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Project 3 Report
CSE 575

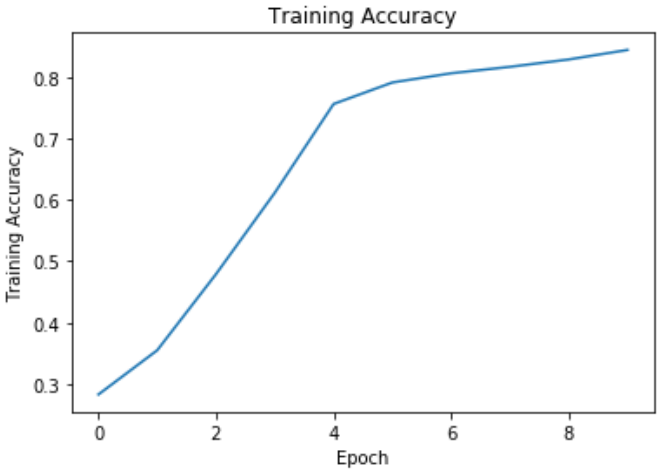
Evaluate Function

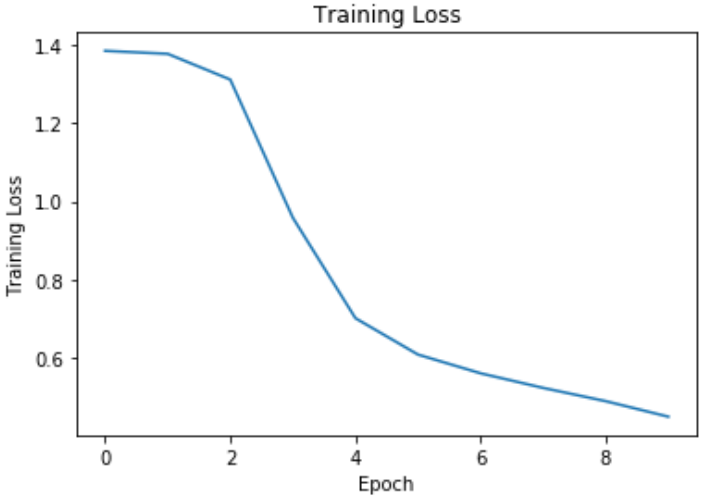
```
def evaluate(net, images, labels):
    acc = 0
    loss = 0
    batch_size = 1

    for batch in range(0, images.shape[0], batch_size):
        x = images[batch]
        y = labels[batch]

        # forward pass calculation
        for layer in range(net.lay_num):                    # traverse through all neurons from first to last layer
            output_layer = net.layers[layer].forward(x)     # output layer
             x = output_layer

        loss += cross_entropy(output_layer, y)              # calculate loss from output layer
        if np.argmax(output_layer) == np.argmax(y):         # calculate accuracy from output layer
          acc += 1

    acc_output = acc/images.shape[0]
    loss_output = loss/images.shape[0]
    return acc_output, loss_output
```

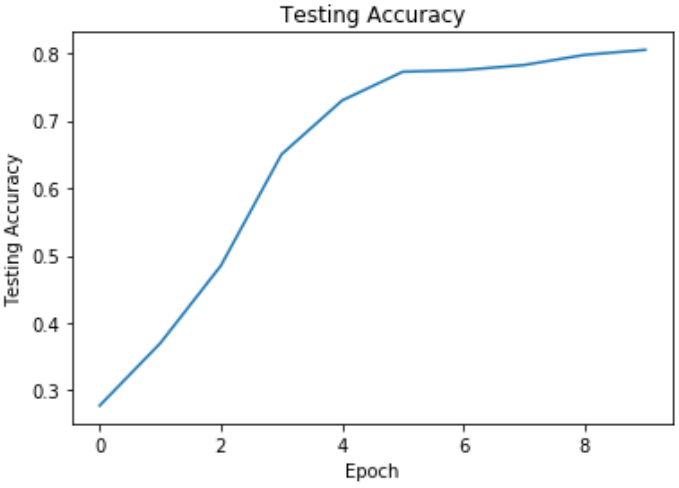
Epoch	Training Accuracy	Training Loss	Testing Accuracy	Testing Loss
0	0.283	1.3850154776741161	0.2775	1.3850722681156531
1	0.355	1.3773580873500315	0.37	1.3772400545542864
2	0.479	1.3115878973680395	0.485	1.3094558577105633
3	0.6115	0.95829571545624537	0.65	0.9419254553896228
4	0.756	0.70139751738847933	0.73	0.69025515241280044
5	0.791	0.60833644979019963	0.7725	0.61564041480352472
6	0.806	0.56049043864695247	0.775	0.58078755363925705
7	0.8165	0.52312026361505504	0.7825	0.55797358253351415
8	0.8285	0.48921699987704126	0.7975	0.53864606363784651
9	**0.844**	**0.44952361032354565**	**0.805**	**0.51439112518090224**

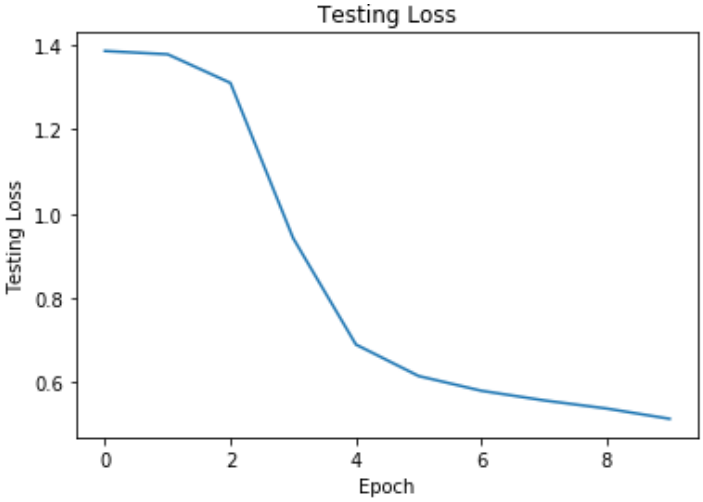
Accuracy and loss outputs (labeled in **red**) for epoch = 9 were submitted.

Plots


Training Accuracy
Training Accuracy
0.8
0.7
0.6
0.5
0.4
0.3
0
2
4
6
8
Epoch


Training Loss
Training Loss
1.4
1.2
1.0
0.8
0.6
0
2
4
6
8
Epoch


Testing Accuracy
Testing Accuracy
0.8
0.7
0.6
0.5
0.4
0.3
0
2
4
6
8
Epoch


Testing Loss
Testing Loss
1.4
1.2
1.0
0.8
0.6
0
2
4
6
8
Epoch