Fashion Classification Model

HyperParameter Hunters
Hema Motiani & Umnia Hameed

Introduction

Why is fashion classification important?

- Personalized shopping experiences through recommendation systems
- Helps brands and retailers automate inventory management
- Trend analysis and visual search tools
- Tackles real-world classification challenges using computer vision
- Opportunity to apply technical skills to a creative, high-impact field

Who does it serve?

• E-commerce platforms, fashion retailers, consumers, and tech companies in fashion

Past work

Previous Dataset:

- We were previously working with the small fashion dataset.
- Baseline CNN model trained from scratch
- Achieved high accuracy quickly due to dataset simplicity

Key Takeaways:

- Limited complexity and poor real-world applicability
- Motivated us to use a more realistic dataset

Next Step:

- Switched to the **DeepFashion** dataset.
- Richer, more complex, better-labeled.





DataSet

Now working with the <u>DeepFashion</u> dataset.

Large-scale benchmark from CUHK's Multimedia Lab.

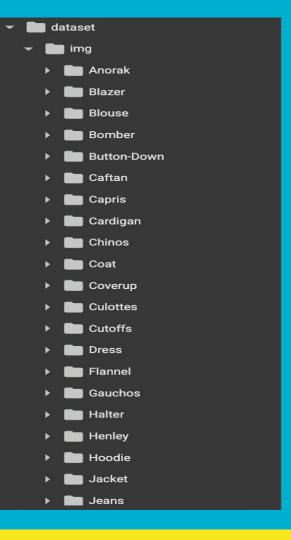
Key Characteristics:

- 800,000+ images of diverse clothing items in various settings
- Annotated with category labels, bounding boxes, landmarks, and attributes
- Captures real-world variations in pose, lighting, and background
- Contains both consumer and shop images.
- The raw dataset was organized in highly specific directory image names.
- We wrote a Python script to:
 - Map detailed hyper specific categories into 50 high-level classes
 - Selected the top 20 most represented classes
 - Performed a stratified 80-20 train/test split for balanced evaluation

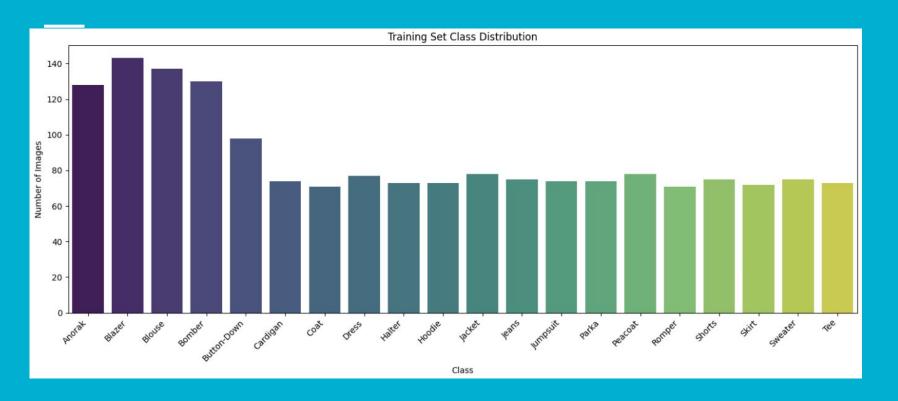
Why This Matters:

This richer, more challenging dataset helps train a robust classification model.

Ideal for building models with better generalization ability



Class Distribution



Method

Step	Model 1: 18%	Model 2: 60.27%				
Data	Top 20 classes, 80-20 stratified split into train_data and test_data	Top 20 classes, 80-20 stratified split into train_data and test_data				
Preprocessing	No Data augmentation	Data Augmentation				
Normalization	ImageNet mean & std	ImageNet mean & std				
Pretrained Model	EfficientNet-B0	EfficientNet-B0				
Transfer Learning	Fully connected Layer trained	Fine tuning last 2 blocks as well as FC Layer				
Training	Adam (Ir=0.001), CrossEntropyLoss, 10 epochs, Batch size = 32	Adam (Ir=0.0005), CrossEntropyLoss, 10 epochs, Batch size = 32 L2 Regularization, LR scheduler				

Evaluation

									Со	nfusio	n Mat	trix				_				$\overline{}$		
Anorak	22	0	1	4	0	0	1	0	0	0	0	0	0	2	0	1	0	0	0	1		
Blazer	0	22	0	5	0	1	1	0	0	0	2	0	1	0	0	1	2	0	1	0		
Blouse	1	8	14	0	2	2	0	2	1	0	0	0	0	0	0	0	1	1	1	1		
Bomber	1	3	0	27	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0		
Button-Down	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		- 2
Cardigan	0	3	0	0	1	9	1	0	0	0	0	1	0	0	0	0	0	2	2	0		
Coat	1	4	0	0	0	0	8	2	0	0	0	0	0	0	1	1	0	0	0	1		
Dress	0	0	0	0	1	0	0	9	4	0	0	0	2	0	0	2	0	0	0	1		
	0	0	1		0			4	8		0	0		1	0	0	0		0	0		
Halter -				0		1	0			0			0					3				- 15
Hoodie Jacket	2	0	0	0	0	0	0	0	0	14	1	1	0	0	0	0	0	0	0	0		
를 Jacket	2	5	2	2	0	0	0	0	0	0	5	1	0	0	1	0	1	0	0	0		
Jeans	0	0	0	0	0	0	3	0	0	1	0	10	1	1	0	1	2	0	0	0		
Jumpsuit	0	0	0	0	0	0	1	3	4	0	0	0	7	0	0	3	0	0	0	1		
Parka	- 3	2	0	2	0	0	3	0	0	0	0	1	0	7	0	0	0	1	0	0		- 10
Peacoat	0	0	0	1	0	0	3	0	0	0	0	0	0	0	15	0	0	0	0	0		
Romper	0	1	3	0	0	0	0	1	1	0	0	0	1	0	0	10	0	0	0	1		
Shorts	0	0	1	0	0	0	0	0	0	0	2	2	0	0	0	0	13	1	0	0		
Skirt	0	0	1	0	0	0	0	1	0	0	0	0	2	0	0	0	1	13	0	0		
Sweater	0	4	4	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	9	0		- 5
Tee	0	1	0	0	0	0	0	2	0	1	0	2	0	0	0	0	1	0	1	10		
iee				-		-		-		-			-	-	-		-		_			
	Anorak	Blazer	Blouse	Bomber	Button-Down	Cardigan	Coat	Dress	Halter	Hoodie	Jacket	Jeans	Jumpsuit	Parka	Peacoat	Romper	Shorts	Skirt	Sweater	Tee		
					But					Predict	ed labe	-1										_ օ

	precision	recall	f1-score
Anorak Blazer Blouse Bomber Button-Down Cardigan Coat Dress Halter Hoodie Jacket Jeans Jumpsuit Parka	0.76 0.44 0.53 0.64 0.89 0.82 0.42 0.44 0.55 0.93 0.33 0.39 0.57	0.69 0.61 0.53 0.85 1.00 0.47 0.63 0.61 0.78 0.16 0.47 0.42	0.72 0.51 0.53 0.73 0.94 0.60 0.43 0.52 0.58 0.85 0.21 0.43 0.48
Peacoat Romper Shorts Skirt Sweater Tee accuracy macro avg weighted avg	0.89 0.47 0.52 0.69 0.79 0.64	0.89 0.50 0.63 0.61 0.58 0.39	0.89 0.49 0.57 0.65 0.67 0.48 0.60 0.59 0.60

Misclassifications



P: Parka T: Anorak



P: Romper T: Anorak



P: Tee

P: Bomber T: Anorak



P: Bomber

P: Bomber T: Anorak



P: Bomber T: Anorak



P: Bomber T: Blazer



P: Shorts T: Blazer



P: Bomber T: Blazer



P: Bomber T: Blazer



P: Coat T: Blazer



P: Bomber T: Blazer



P: Cardigan T: Blazer



P: Bomber T: Blazer



P: Bomber T: Blazer



P: Jacket T: Blazer

Next steps

- Use older small fashion model on new dataset by aligning the labels.
- Merge categories that often get misclassified (e.g blazer and Anorak)
- 3. Run model on more epochs \rightarrow effect on accuracy