

Artificial Intelligence and Machine Learning Fundamentals

Activity 15: Written Digit Detection with Deep Learning

In this section, we will discuss how deep learning improves the performance of your model. We will be assuming that your boss is not satisfied with the results you presented in Activity 14 and has asked you to consider adding two hidden layers to your original model to determine whether new layers improve the accuracy of the model. To ensure that you are able to complete this activity correctly, you will need to be knowledgeable of deep learning:

1. Execute the steps from the previous activity and measure the accuracy of the model.
2. Change the neural network by adding new layers. We will combine the **ReLU** and **softmax** activator functions.
3. Retrain the model.
4. Evaluate the model. Find the accuracy score.
5. Run the code 50 times.
6. Print the confusion matrix.

This deep neural network behaves even more chaotically than the single layer one. It took 600 iterations of 200 samples to get from an accuracy of 0.572 to 0.5723. Not long after this iteration, we jumped from 0.6076 to 0.6834 in the same number of iterations. Due to the flexibility of the deep neural network, we expect to reach an accuracy ceiling later than in the case of the simple model. Due to the complexity of a deep neural network, it is also more likely that it gets stuck at a local maximum for a long time.