

Fashion-MNIST Classification Project

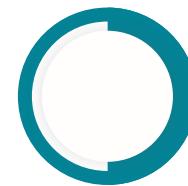
Building a Convolutional Neural Network
(CNN) for Image Classification

Mehrdad Naderi

University of Colorado Boulder

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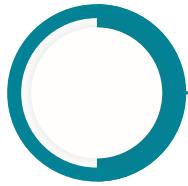




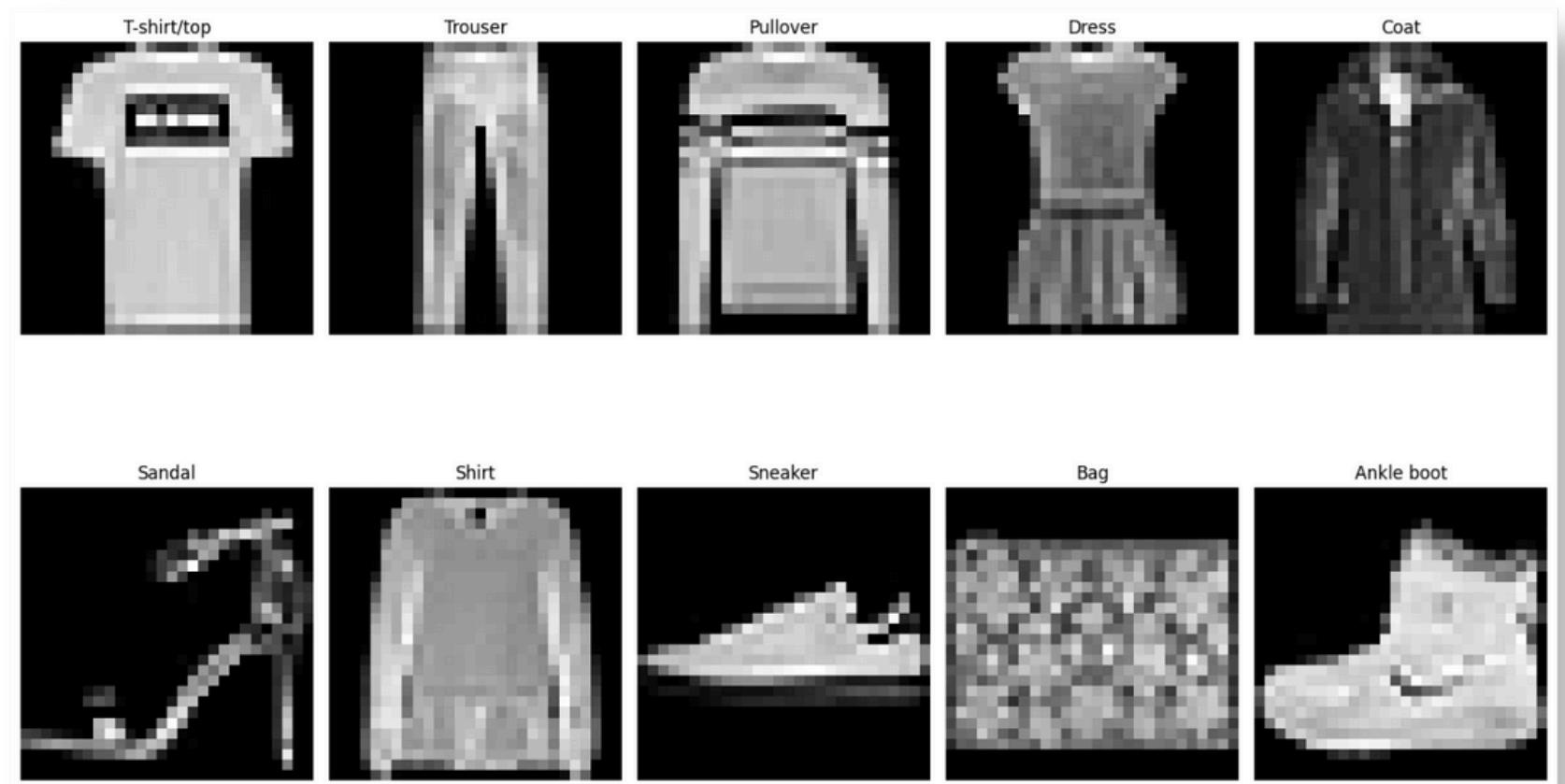
- **Problem:**
Classifying grayscale images of clothing
into 10 categories.



- **Objective:**
Build and evaluate a CNN to achieve high
classification accuracy.



- **Dataset Details:**
 - 60,000 training images and 10,000 test images.
 - Image size: 28x28 pixels, grayscale.
 - Categories: T-shirt/top, trouser, pullover, dress,
coat, sandal, shirt, sneaker, bag, ankle boot.

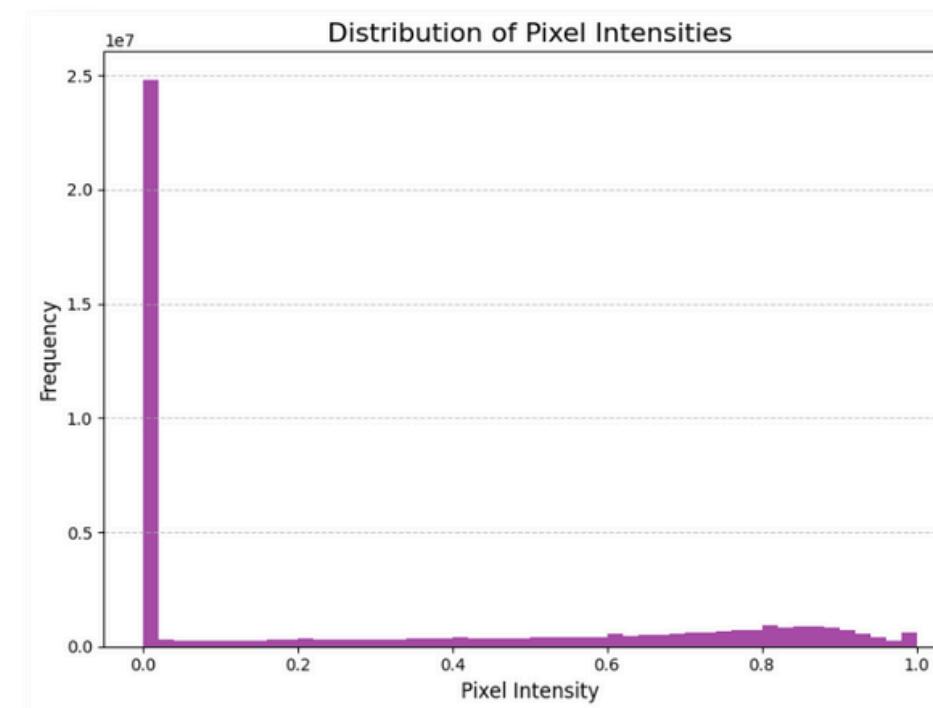
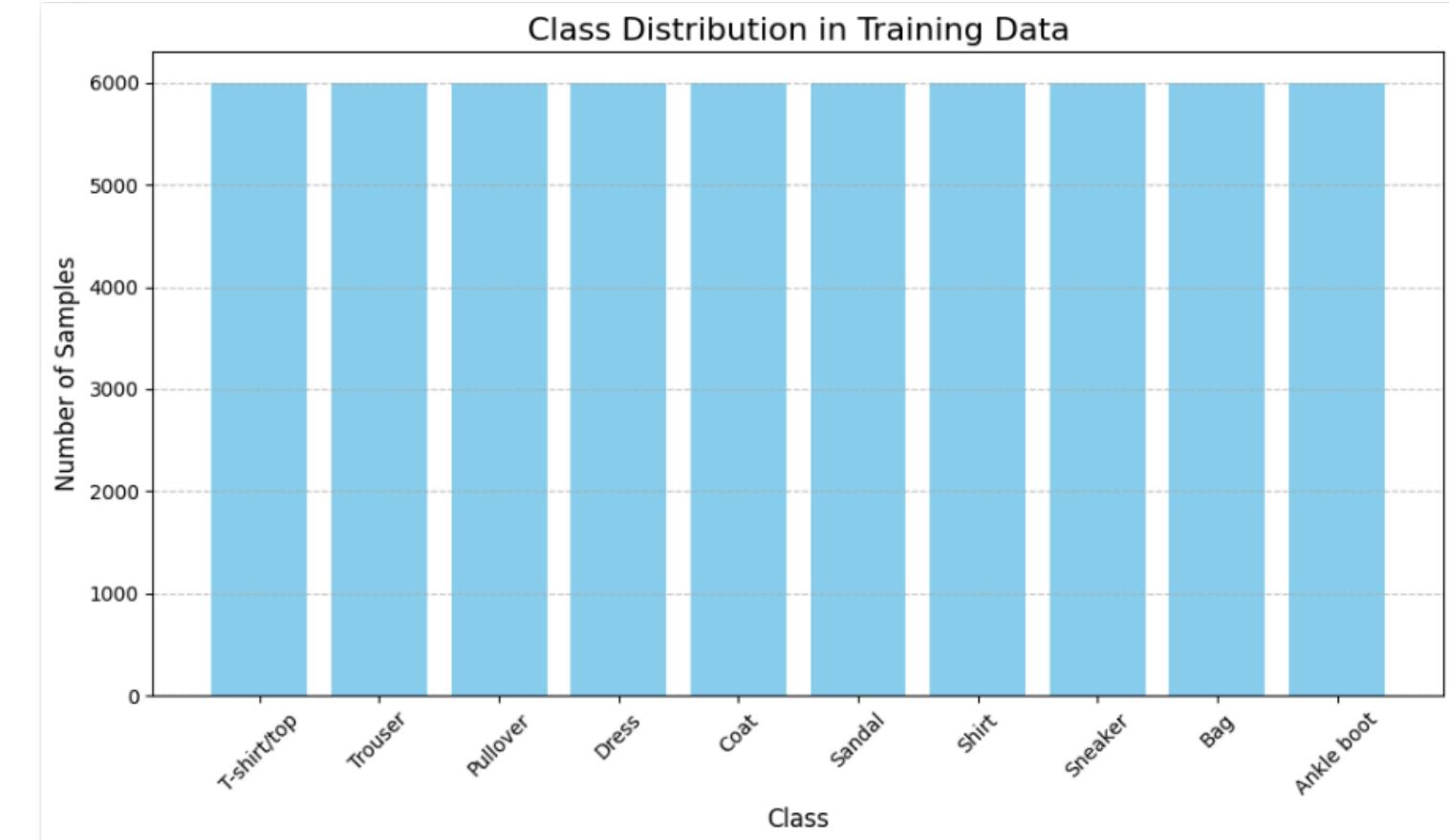


Insights from EDA:

- **Balanced class distribution.**
- **Pixel intensity range [0, 1], confirming consistency.**
- **No missing values or outliers.**

Visualizations:

- **Class distribution plot.**
- **Pixel intensity histogram.**

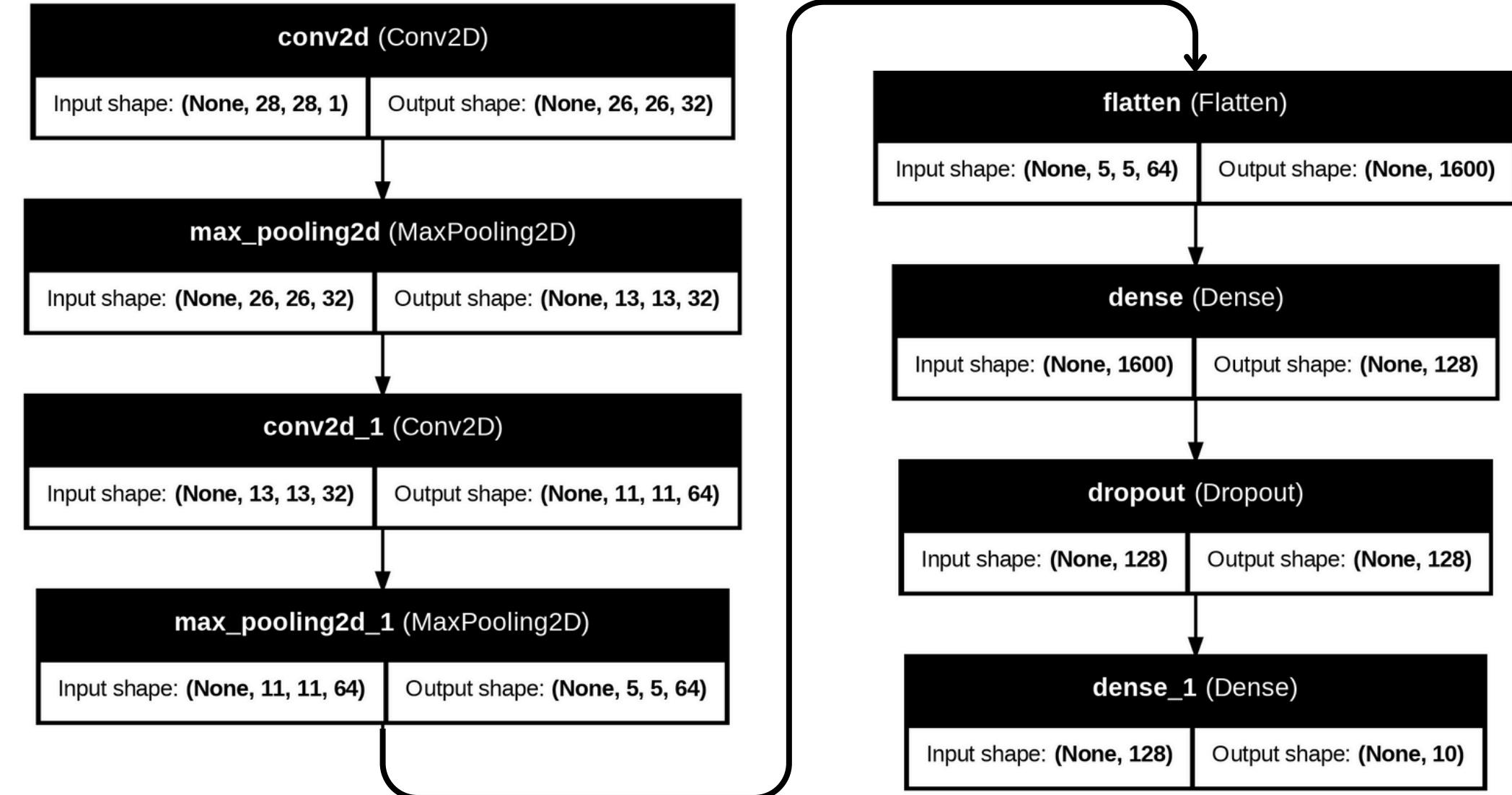


Model Overview:

- Two convolutional layers with max pooling.
- Flattening and dense layers with ReLU activation.
- Dropout for regularization.
- Output layer with softmax activation.

Compilation Details:

- Optimizer: Adam.
- Loss Function: Categorical Crossentropy.
- Metric: Accuracy.



Training Details:

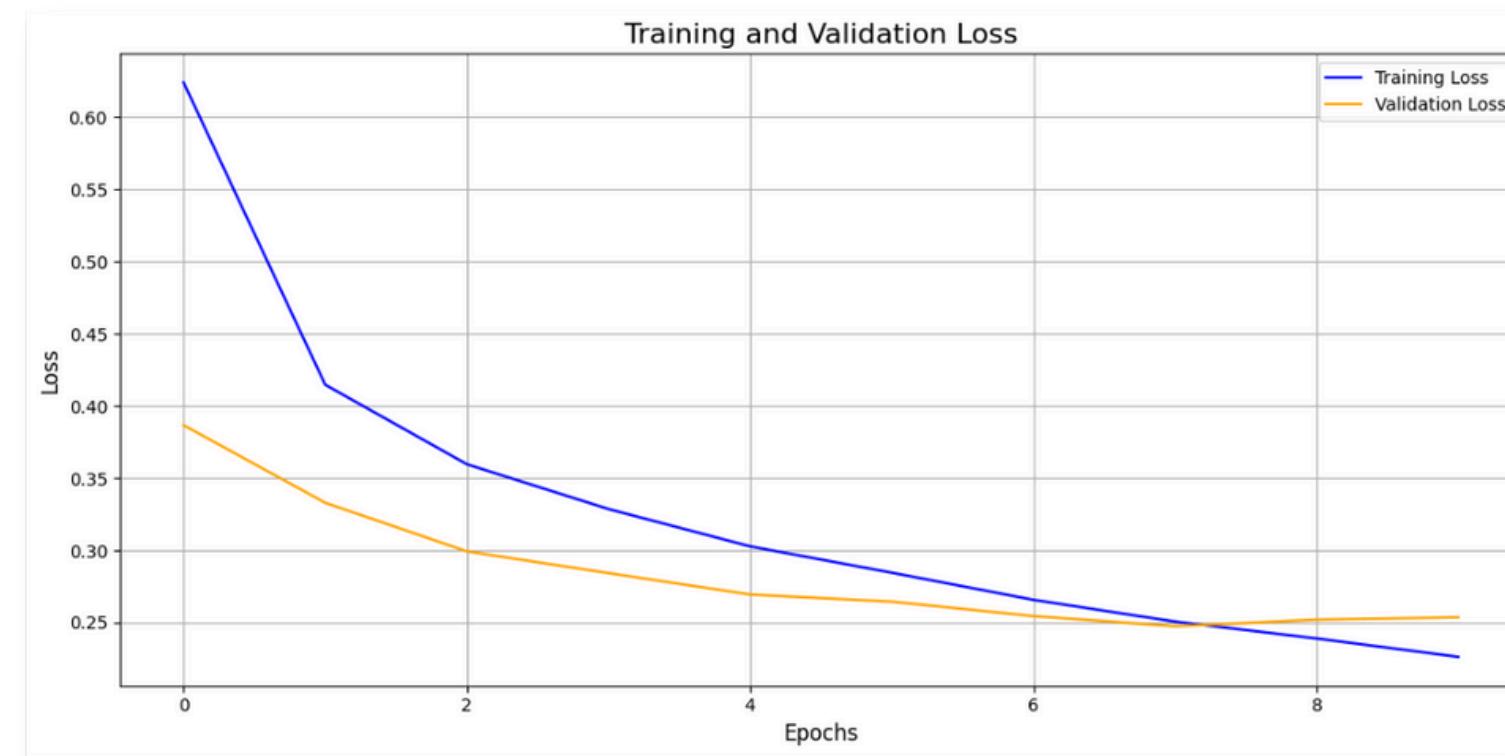
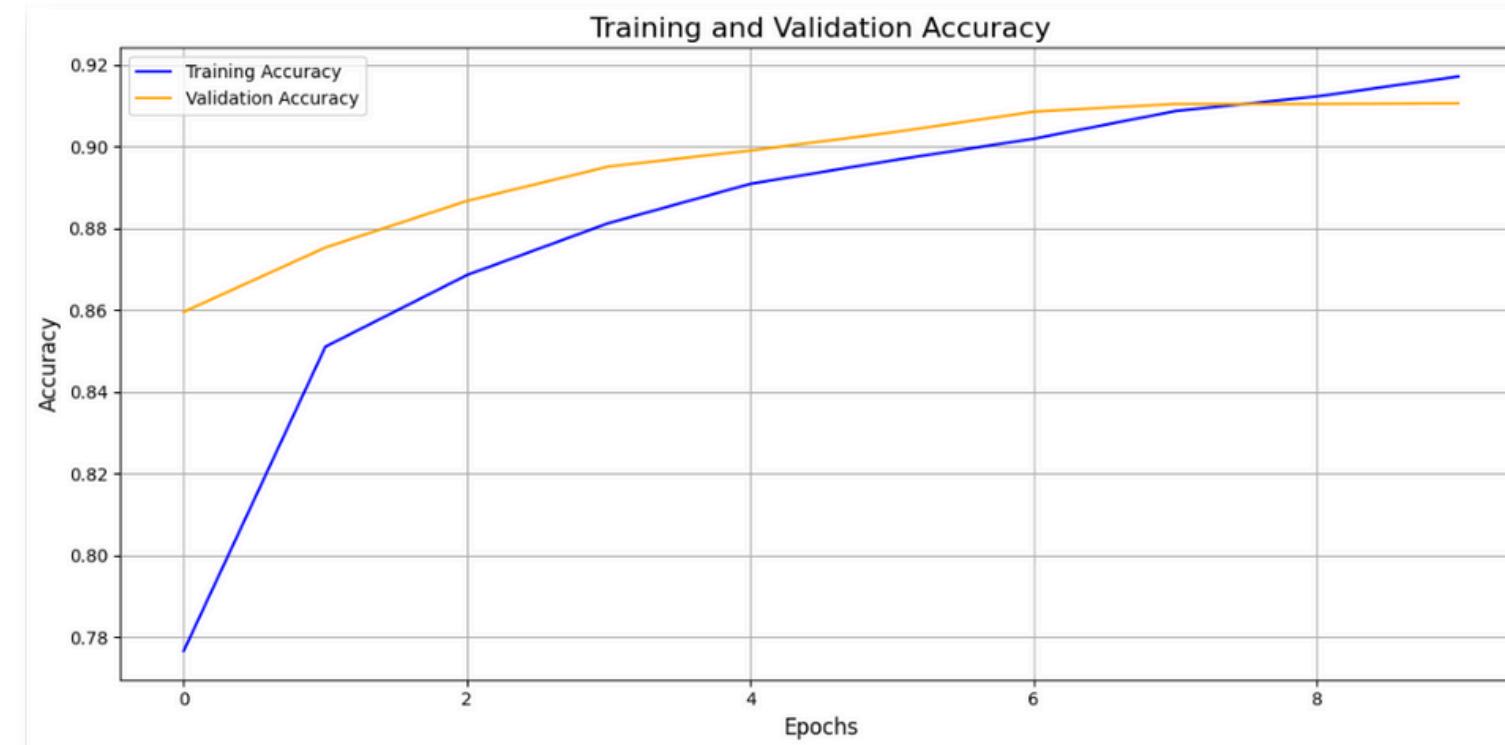
- Batch size: 64.
- Epochs: 10.

Results:

- Training Accuracy: ~92%.
- Validation Accuracy: ~90%.

Loss and Accuracy Trends:

Steady improvement without overfitting.



1

Test Set Performance:

- Test Accuracy: 90.42%.
- Test Loss: 0.2718.

2

Key Takeaways:

- High accuracy demonstrates generalization.
- Low loss reflects good predictions.

Metric	Value
Test Loss	0.2718
Test Accuracy	90.42%

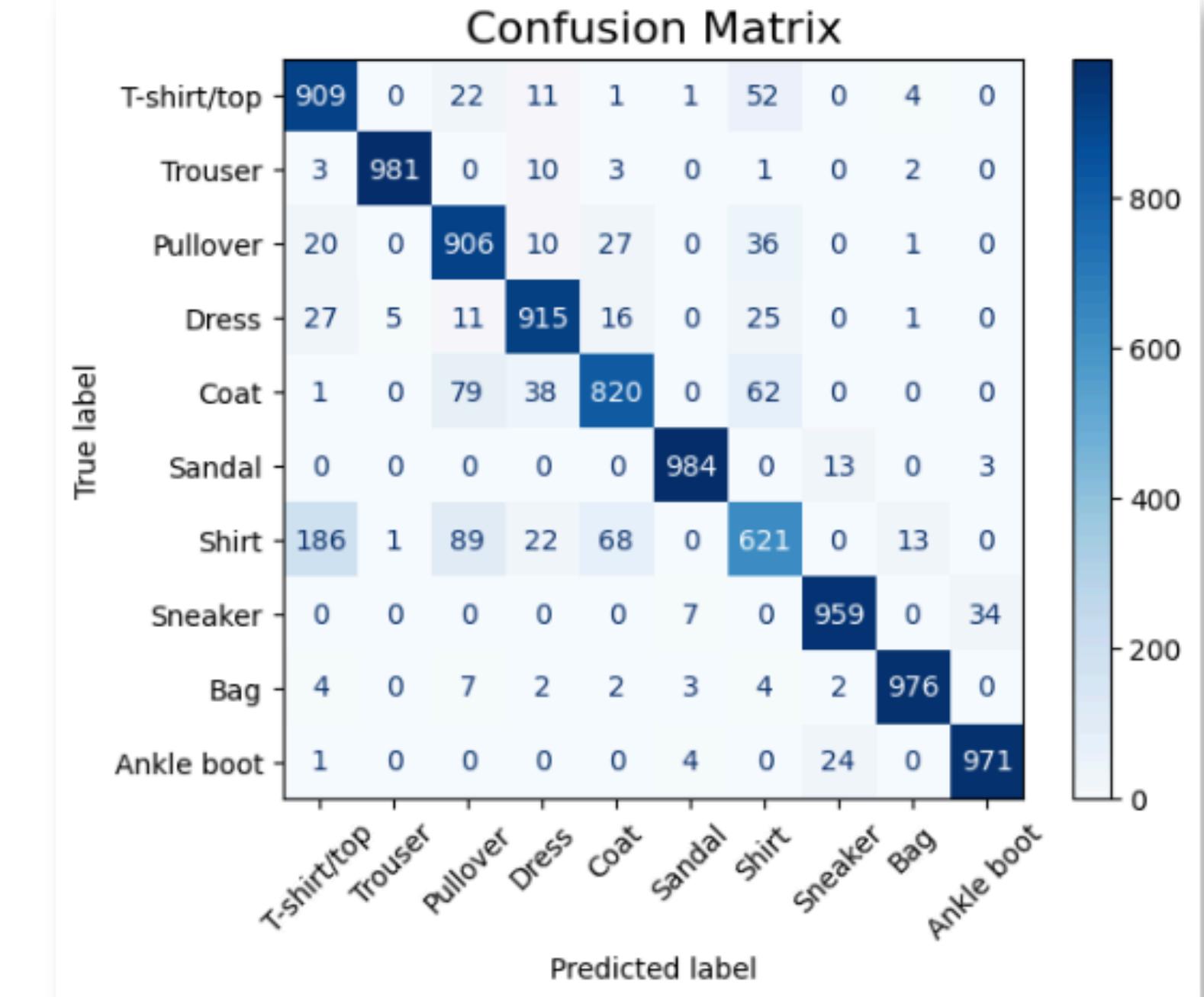
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Purpose:
Shows performance for each class.

2

Key Observations:

- High precision for most classes.
- Minimal misclassifications.

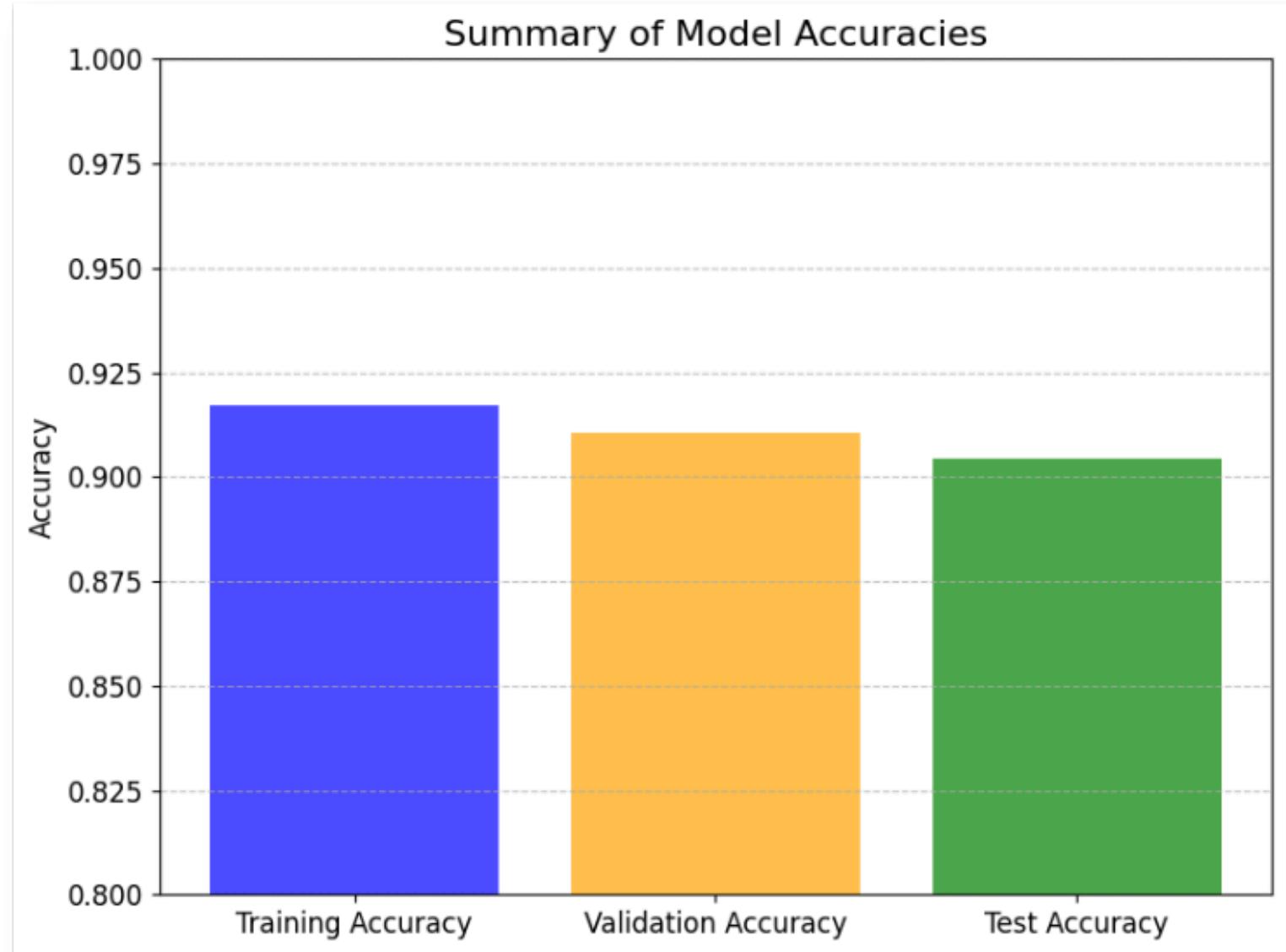


Successes:

- Achieved high accuracy and generalization.
- Balanced and clean dataset simplified the process.
- CNN architecture was effective for this task.

Future Improvements:

- Explore data augmentation.
- Experiment with advanced architectures like ResNet.
- Adapt the model for real-world applications like e-commerce.



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