



# Fashion Item Classification with Fashion MNIST

This presentation details building an image classifier to categorize clothing items using the Fashion MNIST dataset, with results visualized via a confusion matrix.

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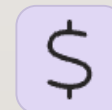


# Problem Statement



Manual categorization: Time-consuming

Prone to human errors.



E-commerce needs automation

Accurate and efficient systems.



Challenge: Low-resolution images  
28x28 grayscale classification.



Goal: High classification accuracy  
Precise clothing item identification.





# Introduction to Fashion MNIST



## Zalando's dataset

Drop-in MNIST replacement.



## 70,000 grayscale images

10 fashion categories.



## Training & testing split

60,000 train, 10,000 test.



## Diverse examples

T-shirt, Trouser, Sandal, Bag.



# Methodology: Data Preparation



## Load dataset

Fashion MNIST data loading.



## Normalize data

Scale pixel values to  $[0, 1]$ .



## Split data

80% training, 20% validation.



## One-hot encode labels

Categorical classification readiness.



# Methodology: Model Architecture

## CNN Architecture

Convolutional and Max Pooling layers.

- ReLU activation
- Flatten layer
- Dense layers
- Softmax activation

## Example Architecture

- Conv2D (32 filters, 3x3 kernel)
- MaxPooling2D (2x2 pool)
- Flatten layer
- Dense (128 units, ReLU)
- Dense (10 units, Softmax)





# Methodology: Training and Evaluation

## Training parameters

Adam optimizer, categorical cross-entropy loss.

## Configuration

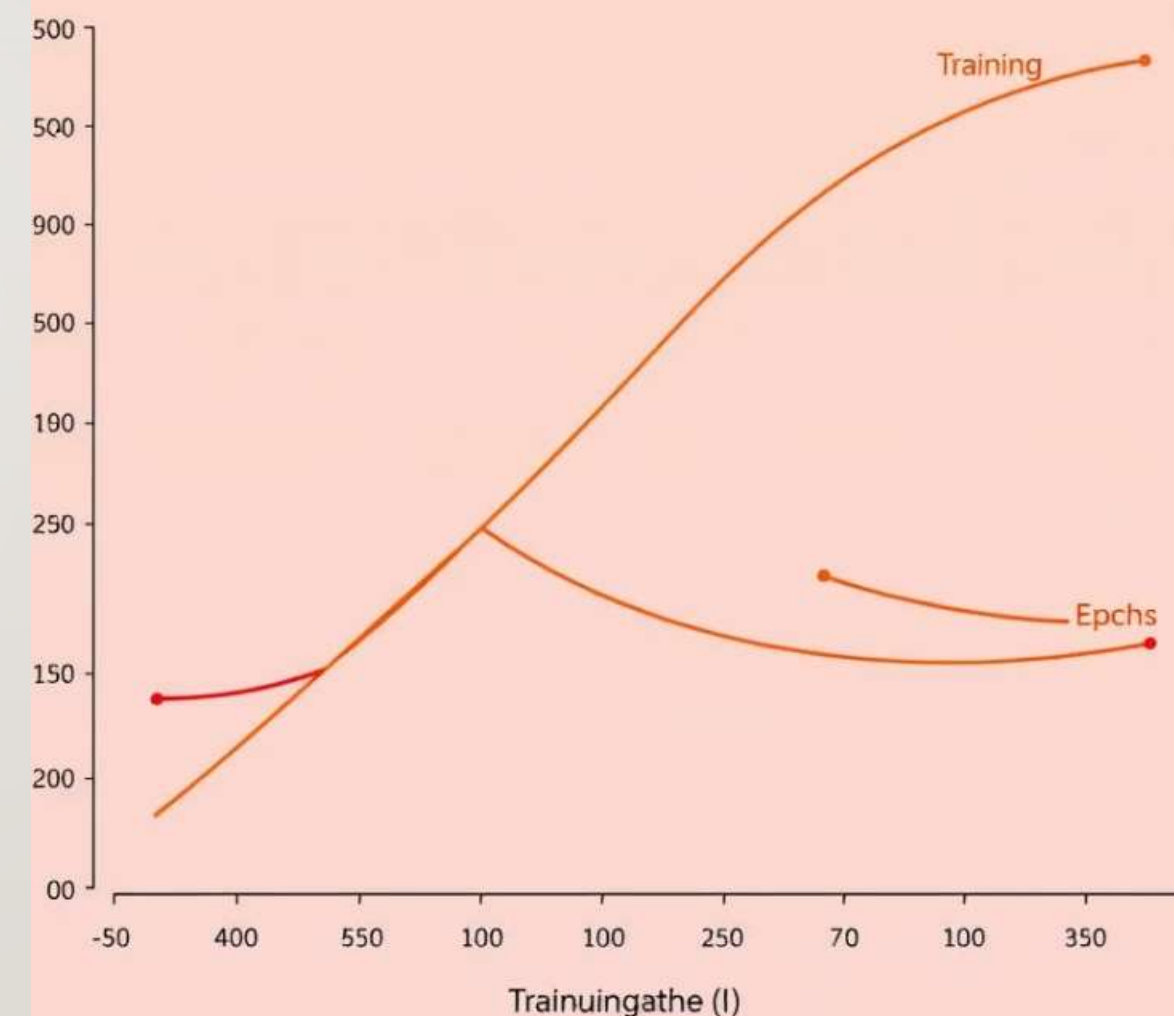
Batch size 128, 20 epochs.

## Prevent overfitting

Monitor validation loss.

## Evaluation metrics

Accuracy, Precision, Recall, F1-score.



## Results: Performance Metrics

True label	T-shirt/top	849	0	30	15	3	2	95	0	6	0
	Trouser	1	985	1	7	3	0	1	0	2	0
	Pullover	10	0	884	6	48	0	49	0	3	0
	Dress	15	11	19	898	33	0	22	0	1	1
	Coat	2	1	53	13	871	0	57	0	3	0
	Sandal	0	0	0	0	0	979	0	10	0	11
	Shirt	101	0	75	22	63	0	722	0	17	0
	Sneaker	0	0	0	0	0	11	0	981	0	8
	Bag	4	0	2	2	2	4	0	4	981	1
	Ankle boot	0	0	0	0	0	7	0	48	0	945
		T-shirt/top	Trouser	Pullover	Dress	Coat	Sandal	Shirt	Sneaker	Bag	Ankle boot

Detailed classification report:

	precision	recall	f1-score	support
T-shirt/top	0.86	0.85	0.86	1000
Trouser	0.99	0.98	0.99	1000
Pullover	0.83	0.88	0.86	1000
Dress	0.93	0.90	0.91	1000
Coat	0.85	0.87	0.86	1000
Sandal	0.98	0.98	0.98	1000
Shirt	0.76	0.72	0.74	1000
Sneaker	0.94	0.98	0.96	1000
Bag	0.97	0.98	0.97	1000
Ankle boot	0.98	0.94	0.96	1000
accuracy			0.91	10000
macro avg	0.91	0.91	0.91	10000
weighted avg	0.91	0.91	0.91	10000



# Conclusion

## High Accuracy

- Fashion MNIST classification successful.
- CNN model effective.

## Insights from Confusion Matrix

- Identified common errors.
- Valuable for model refinement.

## Applications

- E-commerce optimization.
- Inventory management.
- Fashion trend analysis.

## Future Work

- Improve accuracy.
- Deploy model for real-time processing.





THANK YOU

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