```
>> Experiment: SGD_No
 Epoch 1/50 - loss 1.6158, acc 40.07%
 Epoch 2/50 - loss 1.2458, acc 55.12%
 Epoch 3/50 - loss 1.0810, acc 61.51%
 Epoch 4/50 - loss 0.9755, acc 65.58%
 Epoch 5/50 - loss 0.8921, acc 68.79%
 Epoch 6/50 - loss 0.8279, acc 71.09%
 Epoch 7/50 - loss 0.7825, acc 72.73%
 Epoch 8/50 - loss 0.7437, acc 73.83%
 Epoch 9/50 - loss 0.7011, acc 75.69%
 Epoch 10/50 - loss 0.6775, acc 76.50%
 Epoch 11/50 - loss 0.6491, acc 77.48%
 Epoch 12/50 - loss 0.6282, acc 78.33%
 Epoch 13/50 - loss 0.6075, acc 79.09%
 Epoch 14/50 - loss 0.5881, acc 79.65%
 Epoch 15/50 - loss 0.5707, acc 80.30%
 Epoch 16/50 - loss 0.5517, acc 80.93%
 Epoch 17/50 - loss 0.5418, acc 81.19%
 Epoch 18/50 - loss 0.5271, acc 81.81%
 Epoch 19/50 - loss 0.5154, acc 82.15%
 Epoch 20/50 - loss 0.5003, acc 82.72%
 Epoch 21/50 - loss 0.4908, acc 83.13%
 Epoch 22/50 - loss 0.4804, acc 83.42%
 Epoch 23/50 - loss 0.4678, acc 83.95%
 Epoch 24/50 - loss 0.4596, acc 84.06%
 Epoch 25/50 - loss 0.4480, acc 84.53%
 Epoch 26/50 - loss 0.4400, acc 84.71%
 Epoch 27/50 - loss 0.4337, acc 85.06%
 Epoch 28/50 - loss 0.4215, acc 85.61%
 Epoch 29/50 - loss 0.4196, acc 85.65%
 Epoch 30/50 - loss 0.4098, acc 85.90%
 Epoch 31/50 - loss 0.3984, acc 86.19%
 Epoch 32/50 - loss 0.3951, acc 86.46%
 Epoch 33/50 - loss 0.3893, acc 86.43%
 Epoch 34/50 - loss 0.3803, acc 86.94%
 Epoch 35/50 - loss 0.3748, acc 87.07%
 Epoch 36/50 - loss 0.3674, acc 87.43%
 Epoch 37/50 - loss 0.3614, acc 87.54%
 Epoch 38/50 - loss 0.3574, acc 87.70%
 Epoch 39/50 - loss 0.3618, acc 87.45%
 Epoch 40/50 - loss 0.3444, acc 88.23%
 Epoch 41/50 - loss 0.3502, acc 87.88%
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Epoch 42/50 - loss 0.3382, acc 88.33%
Epoch 43/50 - loss 0.3363, acc 88.46%
Epoch 44/50 - loss 0.3328, acc 88.47%
Epoch 45/50 - loss 0.3249, acc 88.78%
Epoch 46/50 - loss 0.3252, acc 88.64%
Epoch 47/50 - loss 0.3181, acc 89.06%
Epoch 48/50 - loss 0.3178, acc 88.94%
Epoch 49/50 - loss 0.3135, acc 88.95%
Epoch 50/50 - loss 0.3130, acc 89.23%
Validation Acc: 87.00%

>> Experiment: SGD_Step
Epoch 1/50 - loss 1.6148, acc 39.84%
Epoch 2/50 - loss 1.2464, acc 55.18%
Epoch 3/50 - loss 1.1080, acc 60.32%
Epoch 4/50 - loss 1.0099, acc 64.45%
Epoch 5/50 - loss 0.9203, acc 67.51%
Epoch 6/50 - loss 0.8615, acc 69.95%
Epoch 7/50 - loss 0.8064, acc 72.00%
Epoch 8/50 - loss 0.7585, acc 73.69%
Epoch 9/50 - loss 0.7285, acc 74.86%
Epoch 10/50 - loss 0.6933, acc 75.89%
Epoch 11/50 - loss 0.6618, acc 77.10%
Epoch 12/50 - loss 0.6389, acc 77.99%
Epoch 13/50 - loss 0.6236, acc 78.33%
Epoch 14/50 - loss 0.5976, acc 79.34%
Epoch 15/50 - loss 0.5733, acc 80.17%
Epoch 16/50 - loss 0.4947, acc 82.86%
Epoch 17/50 - loss 0.4690, acc 83.91%
Epoch 18/50 - loss 0.4585, acc 84.24%
Epoch 19/50 - loss 0.4514, acc 84.48%
Epoch 20/50 - loss 0.4457, acc 84.83%
Epoch 21/50 - loss 0.4372, acc 84.99%
Epoch 22/50 - loss 0.4363, acc 84.92%
Epoch 23/50 - loss 0.4306, acc 85.19%
Epoch 24/50 - loss 0.4236, acc 85.42%
Epoch 25/50 - loss 0.4214, acc 85.68%
Epoch 26/50 - loss 0.4203, acc 85.47%
Epoch 27/50 - loss 0.4153, acc 85.53%
Epoch 28/50 - loss 0.4098, acc 85.92%
Epoch 29/50 - loss 0.4054, acc 86.09%
Epoch 30/50 - loss 0.4059, acc 86.06%
Epoch 31/50 - loss 0.3919, acc 86.61%
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Epoch 32/50 - loss 0.3871, acc 86.83%
Epoch 33/50 - loss 0.3904, acc 86.65%
Epoch 34/50 - loss 0.3856, acc 86.83%
Epoch 35/50 - loss 0.3891, acc 86.73%
Epoch 36/50 - loss 0.3834, acc 86.81%
Epoch 37/50 - loss 0.3811, acc 86.86%
Epoch 38/50 - loss 0.3809, acc 86.83%
Epoch 39/50 - loss 0.3804, acc 86.75%
Epoch 40/50 - loss 0.3789, acc 86.98%
Epoch 41/50 - loss 0.3835, acc 86.58%
Epoch 42/50 - loss 0.3783, acc 87.03%
Epoch 43/50 - loss 0.3840, acc 86.74%
Epoch 44/50 - loss 0.3824, acc 86.75%
Epoch 45/50 - loss 0.3842, acc 86.75%
Epoch 46/50 - loss 0.3776, acc 87.18%
Epoch 47/50 - loss 0.3791, acc 86.92%
Epoch 48/50 - loss 0.3775, acc 86.91%
Epoch 49/50 - loss 0.3786, acc 87.04%
Epoch 50/50 - loss 0.3791, acc 87.00%
Validation Acc: 87.27%

>> Experiment: SGD_Cosine
Epoch 1/50 - loss 1.6363, acc 39.34%
Epoch 2/50 - loss 1.2461, acc 55.12%
Epoch 3/50 - loss 1.0847, acc 61.40%
Epoch 4/50 - loss 0.9895, acc 65.08%
Epoch 5/50 - loss 0.8962, acc 68.79%
Epoch 6/50 - loss 0.8414, acc 70.41%
Epoch 7/50 - loss 0.7813, acc 72.85%
Epoch 8/50 - loss 0.7466, acc 74.03%
Epoch 9/50 - loss 0.7078, acc 75.58%
Epoch 10/50 - loss 0.6820, acc 76.55%
Epoch 11/50 - loss 0.6508, acc 77.27%
Epoch 12/50 - loss 0.6280, acc 78.20%
Epoch 13/50 - loss 0.6064, acc 78.78%
Epoch 14/50 - loss 0.5809, acc 79.98%
Epoch 15/50 - loss 0.5651, acc 80.59%
Epoch 16/50 - loss 0.5490, acc 81.00%
Epoch 17/50 - loss 0.5284, acc 81.81%
Epoch 18/50 - loss 0.5146, acc 82.20%
Epoch 19/50 - loss 0.4984, acc 82.83%
Epoch 20/50 - loss 0.4855, acc 83.10%
Epoch 21/50 - loss 0.4730, acc 83.56%
```

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Epoch 22/50 - loss 0.4551, acc 84.37%
Epoch 23/50 - loss 0.4454, acc 84.53%
Epoch 24/50 - loss 0.4346, acc 84.83%
Epoch 25/50 - loss 0.4132, acc 85.88%
Epoch 26/50 - loss 0.4083, acc 85.93%
Epoch 27/50 - loss 0.4034, acc 86.17%
Epoch 28/50 - loss 0.3843, acc 86.71%
Epoch 29/50 - loss 0.3787, acc 86.76%
Epoch 30/50 - loss 0.3670, acc 87.44%
Epoch 31/50 - loss 0.3583, acc 87.67%
Epoch 32/50 - loss 0.3475, acc 87.94%
Epoch 33/50 - loss 0.3385, acc 88.42%
Epoch 34/50 - loss 0.3344, acc 88.36%
Epoch 35/50 - loss 0.3209, acc 88.94%
Epoch 36/50 - loss 0.3153, acc 89.16%
Epoch 37/50 - loss 0.3083, acc 89.45%
Epoch 38/50 - loss 0.2972, acc 89.71%
Epoch 39/50 - loss 0.2913, acc 90.11%
Epoch 40/50 - loss 0.2807, acc 90.41%
Epoch 41/50 - loss 0.2778, acc 90.54%
Epoch 42/50 - loss 0.2700, acc 90.75%
Epoch 43/50 - loss 0.2715, acc 90.63%
Epoch 44/50 - loss 0.2622, acc 91.10%
Epoch 45/50 - loss 0.2625, acc 91.03%
Epoch 46/50 - loss 0.2570, acc 91.29%
Epoch 47/50 - loss 0.2576, acc 91.11%
Epoch 48/50 - loss 0.2555, acc 91.30%
Epoch 49/50 - loss 0.2536, acc 91.38%
Epoch 50/50 - loss 0.2521, acc 91.35%
Validation Acc: 89.32%

>> Experiment: Adam_No
Epoch 1/50 - loss 1.5432, acc 43.17%
Epoch 2/50 - loss 1.1667, acc 58.36%
Epoch 3/50 - loss 1.0164, acc 64.08%
Epoch 4/50 - loss 0.9006, acc 68.20%
Epoch 5/50 - loss 0.8214, acc 71.27%
Epoch 6/50 - loss 0.7635, acc 73.36%
Epoch 7/50 - loss 0.7161, acc 75.22%
Epoch 8/50 - loss 0.6776, acc 76.67%
Epoch 9/50 - loss 0.6521, acc 77.59%
Epoch 10/50 - loss 0.6252, acc 78.47%
Epoch 11/50 - loss 0.6059, acc 79.09%
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Epoch 12/50 - loss 0.5816, acc 80.09%
Epoch 13/50 - loss 0.5698, acc 80.70%
Epoch 14/50 - loss 0.5492, acc 80.95%
Epoch 15/50 - loss 0.5315, acc 81.67%
Epoch 16/50 - loss 0.5270, acc 82.18%
Epoch 17/50 - loss 0.5116, acc 82.58%
Epoch 18/50 - loss 0.4988, acc 82.90%
Epoch 19/50 - loss 0.4921, acc 83.19%
Epoch 20/50 - loss 0.4846, acc 83.41%
Epoch 21/50 - loss 0.4720, acc 83.83%
Epoch 22/50 - loss 0.4667, acc 84.00%
Epoch 23/50 - loss 0.4650, acc 84.25%
Epoch 24/50 - loss 0.4448, acc 85.00%
Epoch 25/50 - loss 0.4479, acc 84.51%
Epoch 26/50 - loss 0.4396, acc 84.96%
Epoch 27/50 - loss 0.4323, acc 85.33%
Epoch 28/50 - loss 0.4307, acc 85.13%
Epoch 29/50 - loss 0.4290, acc 85.23%
Epoch 30/50 - loss 0.4242, acc 85.40%
Epoch 31/50 - loss 0.4217, acc 85.61%
Epoch 32/50 - loss 0.4217, acc 85.55%
Epoch 33/50 - loss 0.4135, acc 85.78%
Epoch 34/50 - loss 0.4095, acc 85.92%
Epoch 35/50 - loss 0.4118, acc 85.72%
Epoch 36/50 - loss 0.4050, acc 86.30%
Epoch 37/50 - loss 0.4009, acc 86.23%
Epoch 38/50 - loss 0.3998, acc 86.30%
Epoch 39/50 - loss 0.3910, acc 86.64%
Epoch 40/50 - loss 0.3967, acc 86.67%
Epoch 41/50 - loss 0.3975, acc 86.39%
Epoch 42/50 - loss 0.3908, acc 86.72%
Epoch 43/50 - loss 0.3903, acc 86.69%
Epoch 44/50 - loss 0.3854, acc 86.92%
Epoch 45/50 - loss 0.3879, acc 86.91%
Epoch 46/50 - loss 0.3825, acc 86.96%
Epoch 47/50 - loss 0.3819, acc 86.96%
Epoch 48/50 - loss 0.3833, acc 86.89%
Epoch 49/50 - loss 0.3774, acc 86.98%
Epoch 50/50 - loss 0.3800, acc 86.91%
Validation Acc: 85.87%

>> Experiment: Adam_Step
Epoch 1/50 - loss 1.5152, acc 44.16%
```

```
Epoch 2/50 - loss 1.1357, acc 59.74%
Epoch 3/50 - loss 0.9998, acc 64.93%
Epoch 4/50 - loss 0.8888, acc 68.76%
Epoch 5/50 - loss 0.8208, acc 71.39%
Epoch 6/50 - loss 0.7633, acc 73.19%
Epoch 7/50 - loss 0.7180, acc 75.31%
Epoch 8/50 - loss 0.6834, acc 76.52%
Epoch 9/50 - loss 0.6520, acc 77.50%
Epoch 10/50 - loss 0.6341, acc 78.15%
Epoch 11/50 - loss 0.6036, acc 79.25%
Epoch 12/50 - loss 0.5859, acc 79.99%
Epoch 13/50 - loss 0.5712, acc 80.48%
Epoch 14/50 - loss 0.5556, acc 80.87%
Epoch 15/50 - loss 0.5338, acc 81.67%
Epoch 16/50 - loss 0.4244, acc 85.73%
Epoch 17/50 - loss 0.3899, acc 86.71%
Epoch 18/50 - loss 0.3715, acc 87.27%
Epoch 19/50 - loss 0.3570, acc 87.93%
Epoch 20/50 - loss 0.3507, acc 88.08%
Epoch 21/50 - loss 0.3407, acc 88.33%
Epoch 22/50 - loss 0.3381, acc 88.57%
Epoch 23/50 - loss 0.3243, acc 88.97%
Epoch 24/50 - loss 0.3179, acc 89.11%
Epoch 25/50 - loss 0.3150, acc 89.33%
Epoch 26/50 - loss 0.3073, acc 89.54%
Epoch 27/50 - loss 0.3022, acc 89.69%
Epoch 28/50 - loss 0.2928, acc 89.92%
Epoch 29/50 - loss 0.2926, acc 90.04%
Epoch 30/50 - loss 0.2838, acc 90.19%
Epoch 31/50 - loss 0.2694, acc 90.84%
Epoch 32/50 - loss 0.2647, acc 90.94%
Epoch 33/50 - loss 0.2592, acc 91.23%
Epoch 34/50 - loss 0.2564, acc 91.41%
Epoch 35/50 - loss 0.2553, acc 91.30%
Epoch 36/50 - loss 0.2554, acc 91.26%
Epoch 37/50 - loss 0.2532, acc 91.33%
Epoch 38/50 - loss 0.2531, acc 91.40%
Epoch 39/50 - loss 0.2525, acc 91.31%
Epoch 40/50 - loss 0.2544, acc 91.29%
Epoch 41/50 - loss 0.2519, acc 91.62%
Epoch 42/50 - loss 0.2488, acc 91.37%
Epoch 43/50 - loss 0.2480, acc 91.59%
Epoch 44/50 - loss 0.2433, acc 91.68%
```

Epoch 45/50 - loss 0.2490, acc 91.49%
Epoch 46/50 - loss 0.2472, acc 91.58%
Epoch 47/50 - loss 0.2424, acc 91.84%
Epoch 48/50 - loss 0.2422, acc 91.86%
Epoch 49/50 - loss 0.2428, acc 91.80%
Epoch 50/50 - loss 0.2421, acc 91.94%
Validation Acc: 89.58%

>> Experiment: Adam_Cosine
Epoch 1/50 - loss 1.5309, acc 43.34%
Epoch 2/50 - loss 1.1601, acc 58.35%
Epoch 3/50 - loss 1.0166, acc 63.94%
Epoch 4/50 - loss 0.9103, acc 68.36%
Epoch 5/50 - loss 0.8210, acc 71.39%
Epoch 6/50 - loss 0.7650, acc 73.45%
Epoch 7/50 - loss 0.7240, acc 75.04%
Epoch 8/50 - loss 0.6795, acc 76.69%
Epoch 9/50 - loss 0.6492, acc 77.80%
Epoch 10/50 - loss 0.6253, acc 78.59%
Epoch 11/50 - loss 0.5980, acc 79.50%
Epoch 12/50 - loss 0.5758, acc 80.19%
Epoch 13/50 - loss 0.5507, acc 81.14%
Epoch 14/50 - loss 0.5344, acc 81.69%
Epoch 15/50 - loss 0.5157, acc 82.50%
Epoch 16/50 - loss 0.5017, acc 82.67%
Epoch 17/50 - loss 0.4898, acc 83.25%
Epoch 18/50 - loss 0.4712, acc 83.92%
Epoch 19/50 - loss 0.4538, acc 84.43%
Epoch 20/50 - loss 0.4365, acc 84.99%
Epoch 21/50 - loss 0.4236, acc 85.46%
Epoch 22/50 - loss 0.4100, acc 85.87%
Epoch 23/50 - loss 0.3998, acc 86.16%
Epoch 24/50 - loss 0.3860, acc 86.74%
Epoch 25/50 - loss 0.3692, acc 87.28%
Epoch 26/50 - loss 0.3591, acc 87.69%
Epoch 27/50 - loss 0.3498, acc 87.97%
Epoch 28/50 - loss 0.3315, acc 88.73%
Epoch 29/50 - loss 0.3185, acc 89.00%
Epoch 30/50 - loss 0.3076, acc 89.51%
Epoch 31/50 - loss 0.2955, acc 89.78%
Epoch 32/50 - loss 0.2862, acc 90.02%
Epoch 33/50 - loss 0.2751, acc 90.65%
Epoch 34/50 - loss 0.2592, acc 91.13%

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Epoch 35/50 - loss 0.2454, acc 91.61%
Epoch 36/50 - loss 0.2369, acc 91.77%
Epoch 37/50 - loss 0.2277, acc 92.31%
Epoch 38/50 - loss 0.2217, acc 92.36%
Epoch 39/50 - loss 0.2093, acc 92.83%
Epoch 40/50 - loss 0.2046, acc 93.02%
Epoch 41/50 - loss 0.1896, acc 93.50%
Epoch 42/50 - loss 0.1814, acc 93.89%
Epoch 43/50 - loss 0.1803, acc 93.88%
Epoch 44/50 - loss 0.1707, acc 94.22%
Epoch 45/50 - loss 0.1655, acc 94.39%
Epoch 46/50 - loss 0.1603, acc 94.58%
Epoch 47/50 - loss 0.1596, acc 94.68%
Epoch 48/50 - loss 0.1606, acc 94.55%
Epoch 49/50 - loss 0.1535, acc 94.84%
Epoch 50/50 - loss 0.1541, acc 94.78%
Validation Acc: 90.57%

>>> Selected on val: Adam_Cosine (90.57%)
Epoch 1/50 - loss 1.4317, acc 47.67%
Epoch 2/50 - loss 1.0601, acc 62.41%
Epoch 3/50 - loss 0.8964, acc 68.56%
Epoch 4/50 - loss 0.7958, acc 72.35%
Epoch 5/50 - loss 0.7184, acc 74.99%
Epoch 6/50 - loss 0.6694, acc 76.92%
Epoch 7/50 - loss 0.6356, acc 78.19%
Epoch 8/50 - loss 0.5912, acc 79.67%
Epoch 9/50 - loss 0.5644, acc 80.51%
Epoch 10/50 - loss 0.5383, acc 81.65%
Epoch 11/50 - loss 0.5165, acc 82.32%
Epoch 12/50 - loss 0.4987, acc 82.86%
Epoch 13/50 - loss 0.4765, acc 83.62%
Epoch 14/50 - loss 0.4609, acc 84.24%
Epoch 15/50 - loss 0.4425, acc 84.95%
Epoch 16/50 - loss 0.4298, acc 85.38%
Epoch 17/50 - loss 0.4155, acc 85.62%
Epoch 18/50 - loss 0.4048, acc 86.11%
Epoch 19/50 - loss 0.3856, acc 86.82%
Epoch 20/50 - loss 0.3770, acc 87.01%
Epoch 21/50 - loss 0.3643, acc 87.61%
Epoch 22/50 - loss 0.3546, acc 87.93%
Epoch 23/50 - loss 0.3405, acc 88.40%
Epoch 24/50 - loss 0.3318, acc 88.70%
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Epoch 25/50 - loss 0.3140, acc 89.34%
Epoch 26/50 - loss 0.3118, acc 89.38%
Epoch 27/50 - loss 0.2938, acc 90.10%
Epoch 28/50 - loss 0.2868, acc 90.24%
Epoch 29/50 - loss 0.2701, acc 90.91%
Epoch 30/50 - loss 0.2655, acc 91.04%
Epoch 31/50 - loss 0.2512, acc 91.44%
Epoch 32/50 - loss 0.2450, acc 91.74%
Epoch 33/50 - loss 0.2290, acc 92.33%
Epoch 34/50 - loss 0.2222, acc 92.50%
Epoch 35/50 - loss 0.2145, acc 92.73%
Epoch 36/50 - loss 0.1983, acc 93.24%
Epoch 37/50 - loss 0.1913, acc 93.61%
Epoch 38/50 - loss 0.1864, acc 93.56%
Epoch 39/50 - loss 0.1767, acc 94.10%
Epoch 40/50 - loss 0.1676, acc 94.38%
Epoch 41/50 - loss 0.1609, acc 94.67%
Epoch 42/50 - loss 0.1551, acc 94.79%
Epoch 43/50 - loss 0.1496, acc 95.00%
Epoch 44/50 - loss 0.1478, acc 95.08%
Epoch 45/50 - loss 0.1388, acc 95.47%
Epoch 46/50 - loss 0.1346, acc 95.52%
Epoch 47/50 - loss 0.1326, acc 95.54%
Epoch 48/50 - loss 0.1321, acc 95.63%
Epoch 49/50 - loss 0.1310, acc 95.75%
Epoch 50/50 - loss 0.1306, acc 95.68%

Final Test Acc: 91.01%
```

Final Test Confusion Matrix (Adam_Cosine)