HW6 – Write Up

Initial Accuracies:

Text

Description automatically generated

Change 1: Increasing the number of loops from 2 to 8. It should increase the accuracy of the test sets.

Observations: The accuracies of the class improved after increasing the number of epochs. Increasing the number of epochs can improve the accuracy of the CNN by allowing the network to see more examples of the training data during the training process. During each epoch, the network updates its parameters based on the loss between its predicted outputs and the ground truth labels of the training examples. By running the training process for more epochs, the network has the opportunity to fine-tune its parameters to better capture the patterns in the data and improve its ability to generalize to new, unseen examples.

Text

Description automatically generated

Change 2: Increase the learning rate from .001 to .01. I think increasing the rate of learning will improve the accuracy of the data. With a higher learning rate we can converge quicker on to a good set of parameters by taking larger steps in the direction of the steepest descent of the loss function.

Observations: The accuracies significantly went down. They are way worse than before. I believe I set it way too high. If the learning rate is set too high, the network may overshoot the optimal set of parameters and become unstable, resulting in poor performance. This is because a high learning rate can cause the network to "bounce" around the optimal solution and fail to converge to a good set of parameters.

Text

Description automatically generated with medium confidence

Change 3: Adding a linear layer by changing up the Net class. It might make the accuracy go down because it might cause instability which leads to poor performance because the values are too small or too large.

Observations: Some accuracies went up and some went down. The addition of a linear layer can provide an additional level of abstraction and enable the network to capture higher-level representations of the input data. This could improve the network's ability to generalize unseen examples and improve the accuracy. However, the addition of a linear layer can also introduce new sources of error and potentially decrease the accuracy of the network.

Text

Description automatically generated

Accuracies

Text

Description automatically generated

Change 4 : Changing up the sizes of the fully connected layers. I think increasing the size of the output of a linear layer can increase the capacity of the model to learn complex features and potentially improve the accuracy. This is because the increased output size allows for a higher-dimensional feature space in which to learn representations of the input data.

Observations:

Some accuracies decreased while some increased. Based off the output of the accuracies, the increased capacity can also heighten the risk of overfitting the training data. This can cause the accuracies to go down, particularly if the model is not able to generalize well to new, unseen examples.

Text, letter

Description automatically generated

Accuracies:

Table

Description automatically generated

Final Network:

Modified CNN

Graphical user interface, text

Description automatically generated

Set the learning rate to .0009

Set number of epochs to 12



I think this will increase the accuracies because the slower learning rate will allow all the data to be more accurate, because it is taking smaller steps towards the most optimal solution.

Observations: The accuracies significantly improved from the previous run. By decreasing the learning rate, the model is less likely to overfit and more likely to learn generalizable features that lead to better performance on the test data.

Accuracies:

Text, table

Description automatically generated with medium confidence