CSE 472: CNN from Scratch

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MNIST:
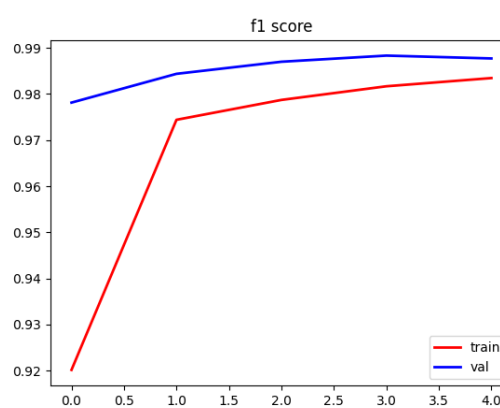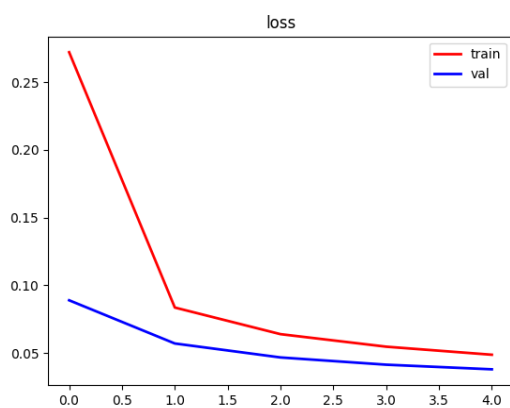
Trained only for digits 0, 1, 2

Model:

Architecture	Parameters
Conv 6 5 1 2 ReLU Pool 2 2 Conv 12 5 1 0 ReLU Pool 2 2 Conv 100 5 1 0 ReLU FC 3 Softmax	'batch_size': 32, 'epochs': 5, 'alpha': 1e-2

Metrics:

Epoch	Loss		Accuracy		F1 Score	
	Training	Validation	Training	Validation	Training	Validation
1	0.272	0.089	0.926	0.978	0.920	0.978
2	0.084	0.057	0.976	0.985	0.974	0.984
3	0.064	0.047	0.980	0.987	0.979	0.987
4	0.055	0.041	0.983	0.989	0.982	0.988
5	0.049	0.038	0.984	0.988	0.983	0.988

Trained for all digits.

Metrics:

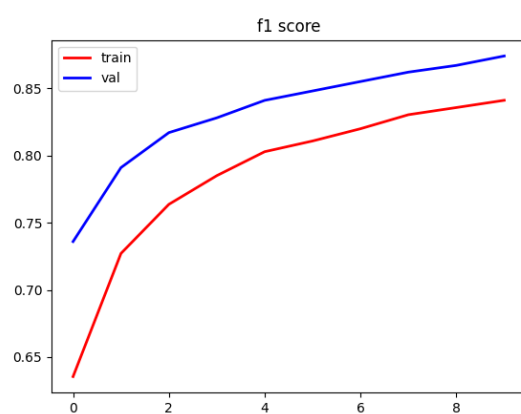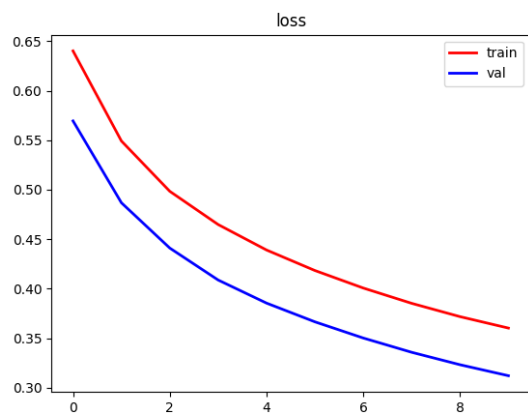| Epoch	Loss		Accuracy		F1 Score	
	Training	Validation	Training	Validation	Training	Validation
1	0.828	0.305	0.761	0.909	0.722	0.908
2	0.272	0.202	0.921	0.939	0.903	0.938
3	0.207	0.163	0.940	0.949	0.925	0.948
4	0.174	0.140	0.948	0.955	0.936	0.955
5	0.154	0.125	0.954	0.960	0.943	0.960

CIFAR-10:

Trained only on labels 0 (airplane) and 1 (automobile)

Model:

Architecture	Parameters
Conv 6 5 1 2 ReLU Pool 2 2 Conv 12 5 1 0 ReLU Pool 2 2 Conv 100 5 1 0 ReLU FC 2 Softmax	'batch_size': 32, 'epochs': 10, 'alpha': 1e-2

Metrics:

Epoch	Loss		Accuracy		F1 Score	
	Training	Validation	Training	Validation	Training	Validation
1	0.640	0.570	0.646	0.736	0.636	0.736
2	0.549	0.487	0.735	0.791	0.727	0.791
3	0.498	0.441	0.770	0.817	0.764	0.817
4	0.465	0.409	0.791	0.828	0.785	0.828
5	0.439	0.385	0.809	0.841	0.803	0.841
6	0.418	0.366	0.816	0.848	0.811	0.848
7	0.401	0.350	0.825	0.855	0.820	0.855
8	0.385	0.336	0.835	0.862	0.830	0.862
9	0.372	0.323	0.840	0.867	0.836	0.867
10	0.360	0.312	0.846	0.874	0.841	0.874

Training on whole dataset:

Metrics:

Epoch	Loss		Accuracy		F1 Score	
	Training	Validation	Training	Validation	Training	Validation
1	2.070	1.888	0.248	0.327	0.201	0.301
2	1.813	1.734	0.353	0.385	0.304	0.367
3	1.674	1.618	0.403	0.420	0.352	0.400
4	1.582	1.571	0.434	0.437	0.382	0.416
5	1.532	1.541	0.452	0.449	0.400	0.427