Fashion Item Classification using Fashion MNIST

Image Classification with Machine Learning

Presented by: Group 12

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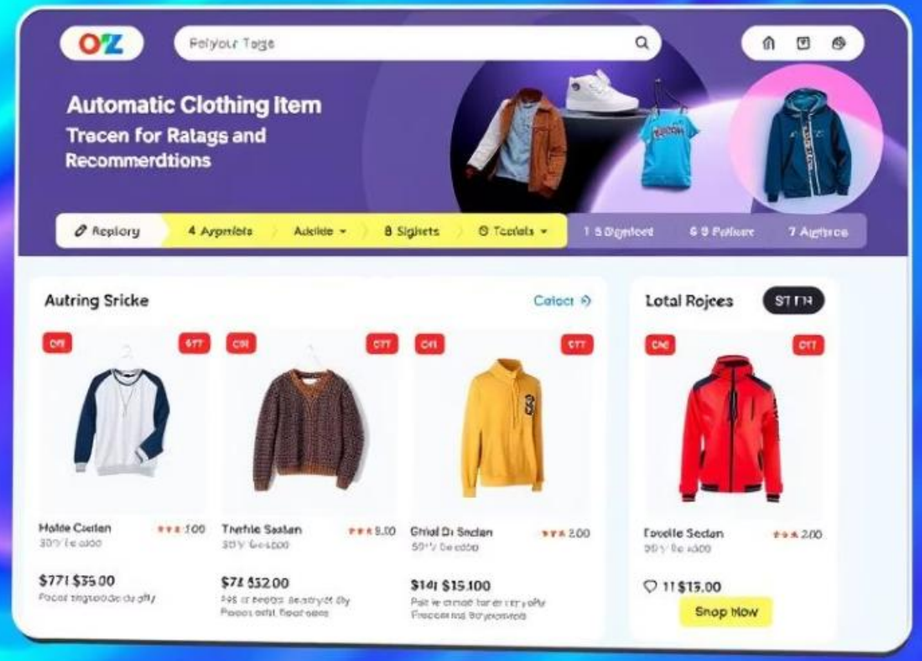
Problem Statement

Our goal is to Build a model to automatically recognize clothing items like shirts, shoes, and bags from images.

Helps in online retail (auto-tagging, recommendations)

Reduces manual labeling of fashion images.

Enhances visual search features in shopping apps



Introduction to Fashion MNIST

Fashion MNIST is a dataset provided by Zalando. It serves as an alternative to the original MNIST dataset. It contains 70,000 grayscale images.

70K

Images

Total grayscale images.

10

Categories

Different fashion items.

60K

Training Set

Images for model training.

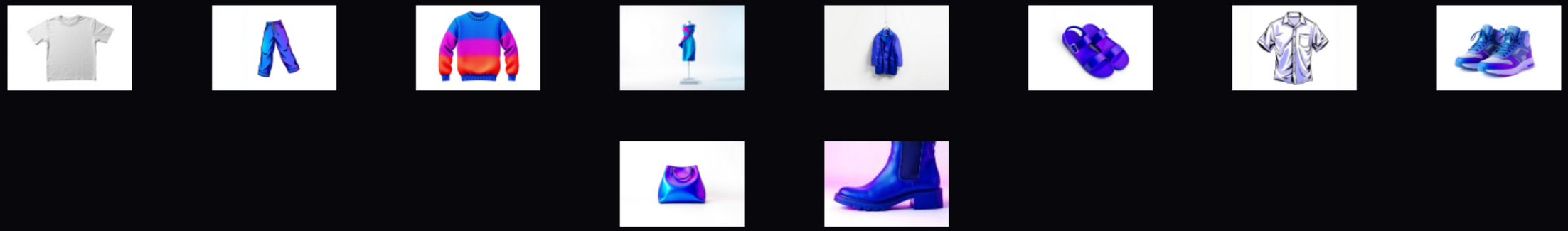
28x28

Pixel Size

Resolution of each image.

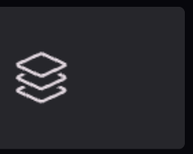
Sample Images from Dataset

Here are example images from each of the ten distinct classes. The dataset is balanced, ensuring fair representation for each category.



Methodology Overview

Our model utilizes a Convolutional Neural Network, or CNN, for image classification. It processes images efficiently.



Load and preprocess data

Build and train the model

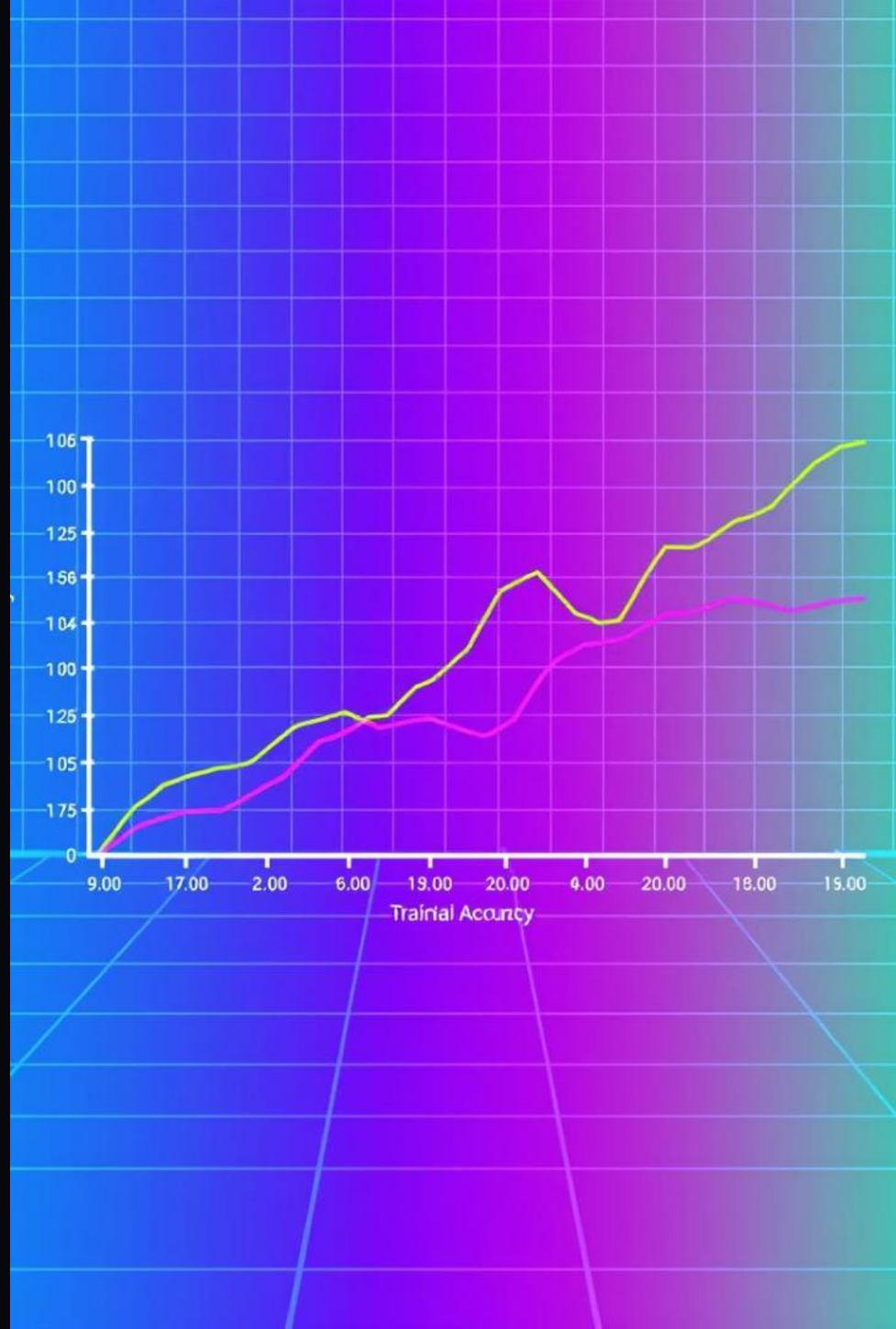
Evaluate model performance

Visualize results using confusion matrix

Training Details

The model was trained using 20 epochs with a batch size of 128. We achieved strong validation accuracy.

Data Split	80% Training, 20% Validation
Optimizer	Adam
Loss Function	Categorical Cross-Entropy
Epochs	20
Batch Size	128
Validation Accuracy	91%



Results

Our model achieved an impressive overall test accuracy of 91.5%. Ankle boots were the best-performing class.

Overall Accuracy

Achieved 91.5% on the test set.

Confusion Matrix

Visualizes classification performance per class.

Metrics Per Class

Precision, recall, and F1-score provided.

Top Performer

Ankle boot with 95% accuracy.

Lowest Performer

Shirt with 85% accuracy.

Error Analysis

We identified common misclassifications by visualizing problematic examples. Similar visual features often led to confusion.

Misclassified Examples

Visual review of incorrectly predicted images. Highlights where the model struggled.

- Shirt vs. T-shirt/Top confusion.
- Coat vs. Pullover confusion.

Future Work

We plan to enhance model performance and explore deployment options. Our focus is on continuous improvement.

Data Augmentation

Explore techniques to expand training data.

New Architectures

Experiment with advanced CNNs like ResNet.

Transfer Learning

Utilize larger fashion datasets for pre-training.

Model Deployment

Implement for real-time recognition.

Conclusion

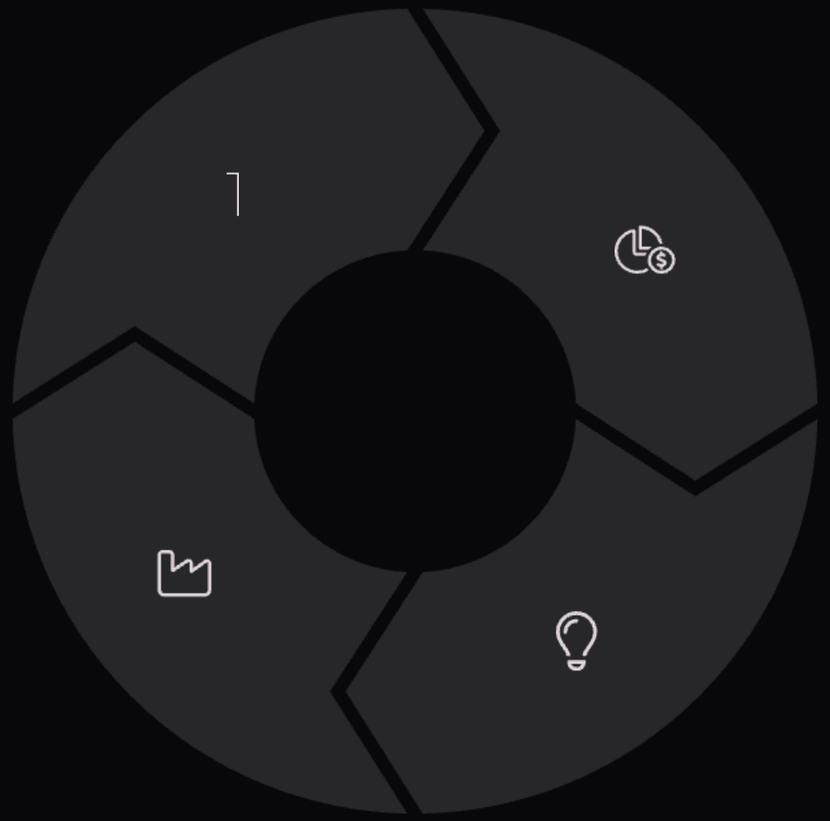
We successfully built a robust CNN model for fashion item classification. It shows significant potential for real-world applications.

CNN Success

Successfully developed a CNN model.

Fashion Industry

Valuable tool for the fashion sector.



High Accuracy

Achieved strong results on Fashion MNIST.

E-commerce Impact

Promising applications in online retail.