

1 CNN Architecture (PyTorch):

The model takes input of images with 28×28 dimensions. The first layer is consist of 32 channels of 5×5 convolutional filters, a ReLU activation, and 2×2 max-pooling downsampling with a stride of 2. This gives an output of 14×14 dimension. The next layer takes 14×14 output of layer 1. This layer is consist of 16 channels of 5×5 convolutional filters, a ReLU activation, and a final 2×2 max-pooling downsampling with a stride of 2. This produces an output of 7×7 dimension. The aiagram is shown in figure 1.

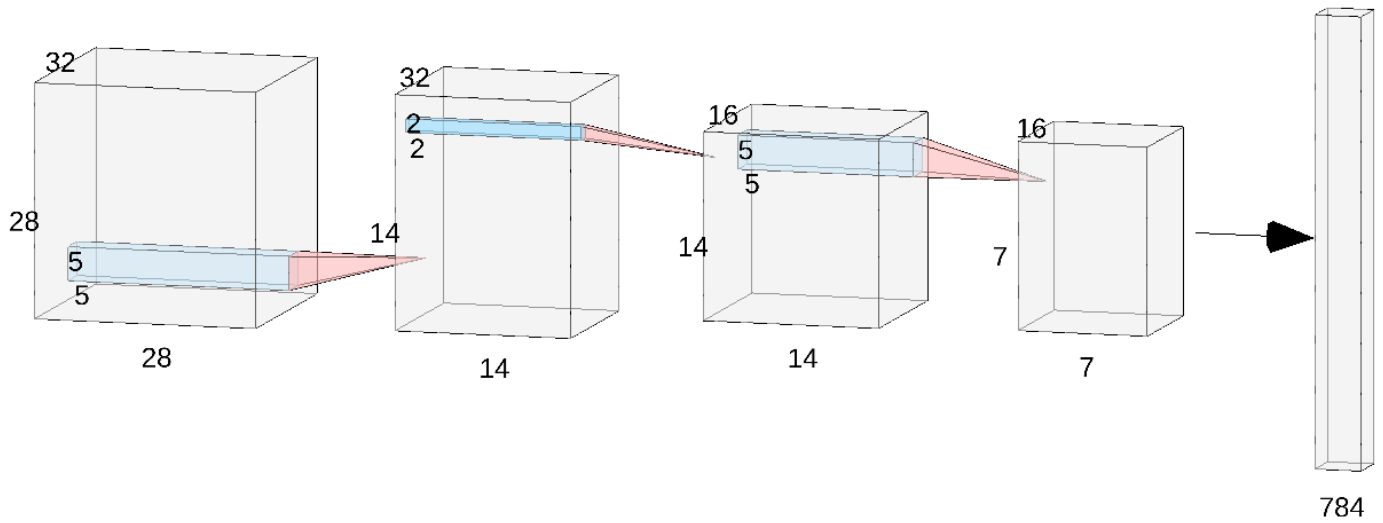


Figure 1: CNN Architecture Diagram

After the convolutional part, there's a flatten operation which creates a fully connected layer of $7 \times 7 \times 16 = 784$ nodes, an intermediate layer of 1024 fully connected nodes, and a softmax operation to produce output of 10 class nodes probabilities. This architecture is shown in figure 2.

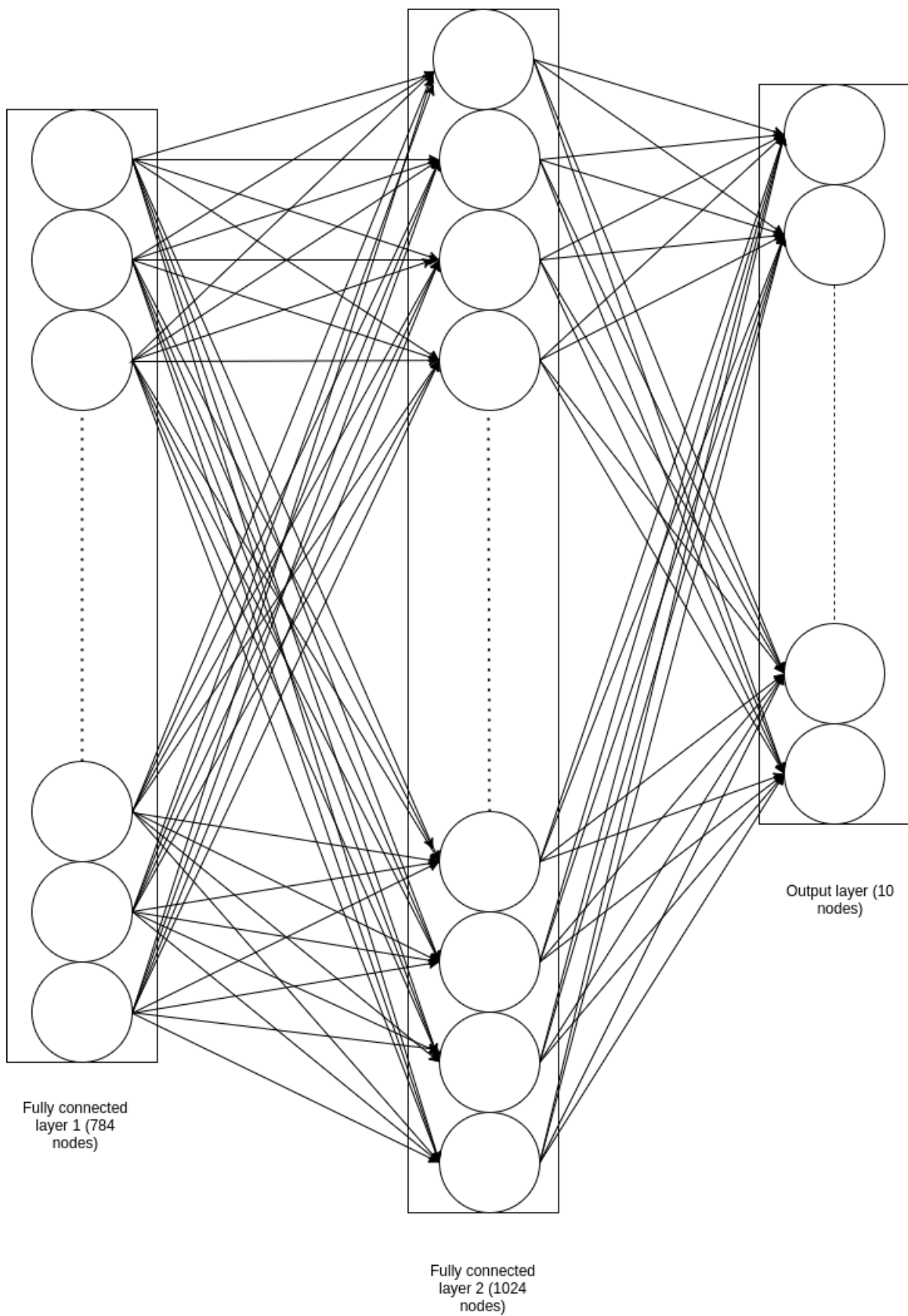


Figure 2: CNN Connected Layer Architecture

2 Accuracy:

2.1 PyTorch:

The accuracy of the model built using PyTorch is 98.5%. The plot of loss vs epoch is shown in figure 3.

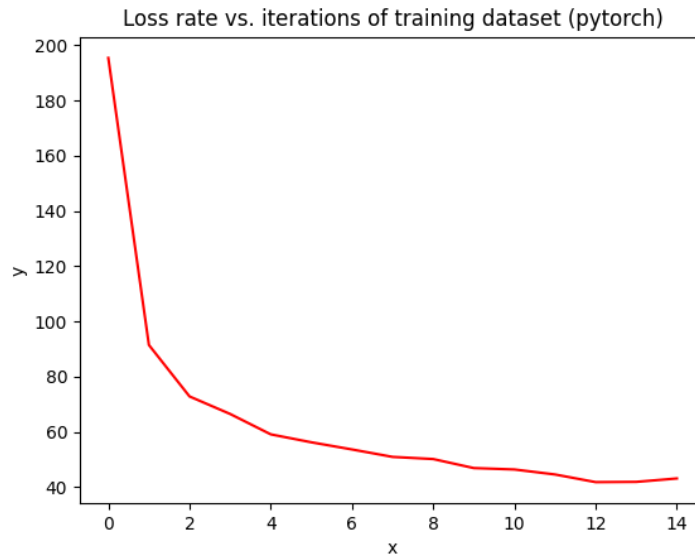


Figure 3: Loss plot of PyTorch

2.2 Tensorflow:

The accuracy of the model built using Tensorflow is 98.9%. The plot of loss vs epoch is shown in figure 4.



Figure 4: Loss plot of Tensorflow

3 Used technologies:

- Keras==2.4.3
- Keras-Preprocessing==1.1.2
- matplotlib==3.3.2
- numpy==1.18.5
- scipy==1.5.3
- tensorboard==2.3.0
- tensorboard-plugin-wit==1.7.0
- tensorflow==2.3.1
- tensorflow-estimator==2.3.0
- torch==1.7.0
- torchvision==0.8.1