



NORTHEASTERN UNIVERSITY

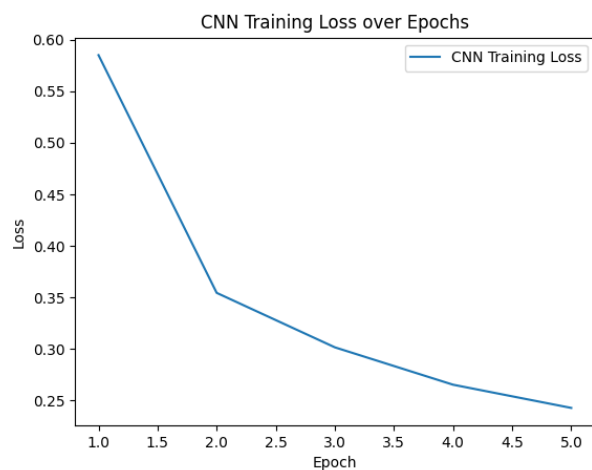
CS 5100: Programming Assignment 3

Foundation of AI

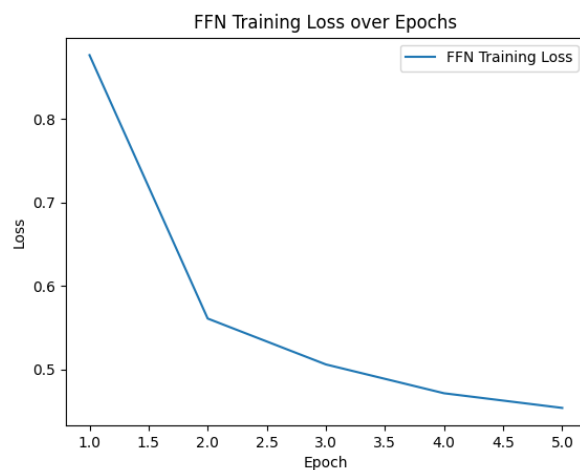
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Training Loss Plots



(a) CNN Training Loss



(b) FFN Training Loss

Figure 1: Comparison of training loss over epochs for CNN and FFN models. CNN shows faster and more effective learning due to its ability to capture spatial features in the data.

Classification Examples

Feedforward Neural Network (FFN)



(a) Correctly Classified by FFN.
True: T-shirt/top, Predicted: T-shirt/top.

(b) Incorrectly Classified by FFN.
True: Pullover, Predicted: Shirt.

Figure 2: Examples of correct and incorrect classifications by the Feedforward Neural Network (FFN).

Convolutional Neural Network (CNN)



(a) Correctly Classified by CNN.
True: Bag, Predicted: Bag.

(b) Incorrectly Classified by CNN.
True: Coat, Predicted: Pullover.

Figure 3: Examples of correct and incorrect classifications by the Convolutional Neural Network (CNN).

Kernel and Feature Visualization

Kernels Learned at the First Convolutional Layer

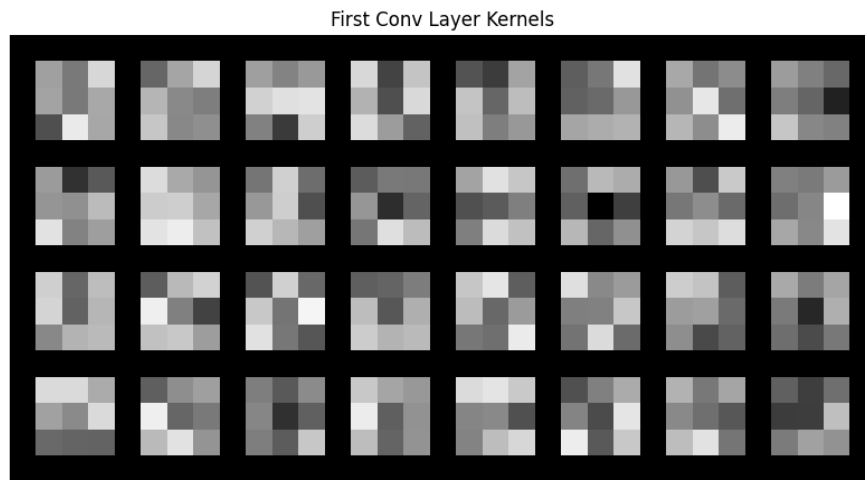


Figure 4: Visualization of the kernels learned at the first convolutional layer of the CNN model. Each image in the grid represents a single kernel normalized to the range $[0, 1]$. These kernels act as feature extractors, detecting patterns like edges or textures.

Features Extracted by the First Convolutional Layer

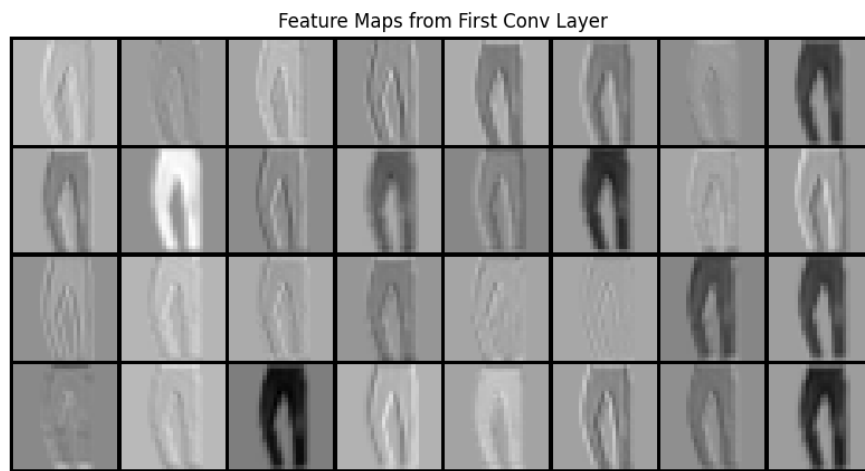


Figure 5: Feature maps extracted from a sample image by applying the kernels of the first convolutional layer. Each image in the grid shows the response of a specific kernel, highlighting the patterns detected by that kernel.