999999, 91.50399999999999, 91.83, 92.106, 92.338, 92.43, 92.85600000000001, 92.85799999999999, 93.042, 93.146, 93.462, 93.766, 94.03399999999999, 93.984]

Validation Accuracy::[47.44, 58.660000000000004, 66.91, 69.16, 72.86, 74.97, 77.45, 79.36999999999999, 79.27, 81.07, 81.93, 81.81, 83.14, 83.6, 81.55, 83.06, 84.06, 84.04, 84.76, 84.6, 84.72, 84.49, 85.3, 85.7, 85.11999999999999, 86.67, 86.02, 85.79, 85.78, 85.98, 85.26, 86.41, 86.75, 87.63, 86.66, 86.95, 87.09, 87.63, 86.2, 87.59]

Accuracy of the network on the 10000 test images: 87.59 %

Accuracy of airplane : 91.40 %

Accuracy of automobile : 94.40 %

Accuracy of bird : 84.90 %

Accuracy of cat : 79.40 %

Accuracy of deer : 86.40 %

Accuracy of dog : 82.50 %

Accuracy of frog : 87.60 %

Accuracy of horse : 86.20 %

Accuracy of ship : 90.20 %

Accuracy of truck : 92.90 %

Accuracy Rate per batch = 92.1875%