ECGR 5106 Homework 2: AlexNet and ResNet

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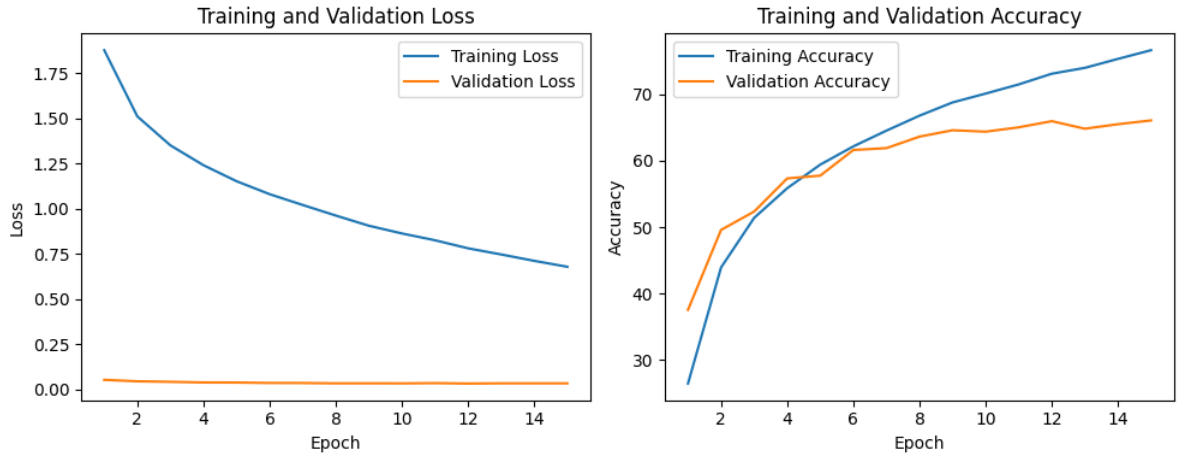
GitHub Link

Click here to view the code

Problem 1.

AlexNet Without Dropout Classification Training Results:
The final training loss was found to be 0.67802927642584. The final validation loss was found to be 0.03329262607395649. The final validation accuracy was found to be 76.648%. My AlexNet had 35,784,212 parameters where traditional AlexNet has 62,300,000. The training loss, validation loss, training accuracy, and validation accuracy plots can be seen below in Figure 1.

Figure 1: Training Loss + Accuracy and Validation Accuracy

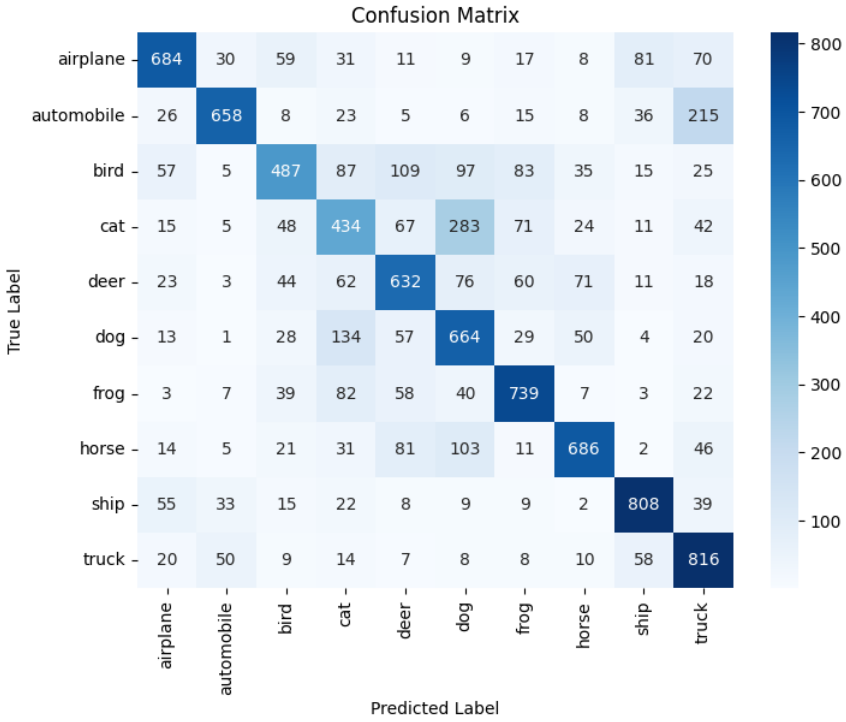


The precision, recall, F1 score, and confusion matrix can be seen in Figures 2 and 3 below:

Figure 2: AlexNet Without Dropout Precision, Recall, and F1 Scores

	precision	recall	f1-score	support
0	0.75	0.68	0.72	1000
1	0.83	0.66	0.73	1000
2	0.64	0.49	0.55	1000
3	0.47	0.43	0.45	1000
4	0.61	0.63	0.62	1000
5	0.51	0.66	0.58	1000
6	0.71	0.74	0.72	1000
7	0.76	0.69	0.72	1000
8	0.79	0.81	0.80	1000
9	0.62	0.82	0.71	1000
accuracy			0.66	10000
macro avg	0.67	0.66	0.66	10000
weighted avg	0.67	0.66	0.66	10000

Figure 3: AlexNet Without Dropout Confusion Matrix



AlexNet With Dropout Classification Training Results:
The final training loss was found to be 0.8763568304760366. The final validation loss was found to be 0.034074881583452225. The final validation accuracy was found to be 63.53%. The training loss was better compared to the model without dropout, but the validation accuracy and validation loss were worse. My AlexNet had 35,784,212 parameters where traditional AlexNet has 62,300,000. The training loss, validation loss, training accuracy, and validation accuracy plots can be seen below in Figure 1.

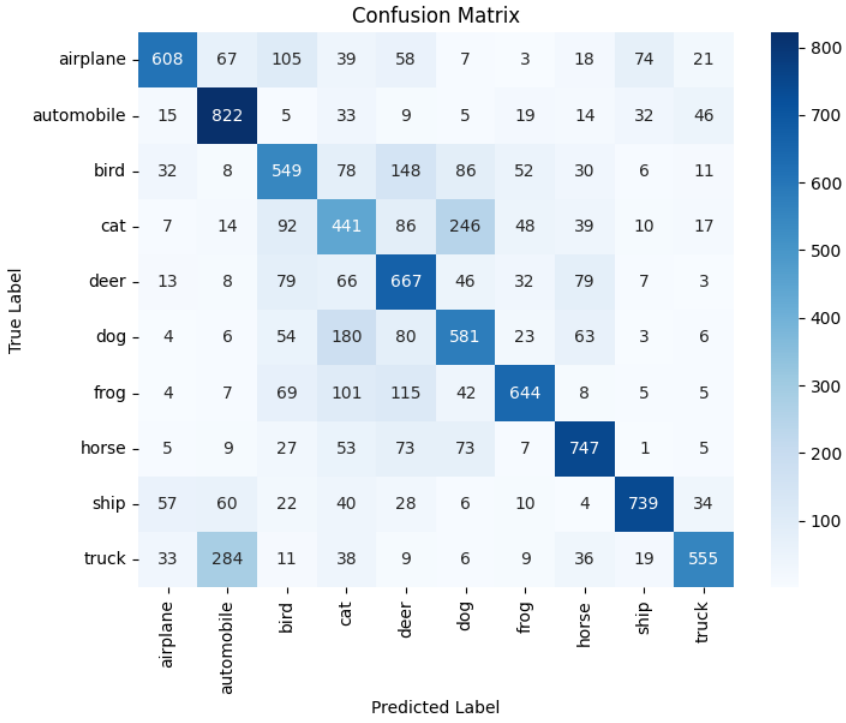
Figure 4: Training Loss + Accuracy and Validation Accuracy

The precision, recall, F1 score, and confusion matrix can be seen in Figures 5 and 6 below:

Figure 5: AlexNet With Dropout Precision, Recall, and F1 Scores

	precision	recall	f1-score	support
0	0.78	0.61	0.68	1000
1	0.64	0.82	0.72	1000
2	0.54	0.55	0.55	1000
3	0.41	0.44	0.43	1000
4	0.52	0.67	0.59	1000
5	0.53	0.58	0.55	1000
6	0.76	0.64	0.70	1000
7	0.72	0.75	0.73	1000
8	0.82	0.74	0.78	1000
9	0.79	0.56	0.65	1000
accuracy			0.64	10000
macro avg	0.65	0.64	0.64	10000
weighted avg	0.65	0.64	0.64	10000

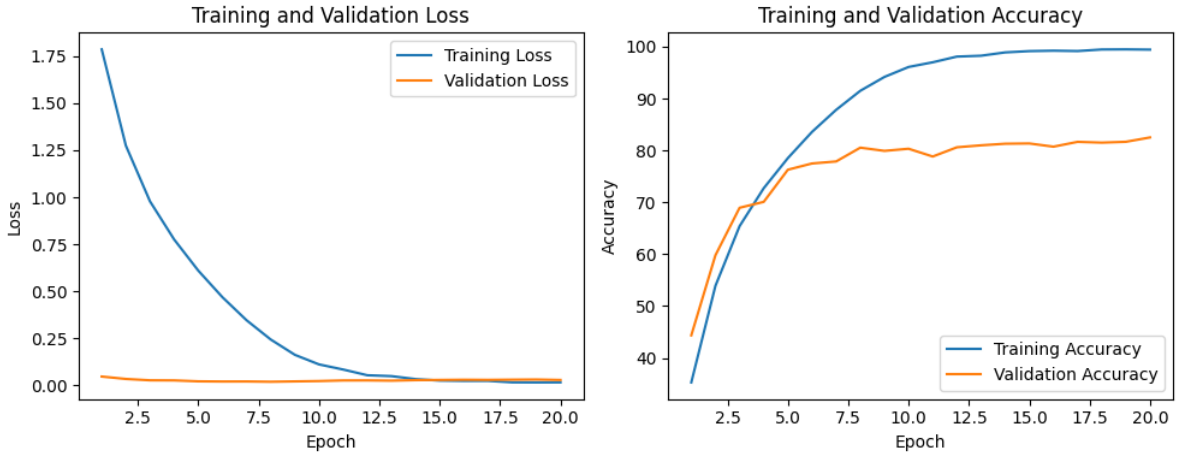
Figure 6: AlexNet With Dropout Confusion Matrix



Problem 2.

ResNet-18 Classification Training Results:
The ResNet-11 model had around 4.8 million parameters while my ResNet-18 model had 11,173,962. In ResNet-18, the final training loss was found to be 0.016840615729136307. The final validation loss was found to be 0.029564213938452304. The final validation accuracy was found to be 82.5%. The training loss, validation loss, training accuracy, and validation accuracy plots can be seen below in Figure 1.

Figure 7: Training Loss + Accuracy and Validation Accuracy



The precision, recall, F1 score, and confusion matrix can be seen in Figures 8 and 9 below:

Figure 8: ResNet-18 With Dropout Precision, Recall, and F1 Scores

	precision	recall	f1-score	support
0	0.83	0.86	0.85	1000
1	0.92	0.92	0.92	1000
2	0.81	0.68	0.74	1000
3	0.63	0.74	0.68	1000
4	0.80	0.80	0.80	1000
5	0.80	0.71	0.75	1000
6	0.86	0.85	0.86	1000
7	0.87	0.86	0.86	1000
8	0.90	0.91	0.90	1000
9	0.87	0.91	0.89	1000
accuracy			0.82	10000
macro avg	0.83	0.82	0.82	10000
weighted avg	0.83	0.82	0.82	10000

Figure 9: ResNet-18 With Dropout Confusion Matrix