Neural Networks and Deep Learning with Business Applications

SP Jain School of Global Management

Assignment L4

Background

In this assignment, you are required to work with the Fashion-MNIST dataset, a dataset comprising of 28x28 grayscale images of 70,000 fashion products from 10 categories, with 7,000 images per category. The training set has 60,000 images, and the test set has 10,000 images. Your task is to build and train a neural network to classify these images into their respective categories accurately.

Dataset Features

The dataset consists of 28x28 pixel grayscale images of fashion items classified into 10 categories:

- T-shirt/top
- Trouser
- Pullover
- Dress
- Coat
- Sandal
- Shirt
- Sneaker
- Bag
- Ankle boot

Task

Data Preprocessing

- Load and explore the Fashion-MNIST dataset.
- Implement preprocessing steps such as normalization and data augmentation to improve model performance.

Model Implementation and Training

- Design and implement a convolutional neural network suitable for classifying the images in the dataset.
- Train the model on the training dataset and evaluate its performance on the test dataset.
- Experiment with different network architectures and hyperparameters to achieve the best possible accuracy.

Analysis and Reporting

- Analyze the performance of your model and provide insights on what factors contribute to successful image classification in this context.
- Discuss any challenges faced during the implementation and training process and how you addressed them.

Deliverables

- A Jupyter notebook containing your code, model architecture, training process, and performance evaluation.
- A report discussing your findings, model design decisions, and a critical analysis of the model's performance.