Assignment – 3

Title - MNIST Fashion Dataset using CNN.

Problem Statement - Use MNIST Fashion Dataset and create a classifier to classify fashion clothing into categories using CNN.

Objectives -

- To build a CNN model to classify fashion clothing into categories.

Outcomes -

- To understand the exploratory data analysis, split the training and testing data, Model Evaluation and Prediction by the CNN on the MNIST Fashion dataset.

Theory -

CNN:
A CNN is a kind of network architecture for deep learning algorithms and is specifically used for image recognition and tasks that involve the processing of pixel data. There are other types of neural networks in deep learning, but for identifying and recognizing objects, CNNs are the network architecture of choice.

The Fashion-MNIST clothing dataset is a new standard one used in computer vision (CV) and deep learning (DL). Although the dataset is relatively simple, it can be used as the basis for learning and practicing how to develop, evaluate, and use deep convolutional neural networks for image classification from scratch. This includes how to develop a robust test harness for estimating the performance of the model, how to explore improvements to the model, and how to save the model and later load it to make predictions on new data.

Fashion MNIST Clothing Classification:

The Fashion-MNIST dataset is proposed as a more challenging replacement dataset for the MNIST dataset.
It is a dataset comprised of 60,000 small square 28×28 pixel grayscale images of items of 10 types of clothing, such as shoes, t-shirts, dresses, and more. The mapping of all 0-9 integers to class labels is listed below.
0: T-shirt/top
1: Trouser
2: Pullover
3: Dress
4: Coat
5: Sandal
6: Shirt
7: Sneaker
8: Bag

9: Ankle boot
It is a more challenging classification problem than MNIST and top results are achieved by deep learning convolutional neural networks with a classification accuracy of about 90% to 95% on the hold out test dataset.

Model Evaluation Methodology:

The Fashion-MNIST dataset was developed as a response to the wide use of the MNIST dataset, that has been effectively "solved" given the use of modern convolutional neural networks.
Fashion-MNIST was proposed to be a replacement for MNIST, and although it has not been solved, it is possible to routinely achieve error rates of 10% or less. Like MNIST, it can be a useful starting point for developing and practicing a methodology for solving image classification using convolutional neural networks.
Instead of reviewing the literature on well-performing models on the dataset, we can develop a new model from scratch. The dataset already has a well-defined train and test dataset that we can use.
In order to estimate the performance of a model for a given training run, we can further split the training set into a train and validation dataset. Performance on the train and validation dataset over each run can then be plotted to provide learning curves and insight into how well a model is learning the problem.

Algorithm:

Conclusion -

We have analyzed a CNN Model which will help to classify fashion clothing into categories.