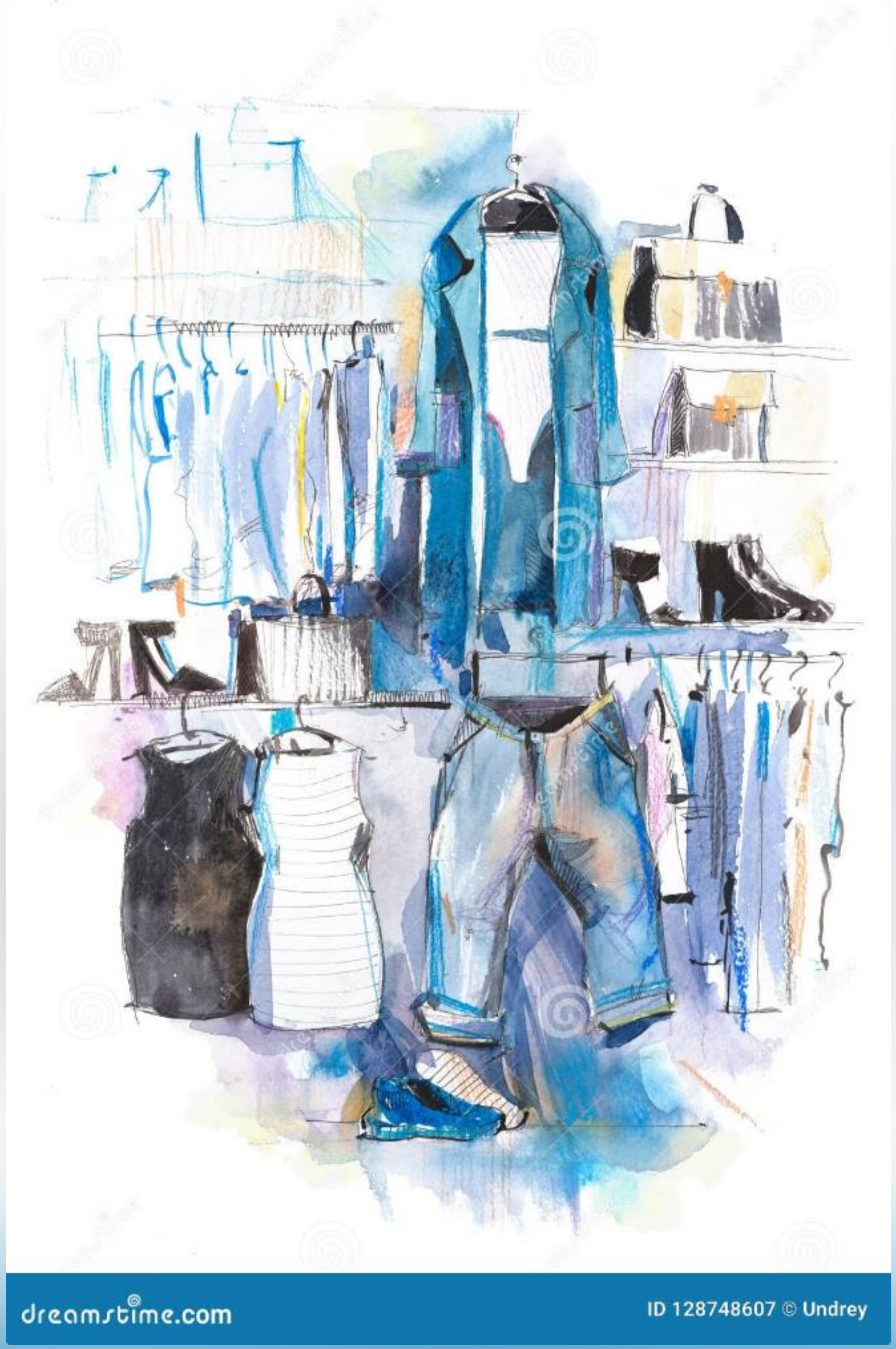


CNN Model for Fashion Image Classification

Team Members Name:-

1. Niraj Band - UGMR20230039
2. Swikruti Thantharate - UGMR20230005
3. Sakshi Kadu - UGMR20230029
4. Tejaswini Badpaiya - UGMR20230024
5. Sania Sheikh - UGMR20230031
6. Riya Darda - UGMR20230023

Guided by: Mr. Anirvinya Gururajan

Introduction

Fashion classification is a challenging task due to the wide variety of styles, patterns, and textures. This study proposes an enhanced CNN model that utilizes image augmentation and batch normalization to address these challenges.

1 Image Augmentation

Expands the dataset by applying transformations like rotations, shifts, zooms, and flips.

2 Batch Normalization

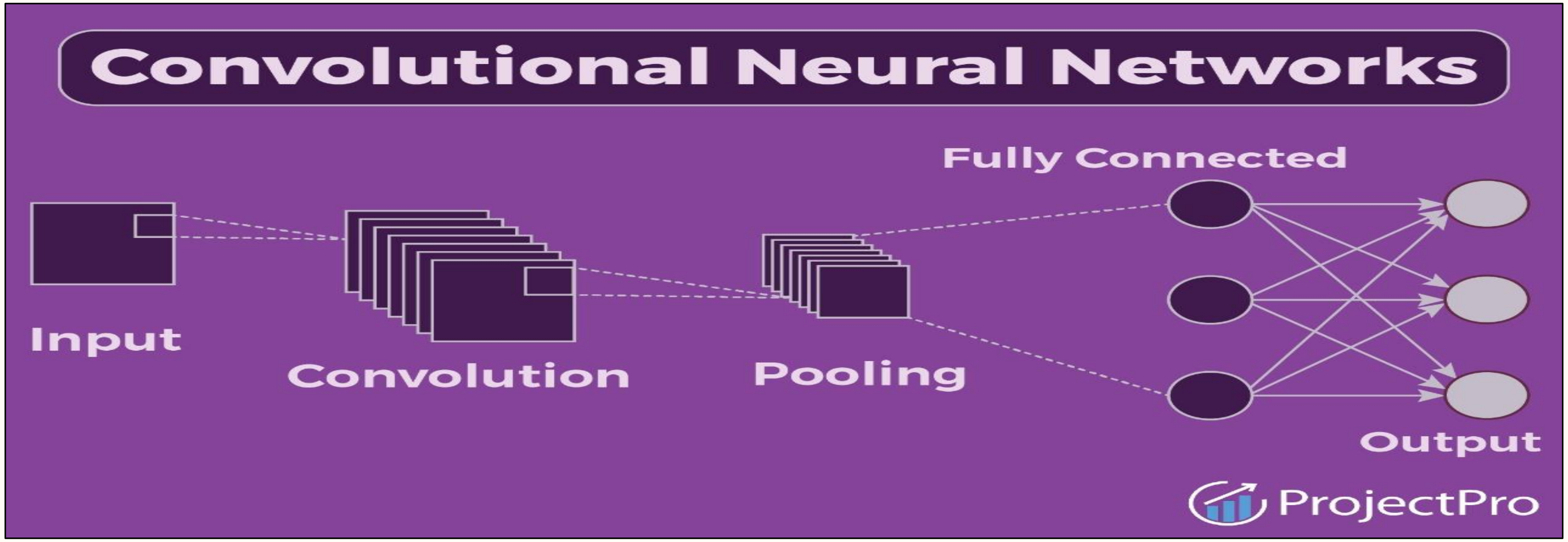
Stabilizes the learning process by normalizing layer inputs, speeding convergence.

3 Model Architecture

Combines convolutional layers, Batch Normalization, Max Pooling, and fully connected layers.

4 Performance

The model achieved a test accuracy of 92.74%, outperforming a standard CNN model.



Literature Review

This section reviews existing research on fashion classification using CNNs, highlighting key findings and approaches.

Paper Title	Key Findings
Dynamic CNN Models For Fashion Recommendation in Instagram	Dynamic CNN models improve fashion recommendations on Instagram.
Enhanced Convolutional Neural Network for Fashion Classification	Image augmentation and batch normalization enhance CNN performance for fashion classification.
Fashion - MNIST Classification using CNN	CNNs are effective for classifying fashion images using the Fashion-MNIST dataset.
Classification of Garments from Fashion MNIST Dataset Using CNN LeNet-5 Architecture	LeNet-5 architecture achieves high accuracy for classifying fashion items in the Fashion-MNIST dataset.
Classification of Fashion Article Images using Convolutional Neural Networks	Residual skip connections and batch normalization improve CNN performance for fashion classification.
CNN Model for Images Classification on MNIST and Fashion-MNIST Dataset	CNN models perform well on MNIST and Fashion-MNIST datasets, with variations in performance based on model design and settings.

Methodology

This section describes the data collection, model architecture, preprocessing, training process, and evaluation metrics used in the study.

1

Data Collection

The Fashion-MNIST dataset from Zalando Research was used, containing 70,000 grayscale images of 10 fashion categories.

2

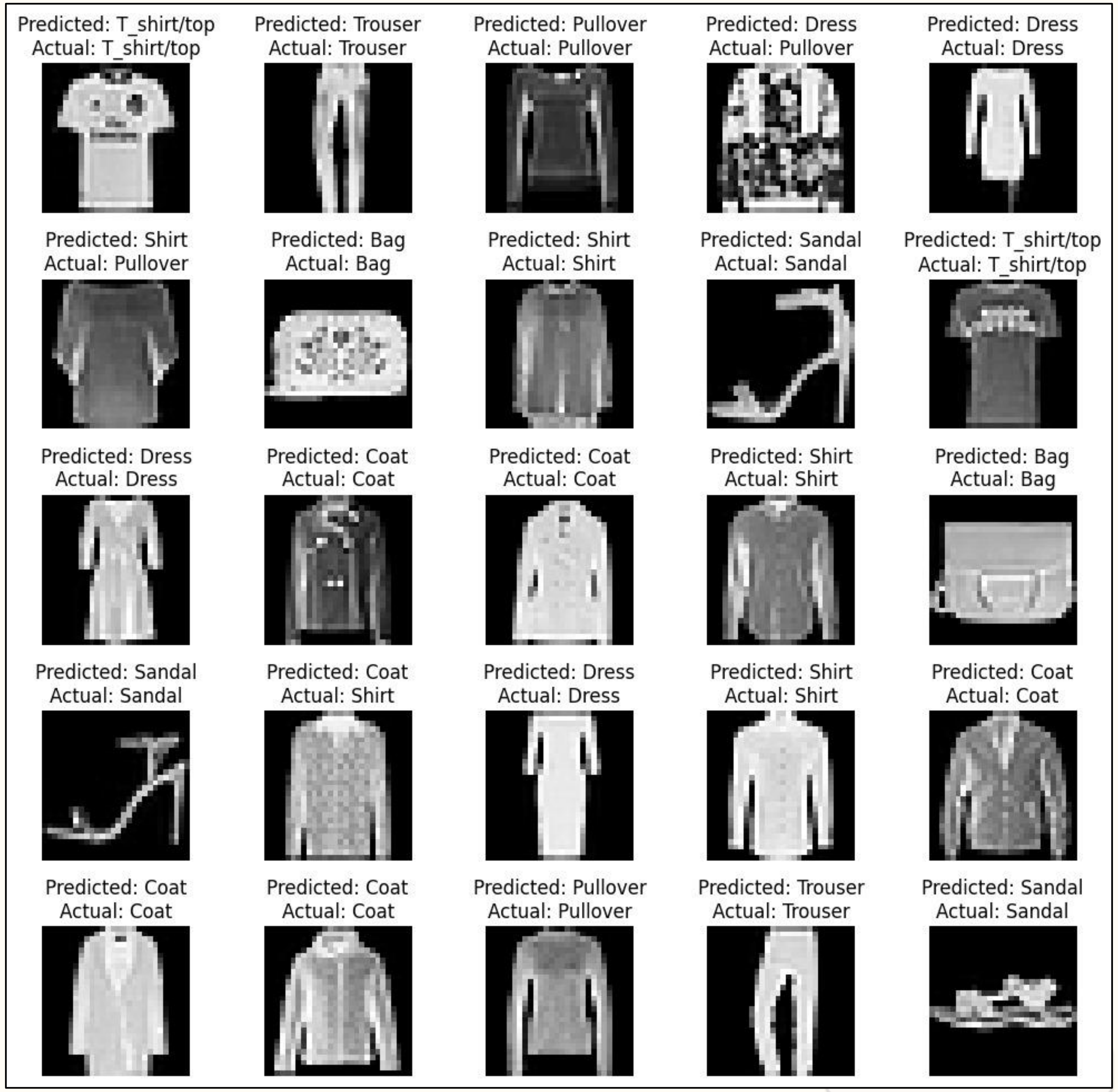
Model Architecture

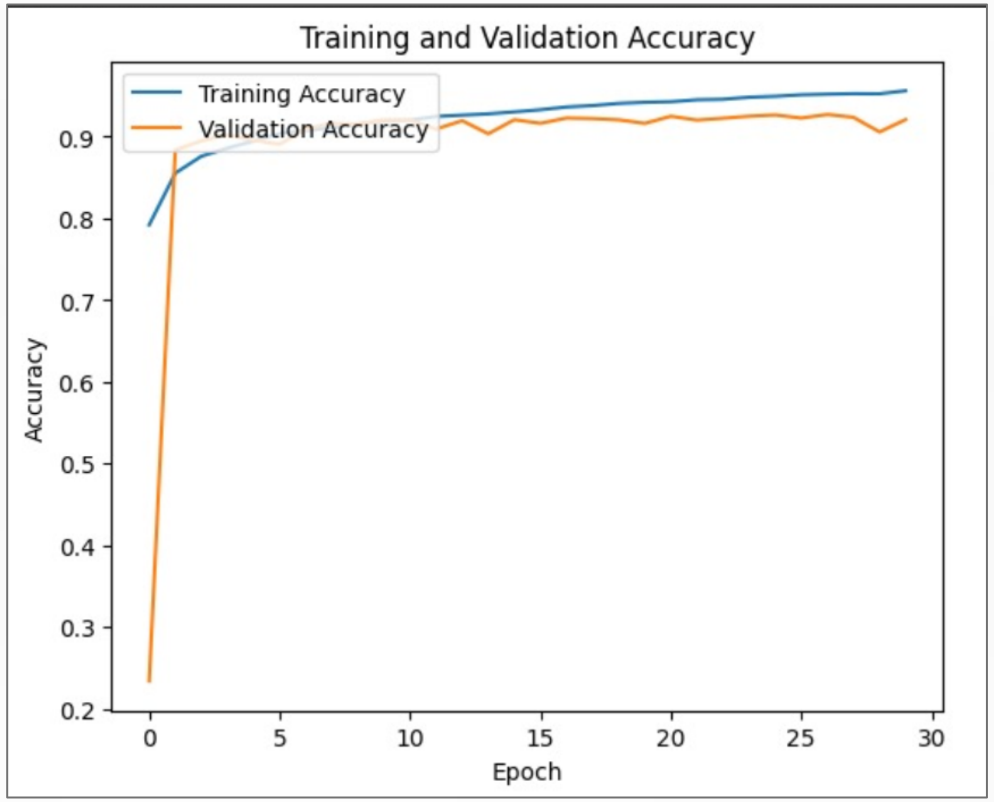
A CNN architecture was designed with convolutional layers, pooling layers, dropout layers, and dense layers.

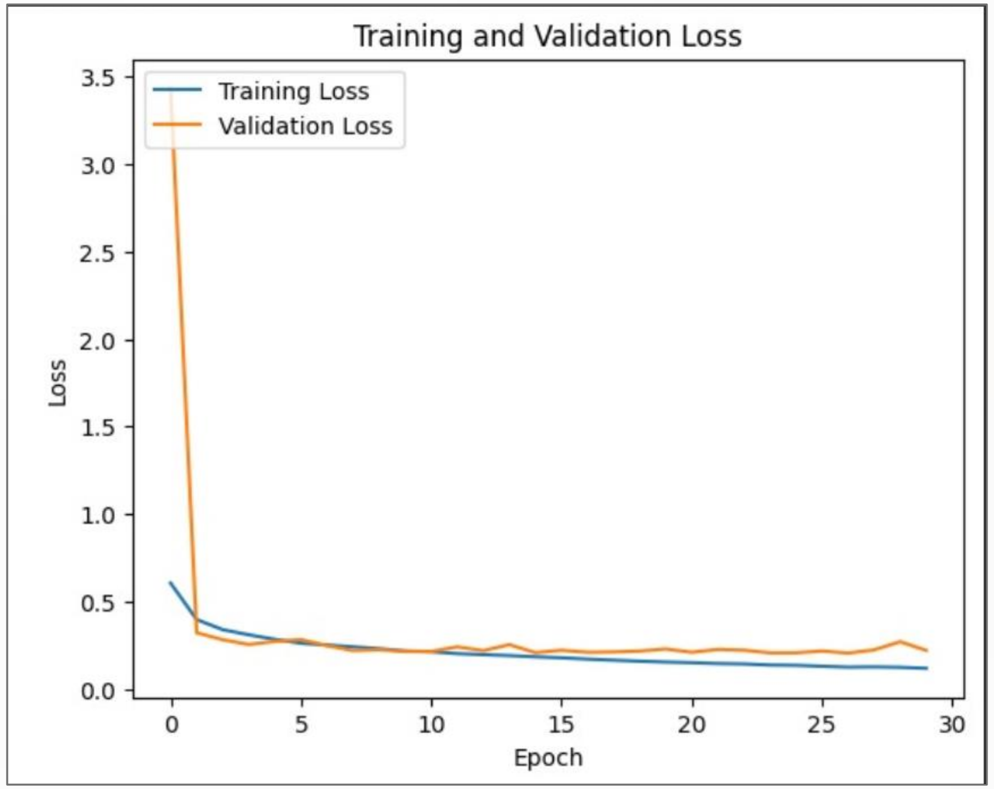
3

Training Process

The model was trained using the Adam optimizer with a learning rate of 0.001 and a batch size of 64 for 20 epochs.







Model Evaluation

The model's performance was evaluated using accuracy, precision, recall, F1-score, and loss curves.

1. **Accuracy**

   The primary metric for evaluating the model on both training and test sets.

2. **Classification Report**

   Provides precision, recall, and F1-score for each class, offering a deeper understanding of model performance.

3. **Loss Curves**

   Monitored training and validation losses to detect overfitting or underfitting.

4. **Visual Analysis**

   Misclassified images were reviewed to identify recurring patterns or difficult classes.

Conclusion and Future Scope

The study concludes that the enhanced CNN model, incorporating image augmentation and batchmnormalization, significantly improves classification performance on the Fashion-MNIST dataset.

Advanced Data Augmentation

Incorporating techniques like elastic distortions, cutout, and mixup could further enhance model robustness.

Transfer Learning

Using pretrained models can improve model generalization, especially on smaller datasets.

Regularization and Optimization

Testing different regularization methods and optimizing hyperparameters could further enhance performance.

Application to Complex Datasets

Extending these techniques to larger datasets like CIFAR-10 and ImageNet would demonstrate scalability.