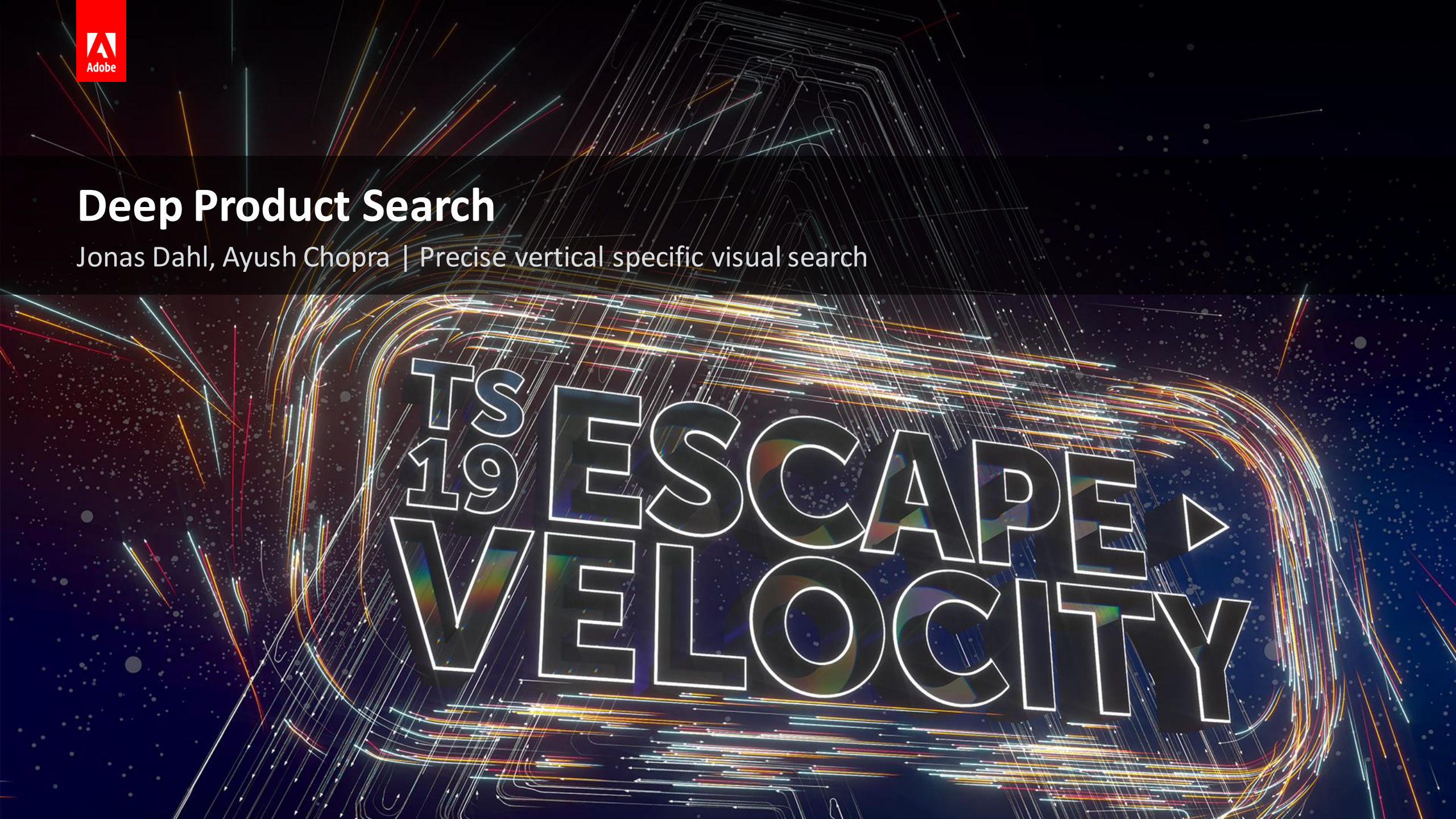
Deep Product Search

Jonas Dahl, Ayush Chopra | Precise vertical specific visual search



★★★★½ 3 REVIEWS

CLASSIC PETITE TALL

CHF 173.77

SIZE: SIZE CHARTS

All sizes are US sizes.

00 0 2 4 6 8 10

12 14 16

QUANTITY: 1

Prices do not include taxes.

Add to Bag

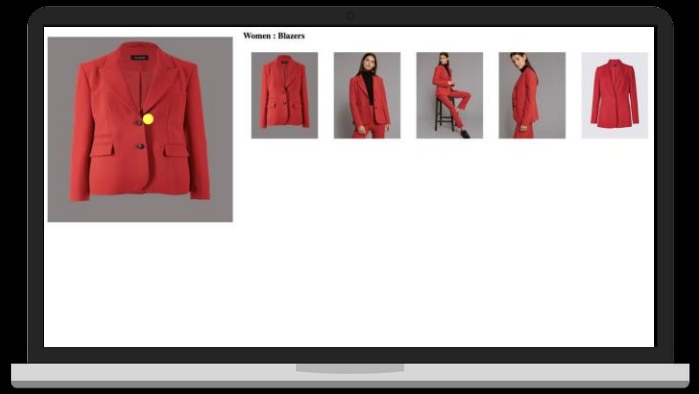
ADD TO WISHLIST


Céline
“Contrasting CHECKS with stripes is a thoroughly *modern* move”

Céline

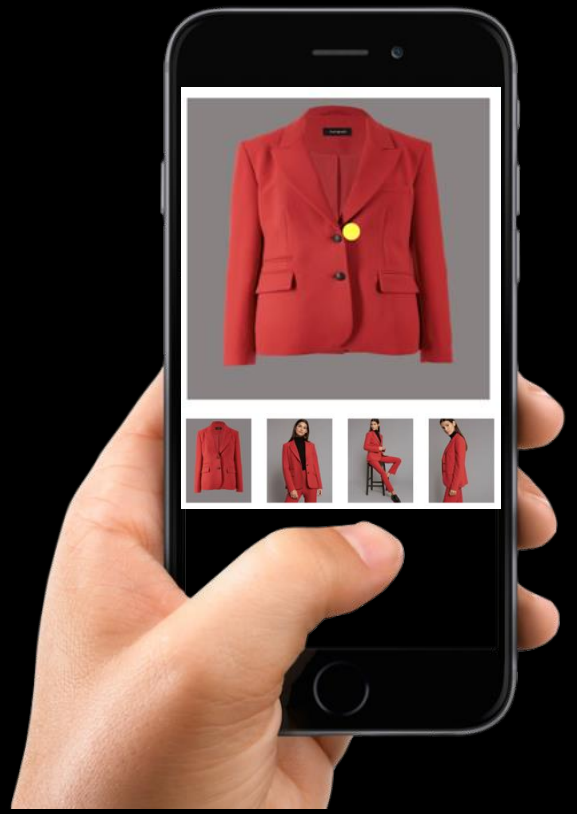
Search

Deep Product Search – Apparel API



Web site Deep Product Search and find-similar functionality

Find similar products in-store



Search for apparel using in-the-wild images

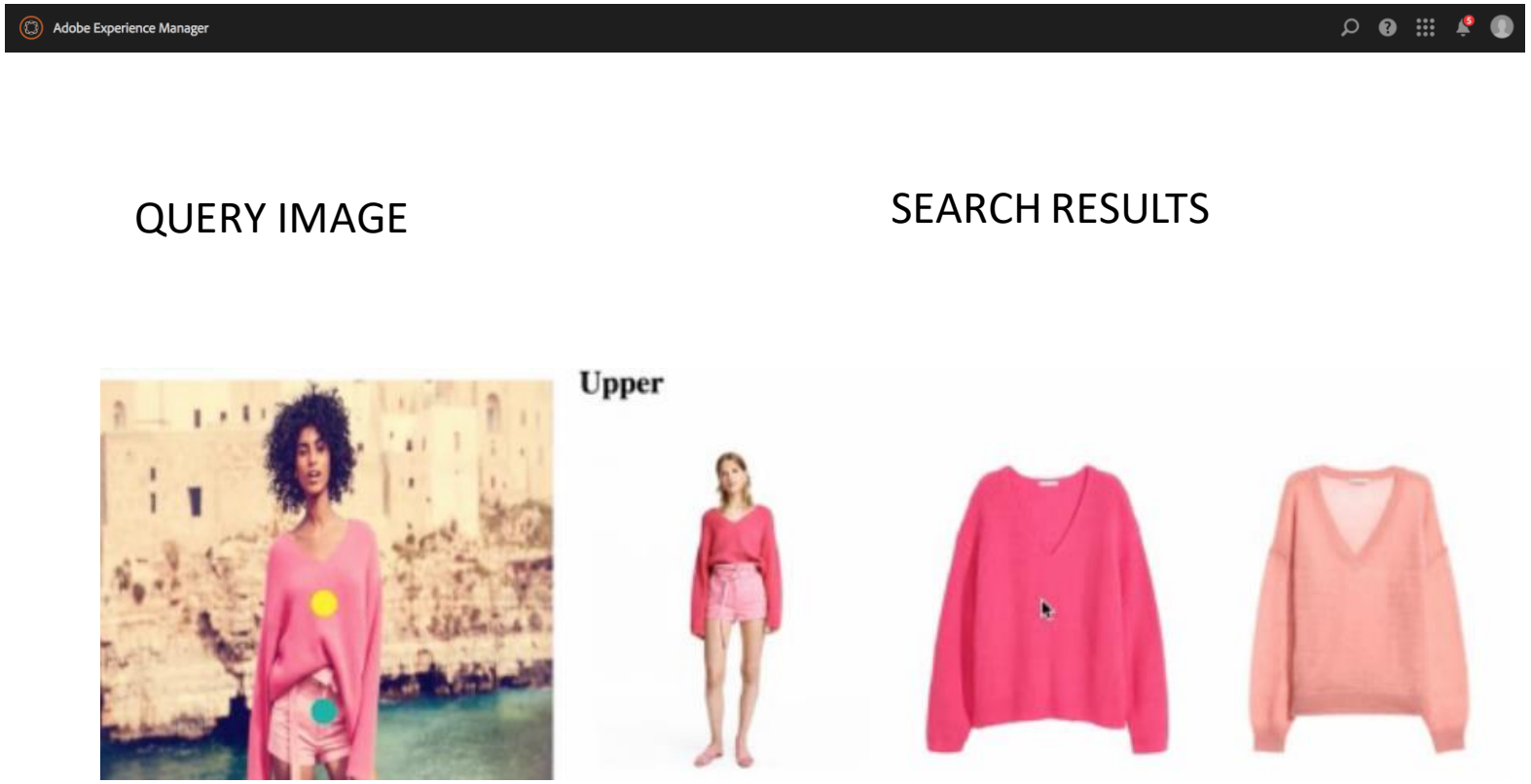
Exploration

Recommendations

ENGAGEMENT

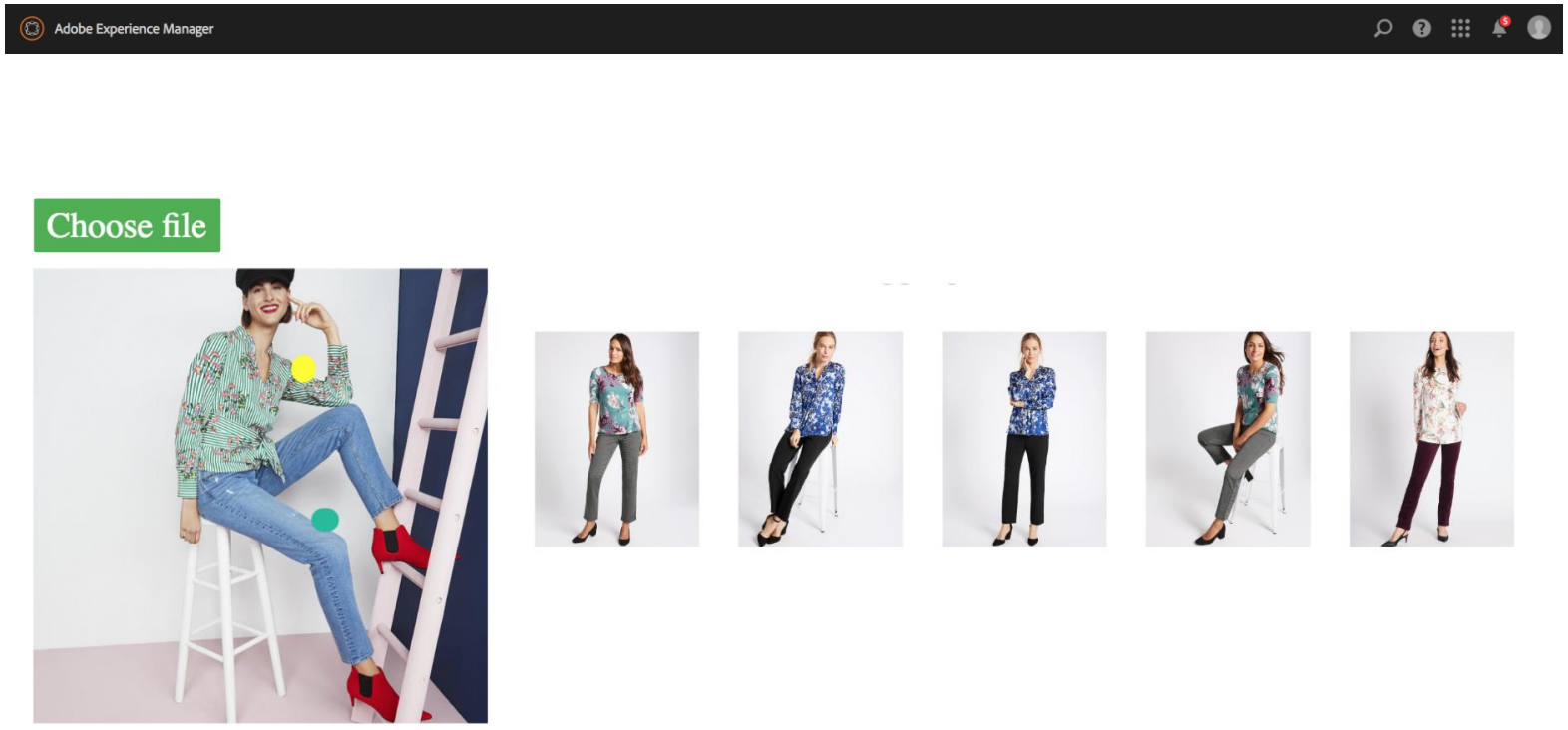
Leverages Adobe Sensei to accomplish best-in-class accuracy

Great support for non-exact matches



EXACT MATCHES

Matches can be found in challenging pictures including apparel that's displayed on a model as well as isolated on a plain background, which are visually very different.



SIMILAR RESULTS

The product catalog doesn't necessarily include an exact match. Therefore, it's very important that the algorithm is able to also suggest similar items.

Visual dissimilar exploration

Aviator™

Original Wayfarer®

New Wayfarer®

Clubmaster

Justin

Erika

Round Metal

RB2180

RB2447

DEMO

ALGORITHMIC OVERVIEW

Workflow Components

Workflow Components

1. Hotspot Detection

Workflow Components

1. Hotspot Detection

2. Feature Vector Extraction

Workflow Components

1. Hotspot Detection

2. Feature Vector Extraction

3. Recommendation

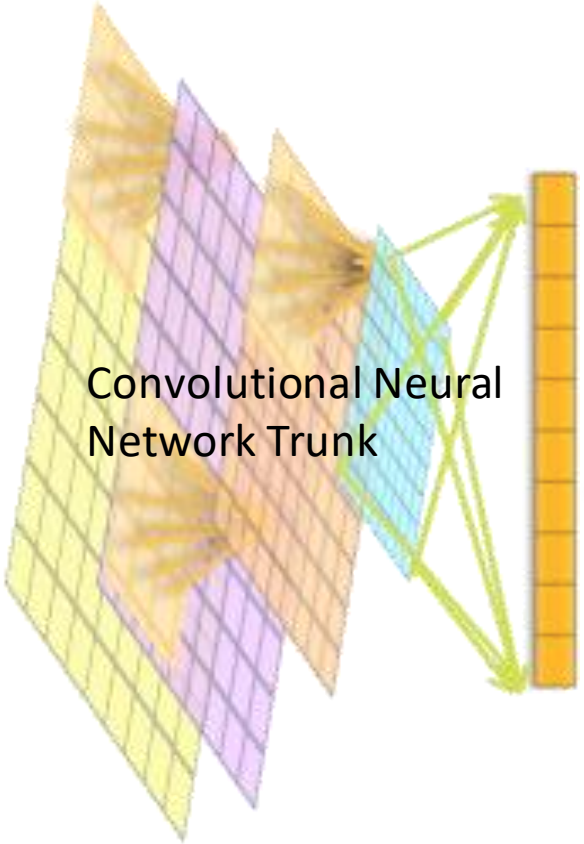
Workflow Components

1. Hotspot Detection

2. Feature Vector Extraction

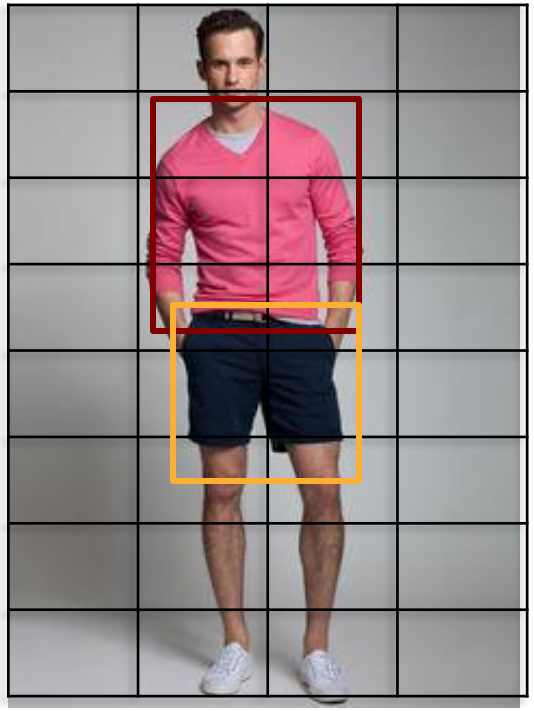
3. Recommendation

Bounding Box Segmentation



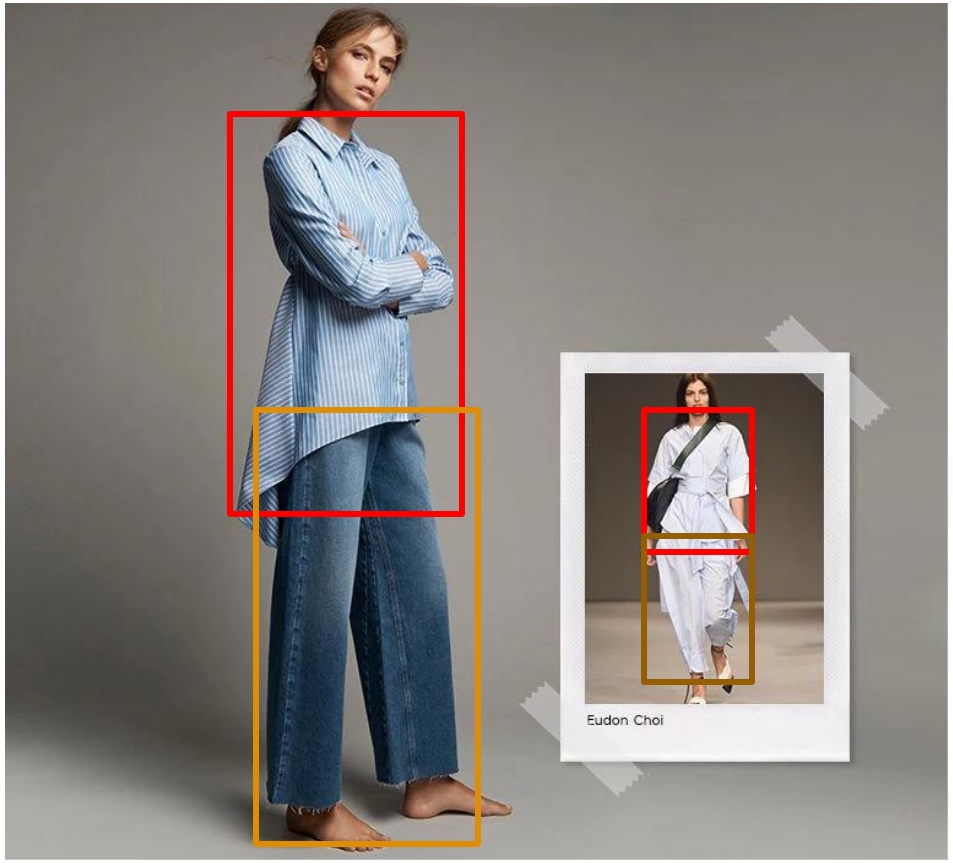
bbox regression

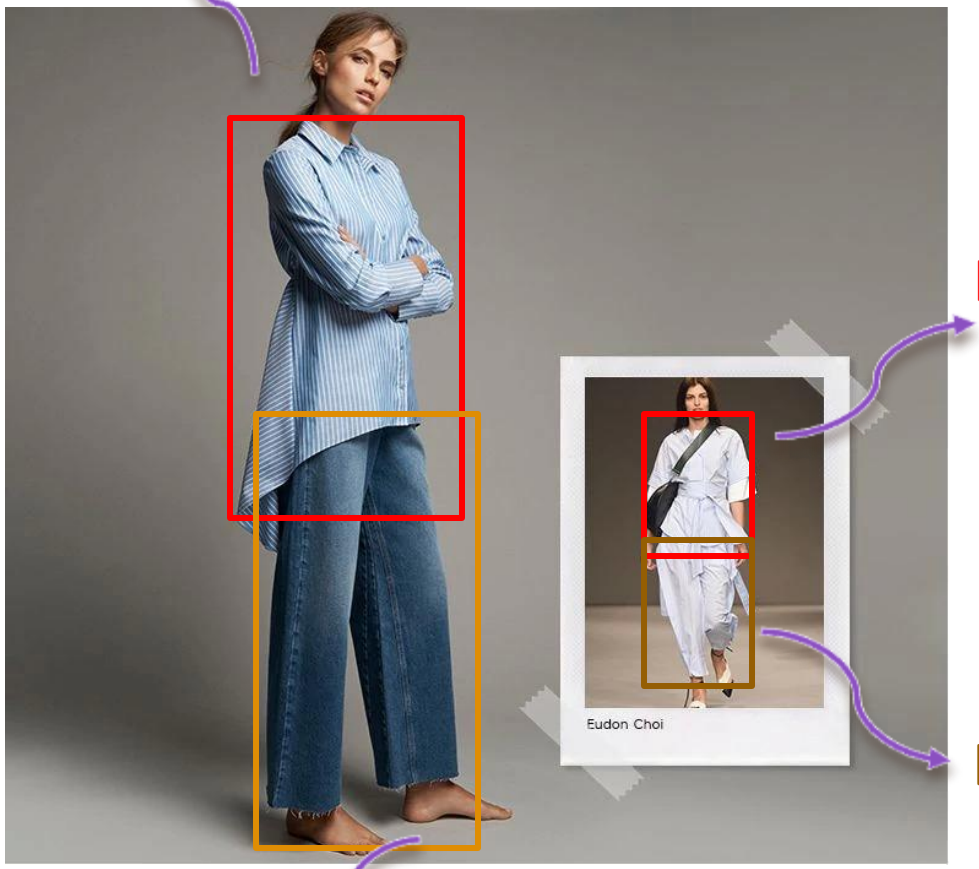
(x, y, w, h)



classification

[shirt, shorts]





Workflow Components

1. Hotspot Detection

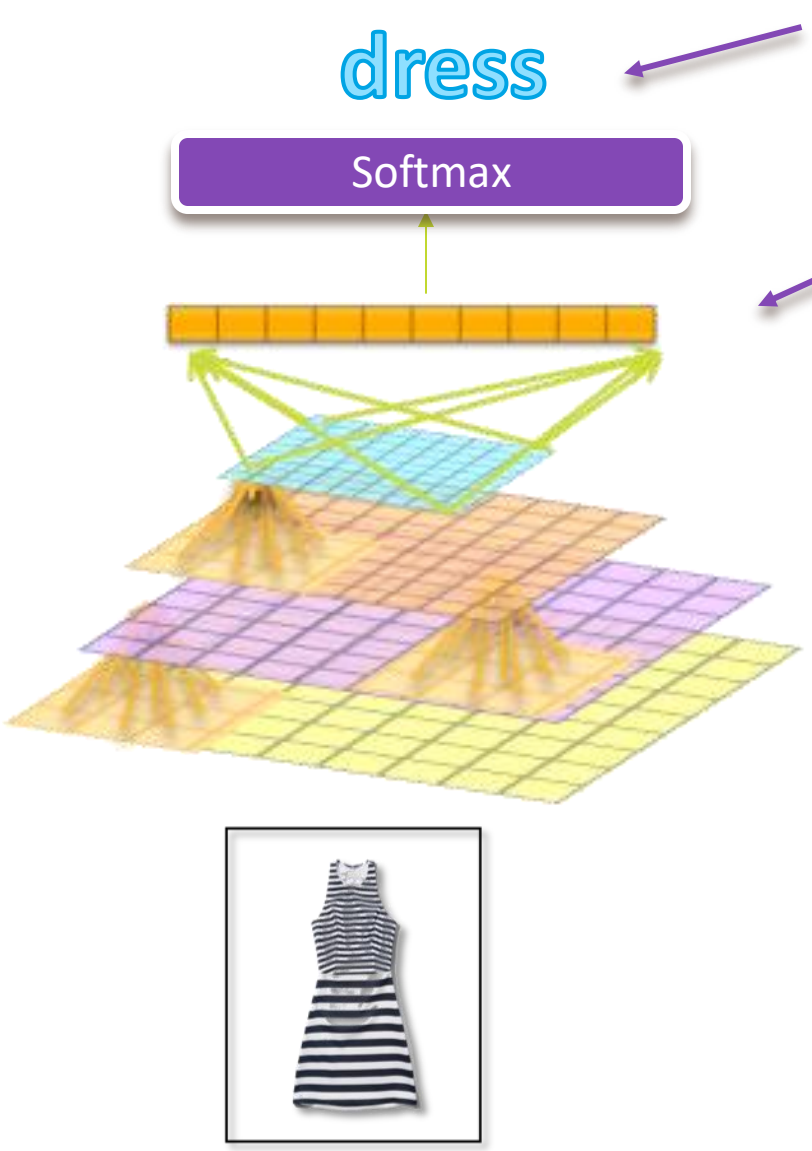
2. Feature Vector Extraction

3. Recommendation

How to generate robust feature vectors?

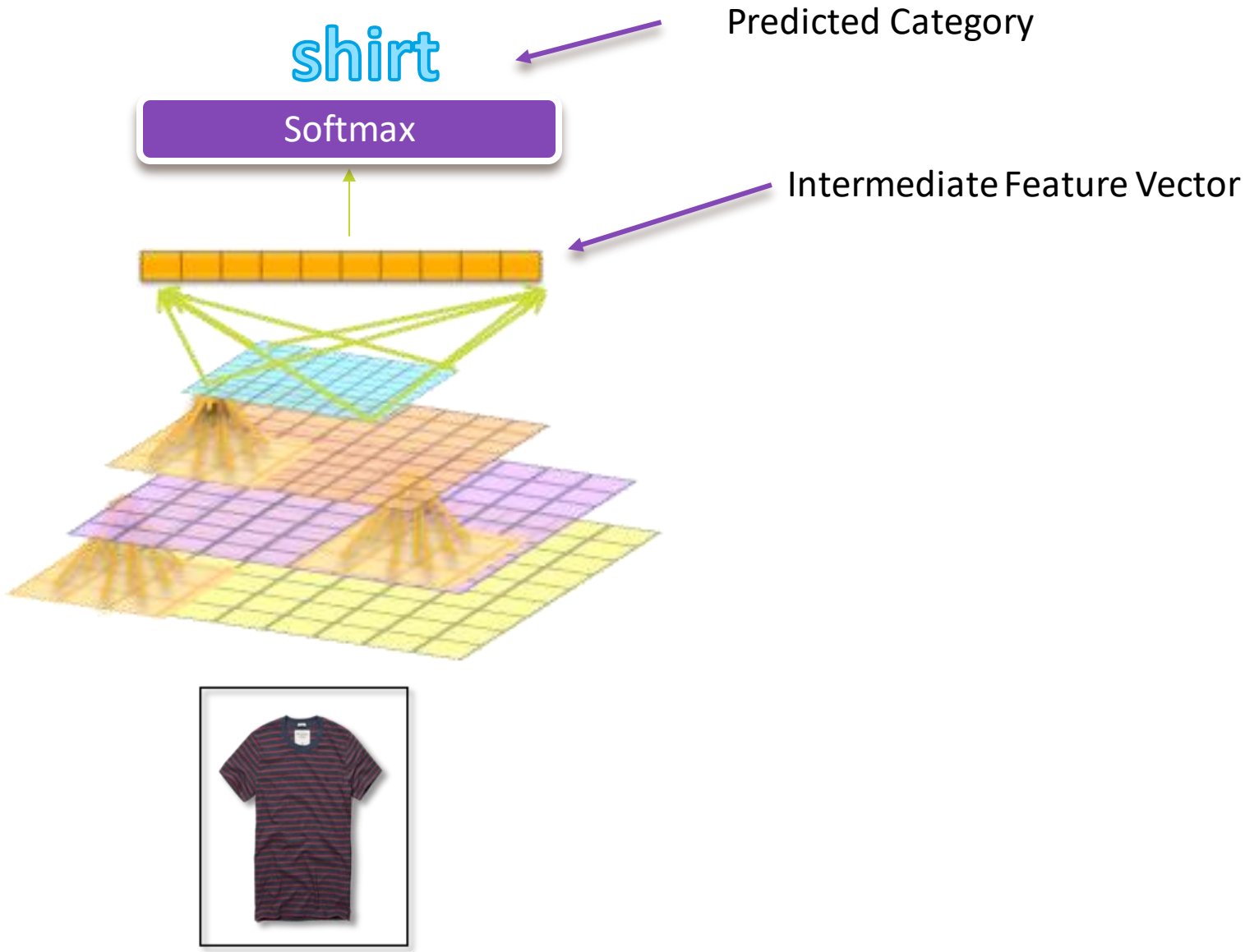
Approach 1: Classification Network

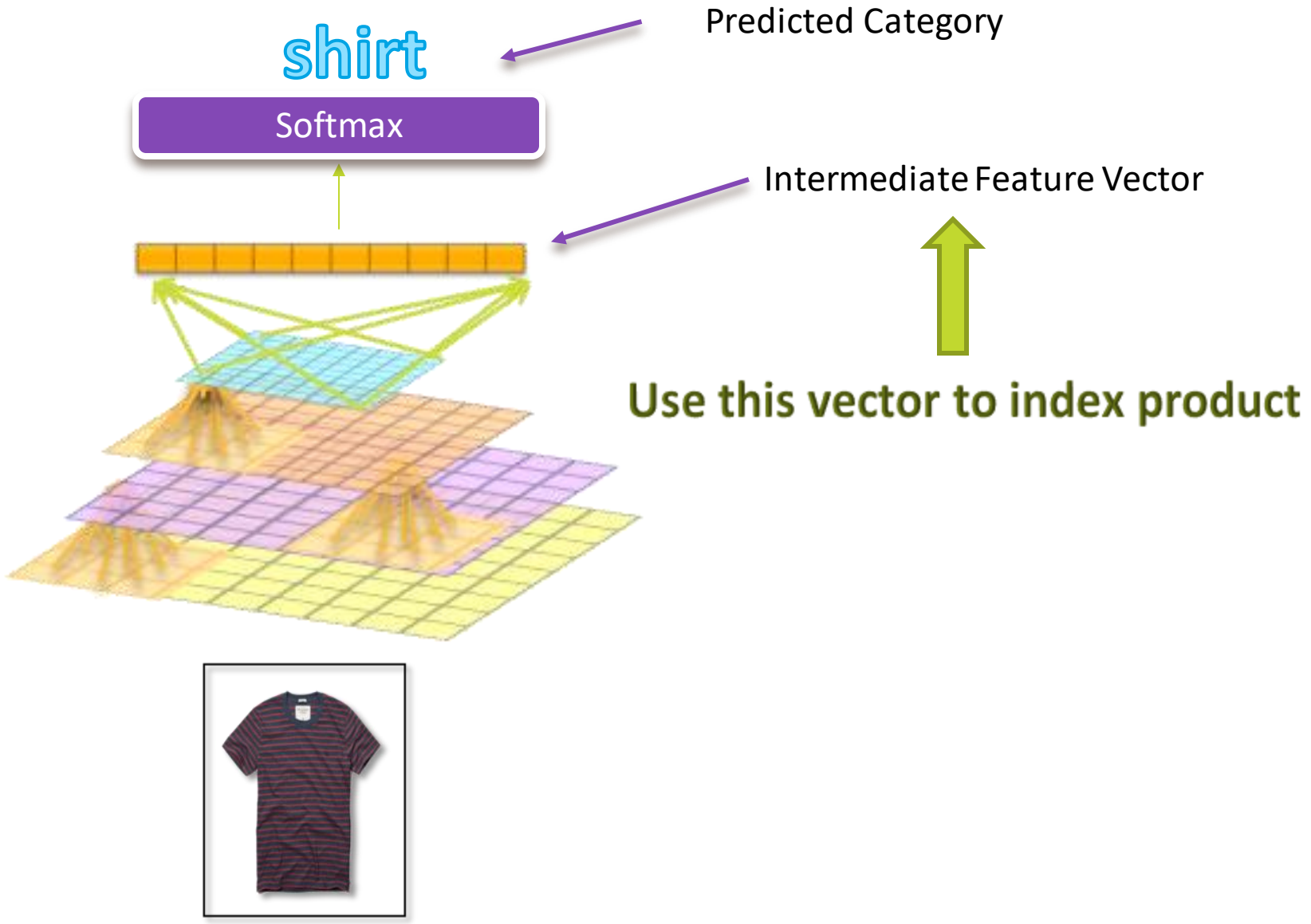
27



Predicted Category

Intermediate Feature Vector





Problem: Feature Vector biased by product category

31

Query

B

C

Query

B

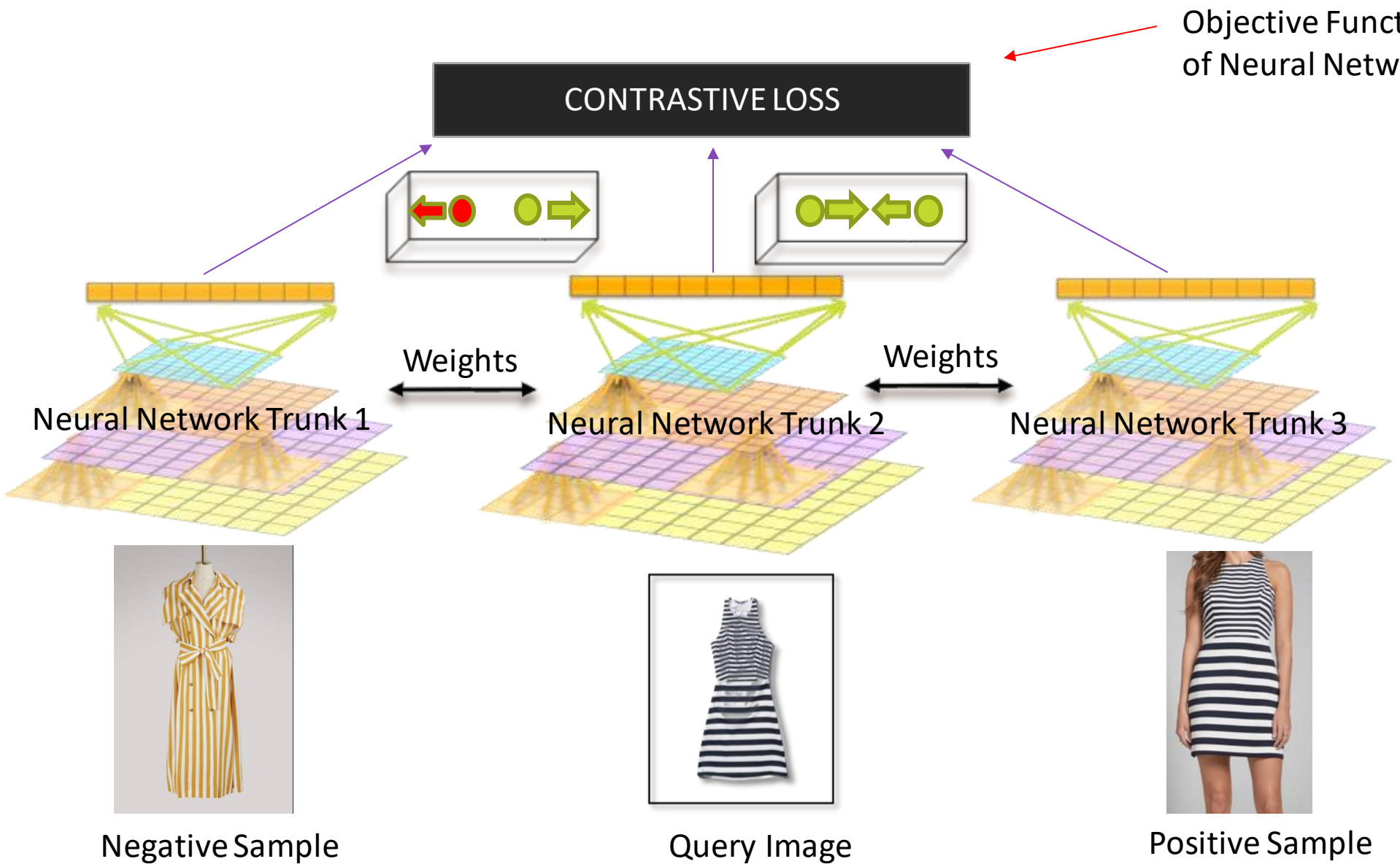
D

Solution: Need some measure of fine-grained similarity

34

Approach 2: Siamese Neural Networks

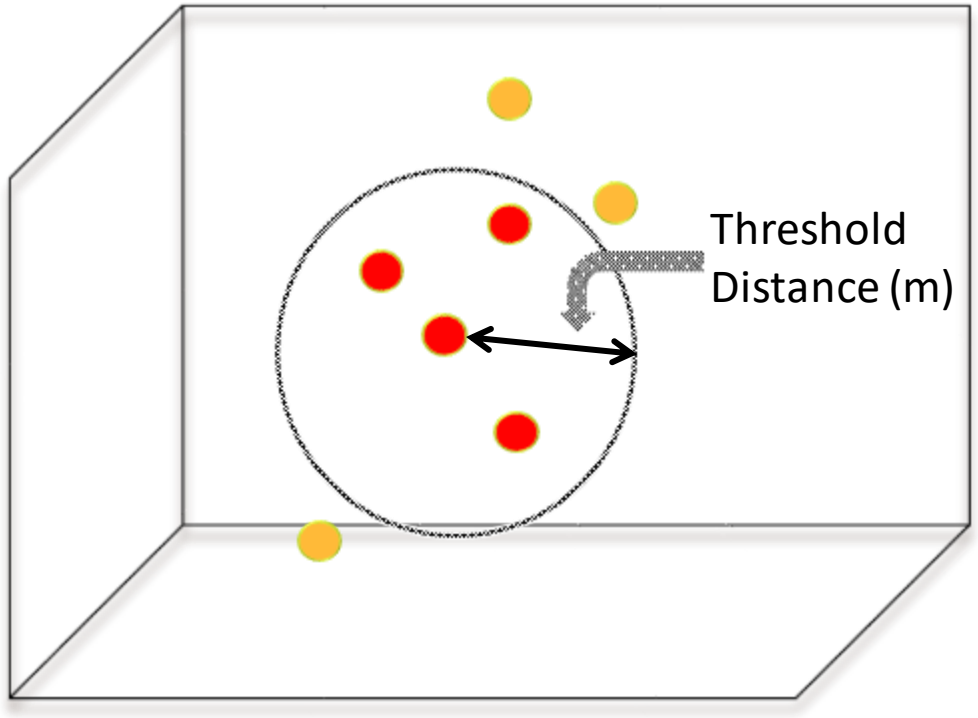
35



CONTRASTIVE LOSS

$$(1-Y)\frac{1}{2}(D_W)^2 + (Y)\frac{1}{2}\{max(0, m - D_W)\}^2$$

$$D_W \sqrt{\{G_W(X_1) - G_W(X_2)\}^2}$$



Problem: Feature Vectors not robust to hard negatives.

Query

B

D

Query

B

D

Solution: Jointly compare query against multiple negative and positive samples.

Approach 3 : Grid Search Network

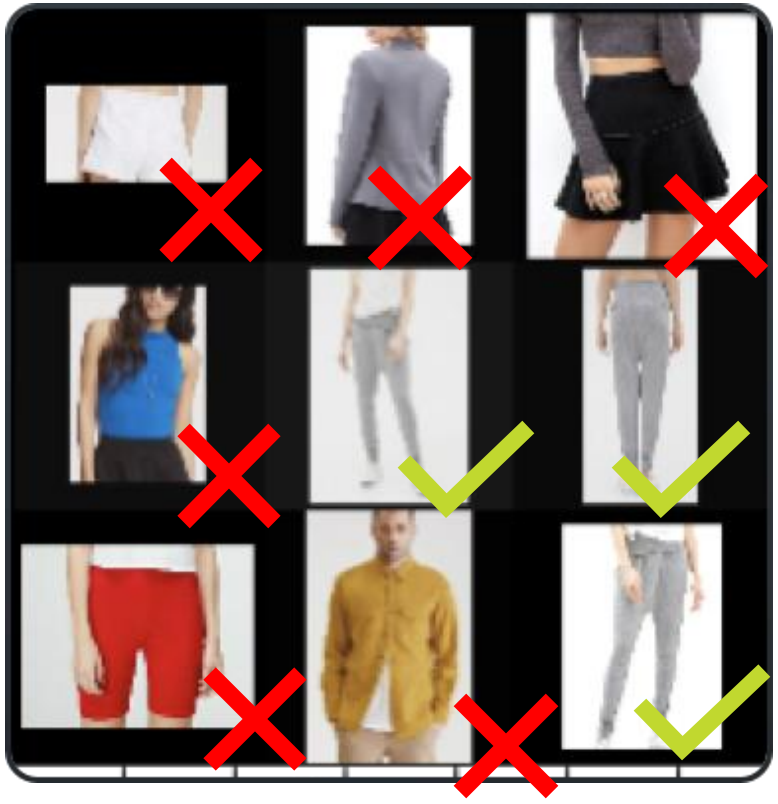
42

QUERY IMAGE

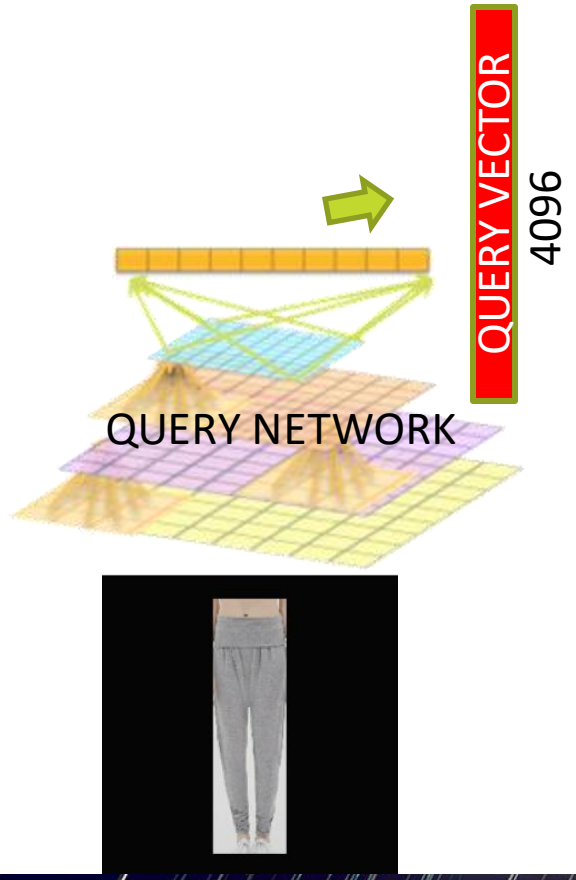
TARGET GRID

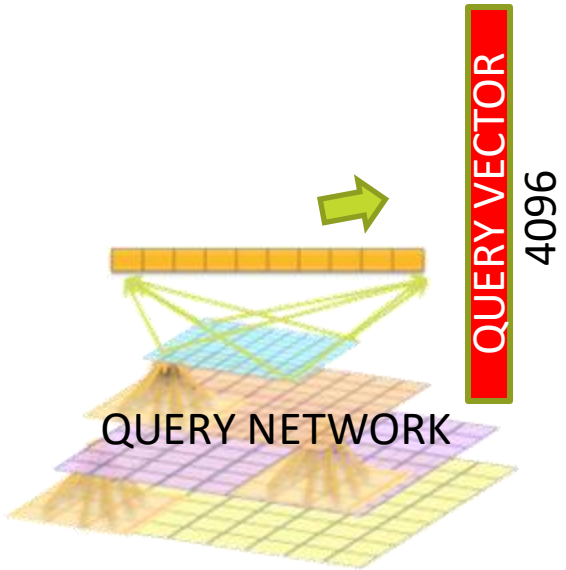
Locate all instances of query in target

QUERY IMAGE

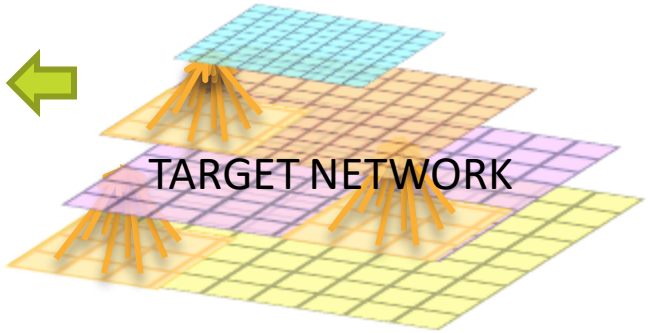


TARGET GRID

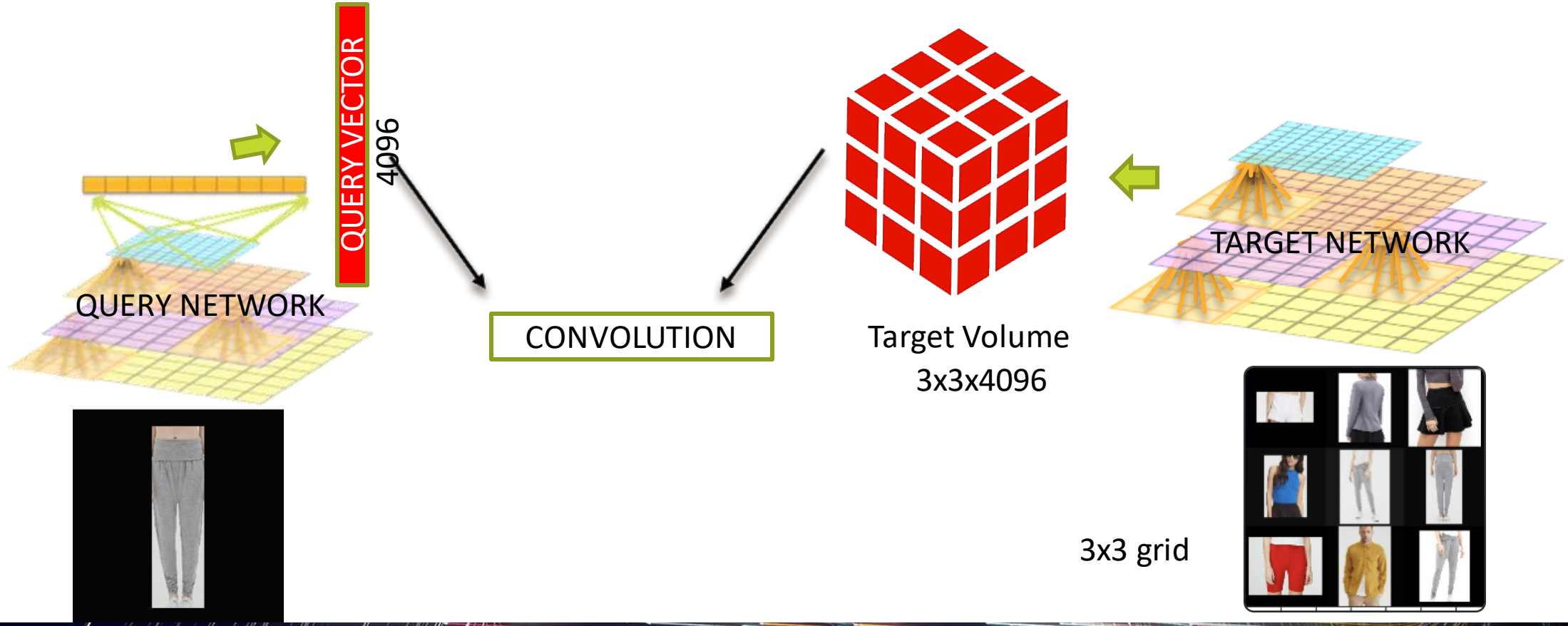




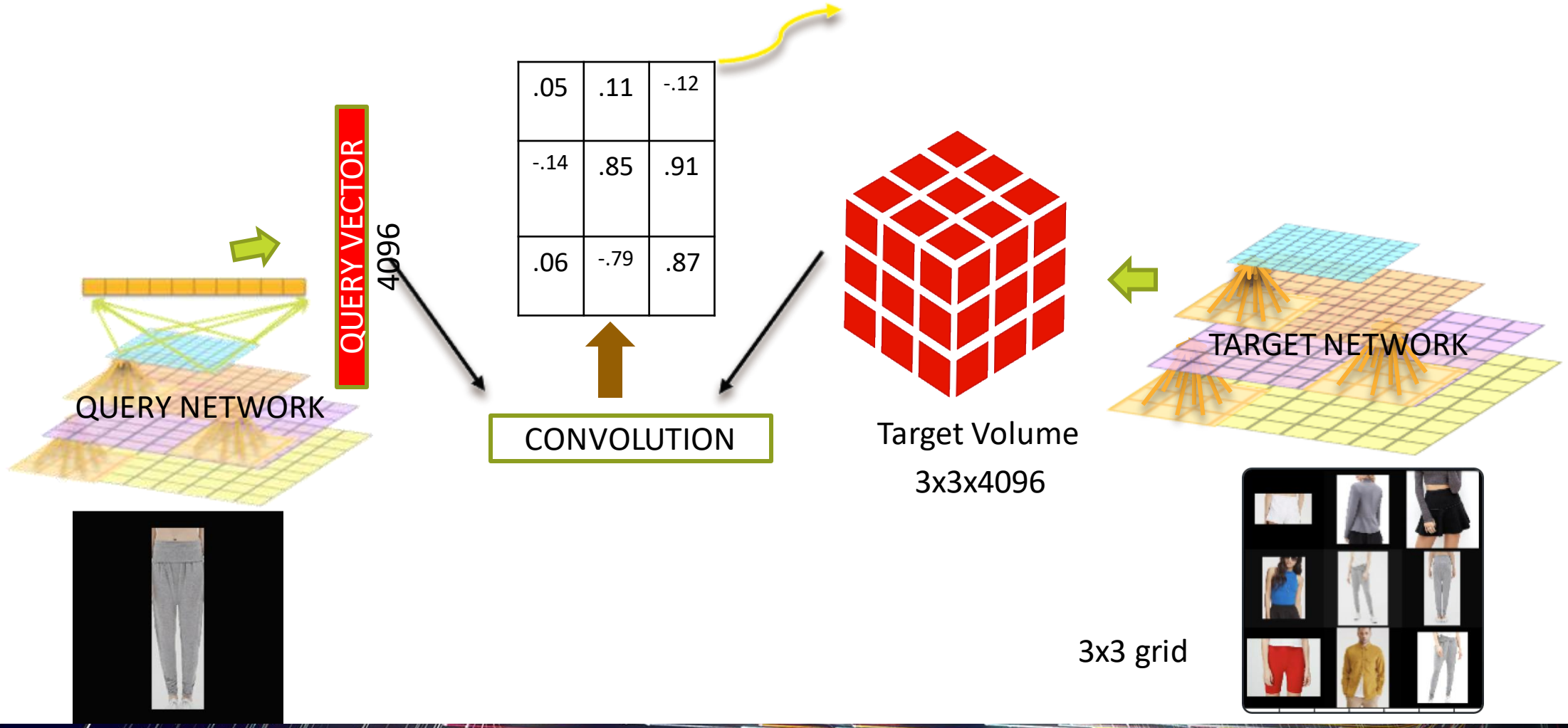
Target Volume
3x3x4096

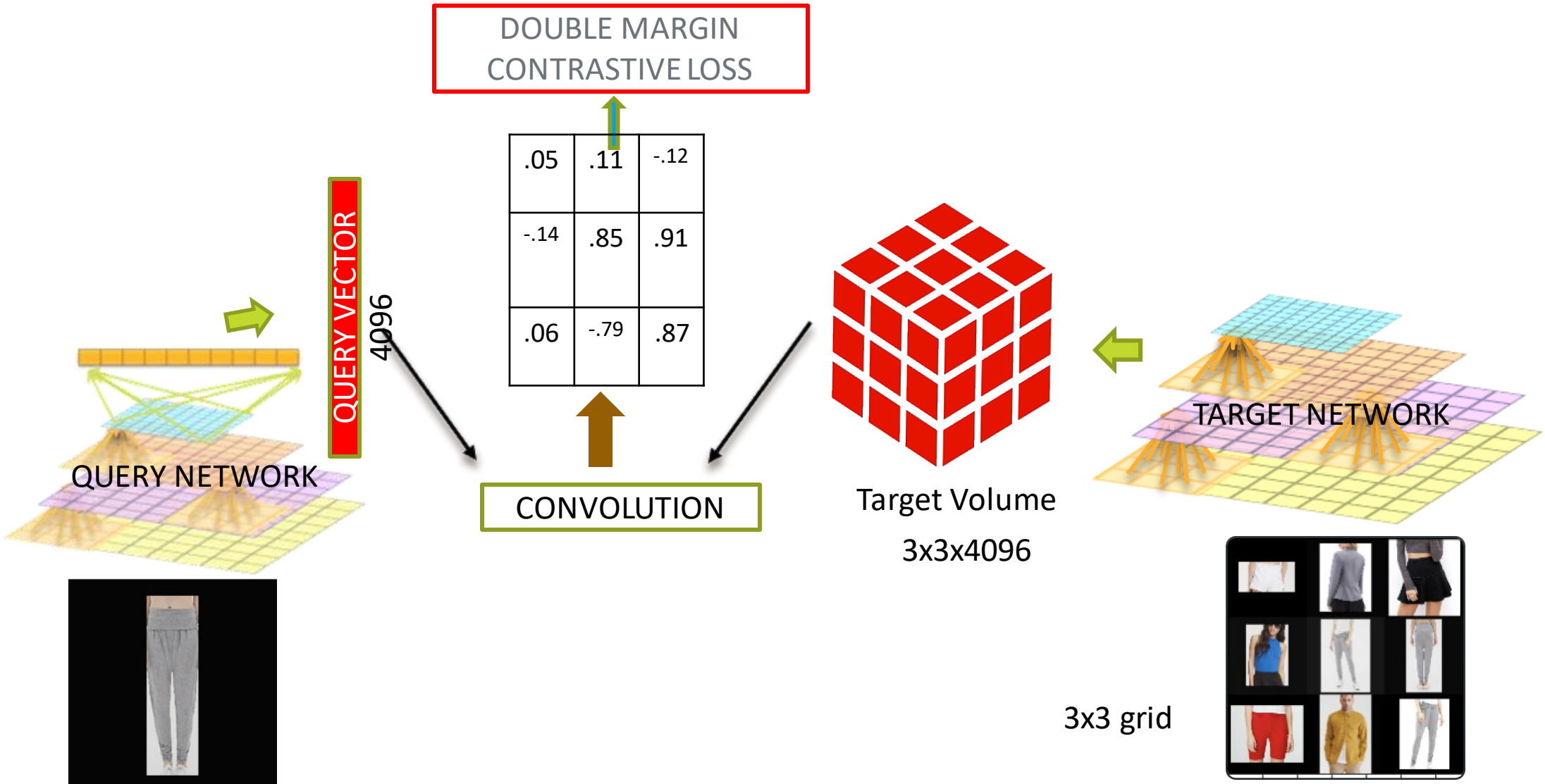


3x3 grid



3x3 cosine similarity map





LOW THRESHOLD

-1	-1	-1
-1	.9	.9
-1	-1	.9

HIGH THRESHOLD

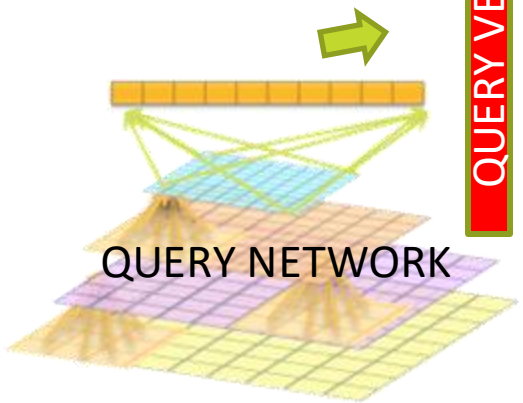
0	0	0
0	1	1
0	0	1

DOUBLE MARGIN CONTRASTIVE LOSS

.05	.11	-.12
-.14	.85	.91
.06	-.79	.87

QUERY VECTOR

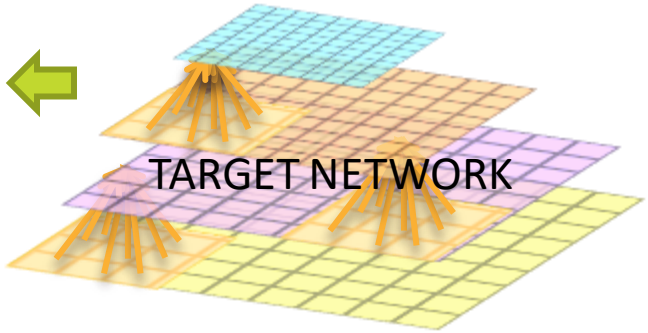
4096



CONVOLUTION

Target Volume

3x3x4096

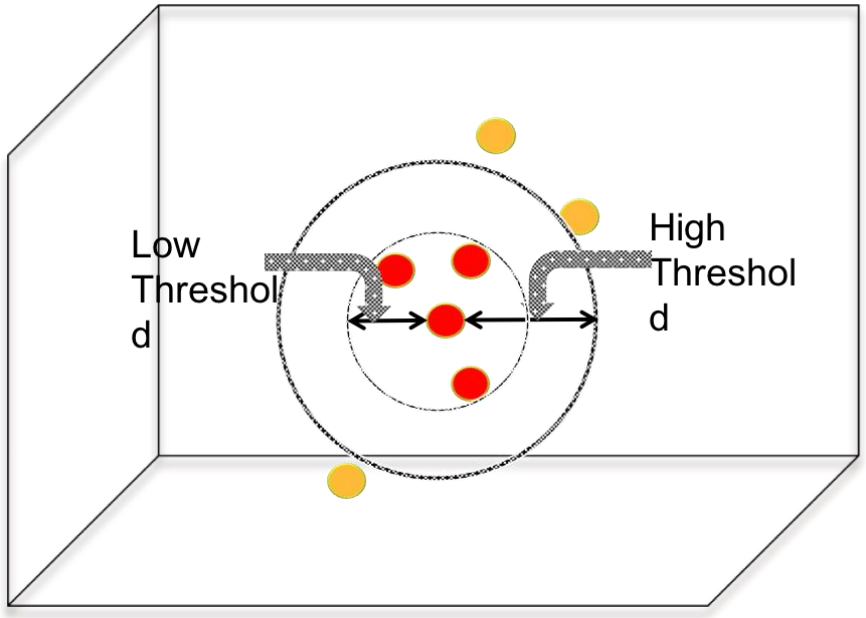


3x3 grid

OBJECTIVE FUNCTION

Double Hinge Contrastive Loss

$$loss = \sum_{j=0}^{j<H} \sum_{i=0}^{i<W} y[i,j] * \max(H[i,j] - d[i,j],0)^2 + (1 - y[i,j]) * \max(d[i,j] - L[i,j],0)^2$$

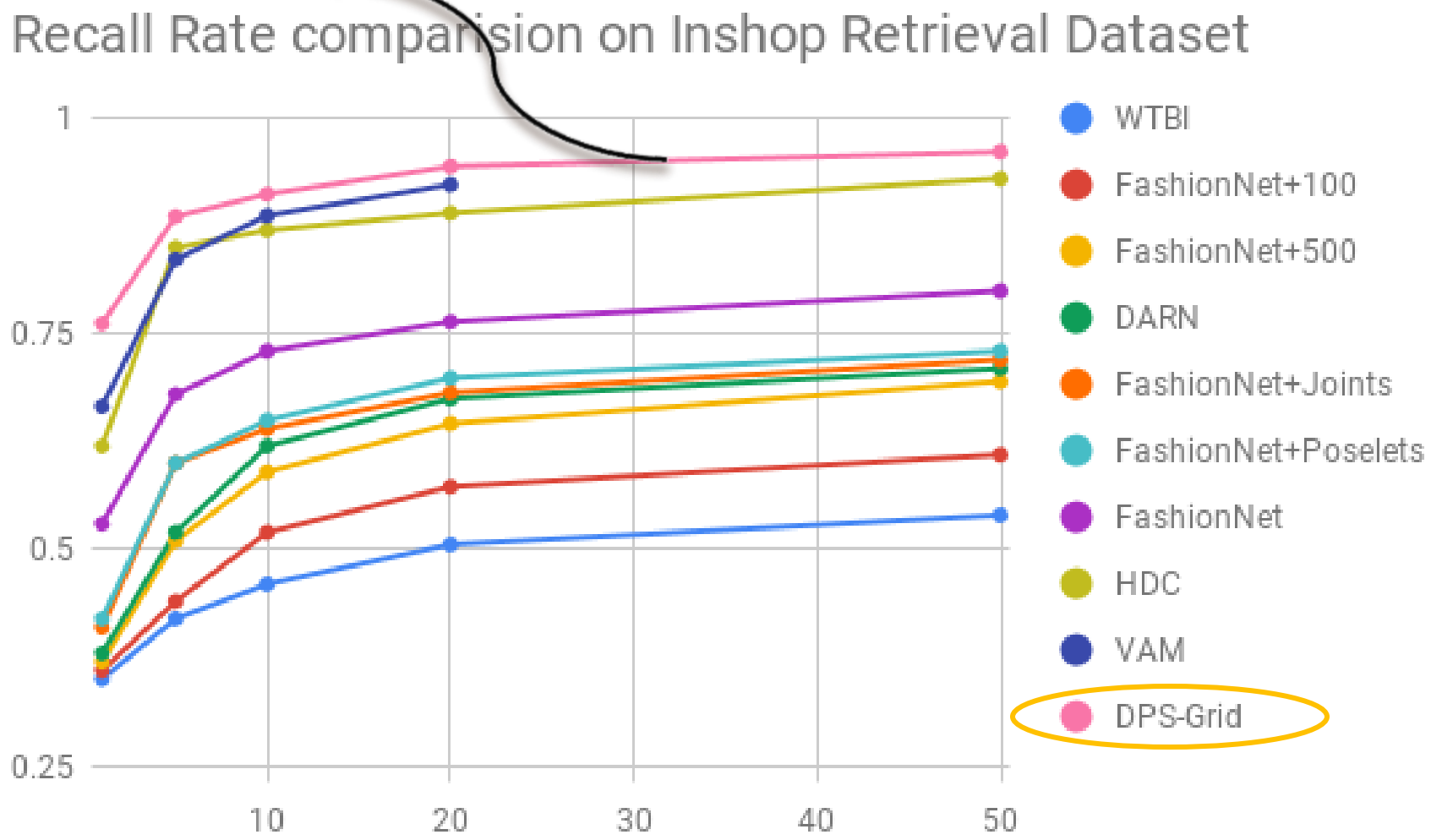


52

QUANTITATIVE PEFORMANCE

State of Art on Visual Retrieval

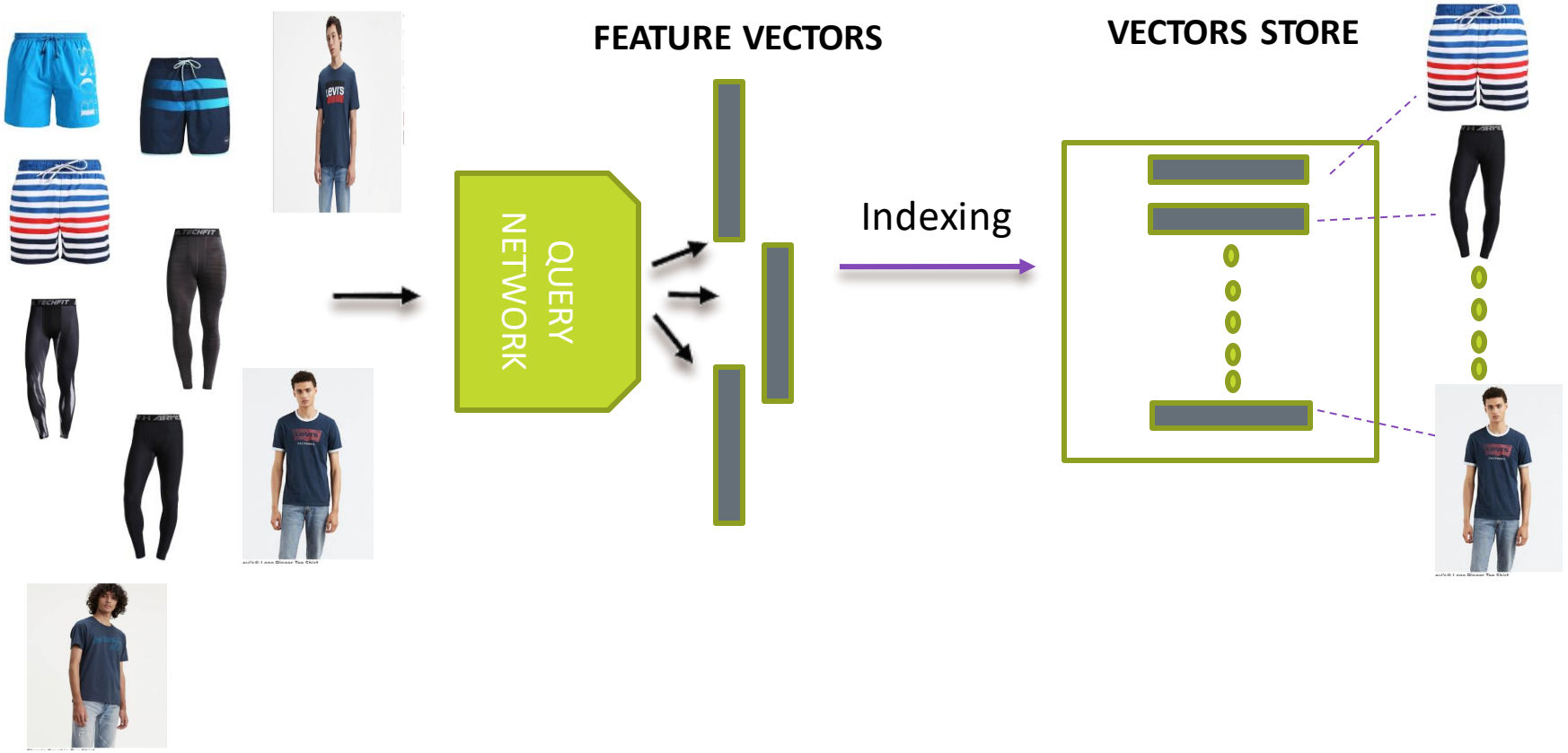
Our result



PUTTING IT ALL TOGETHER

Case Study: Visual Recommendations

VISUAL RECOMMENATIONS: INDEXING



VISUAL RECOMMENATIONS: INDEXING

CATALOG

QUERY NETWORK

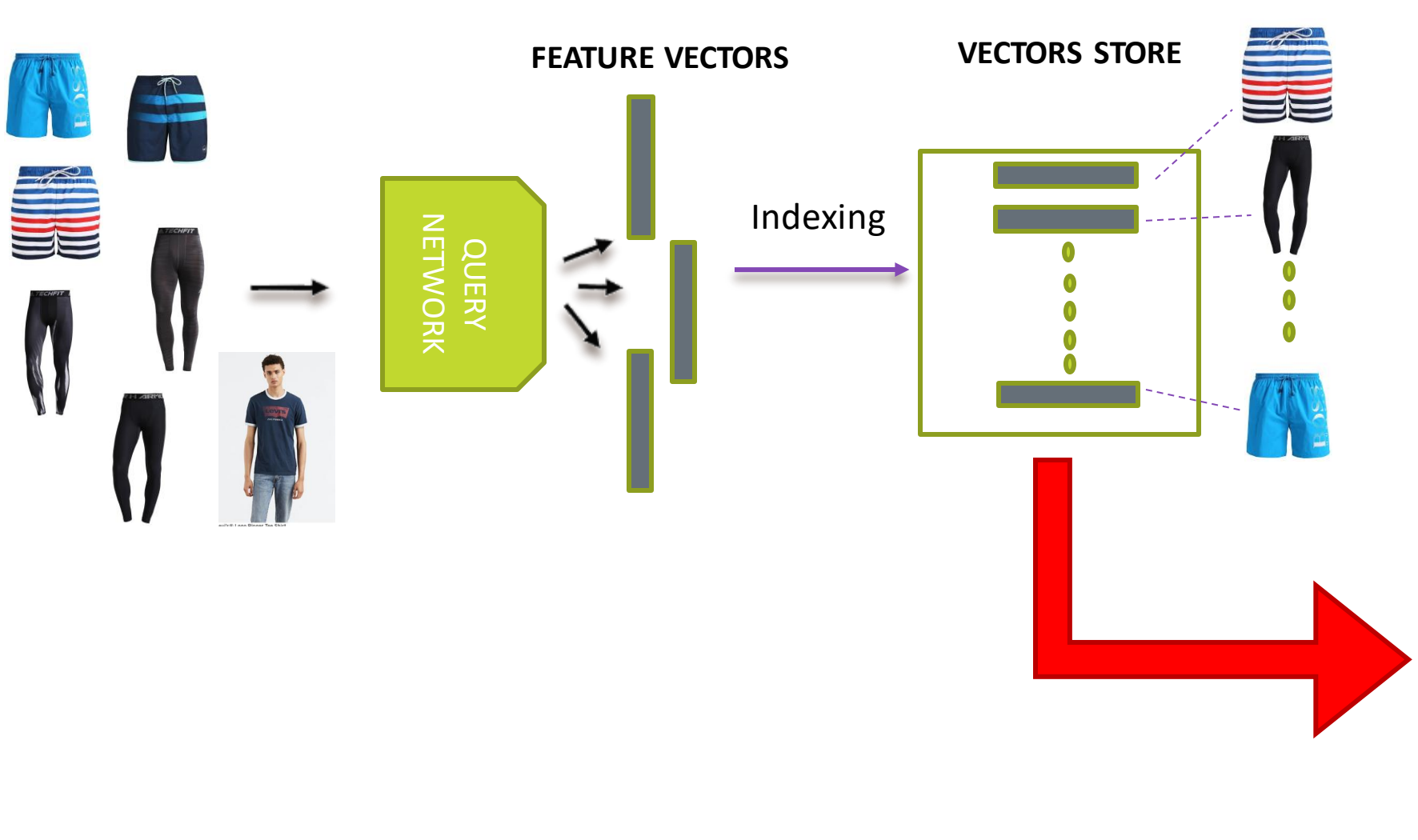
FEATURE VECTORS

Indexing

VECTORS STORE

Image	Best Matches	
		
		
		

VISUAL RECOMMENATIONS: INDEXING



VISUAL RECOMMENATIONS: INFERENCE

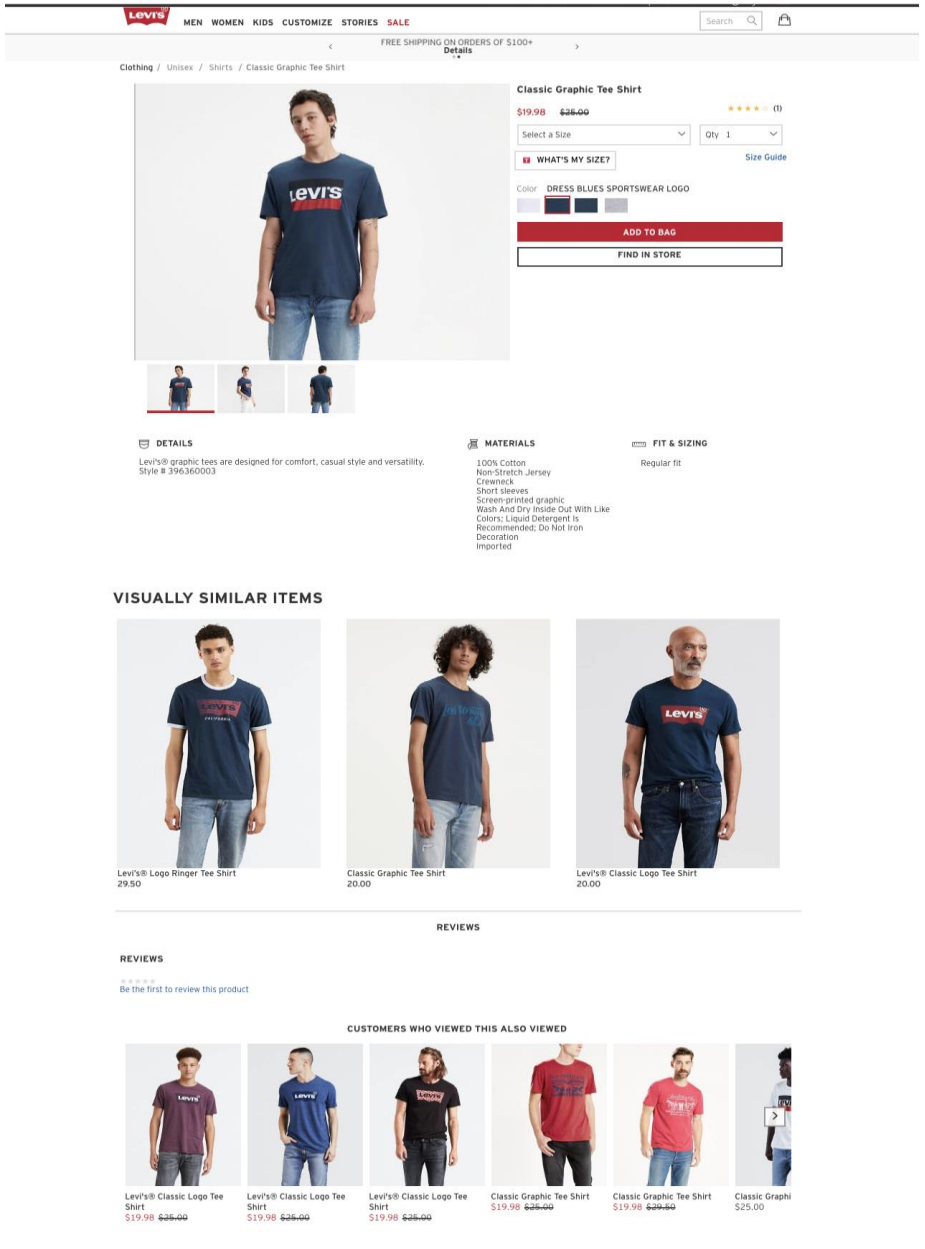
BROWSED CATALOG PRODUCT

Search

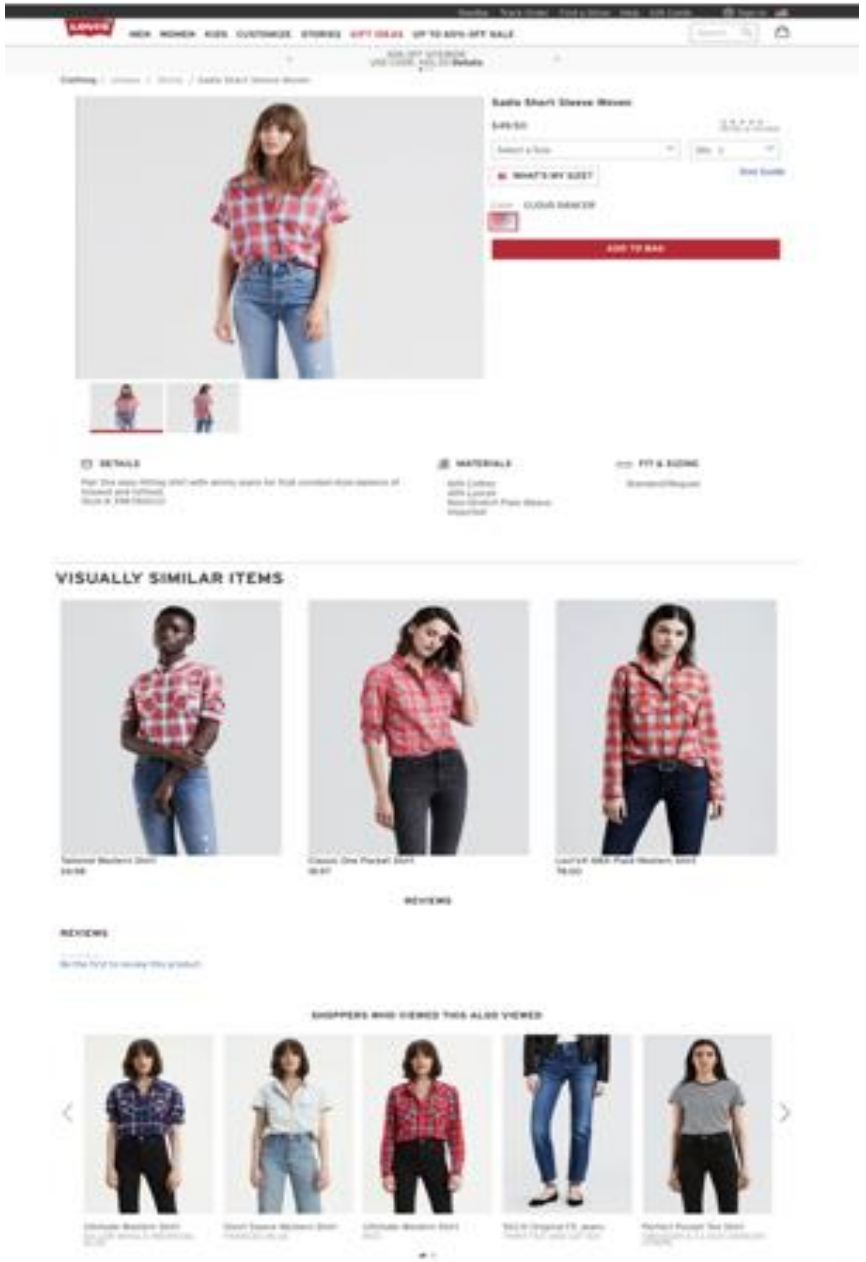
Image | Best Matches

Retrieval

Best Matches



VISUAL RECOMMENDATIONS IN ACTION

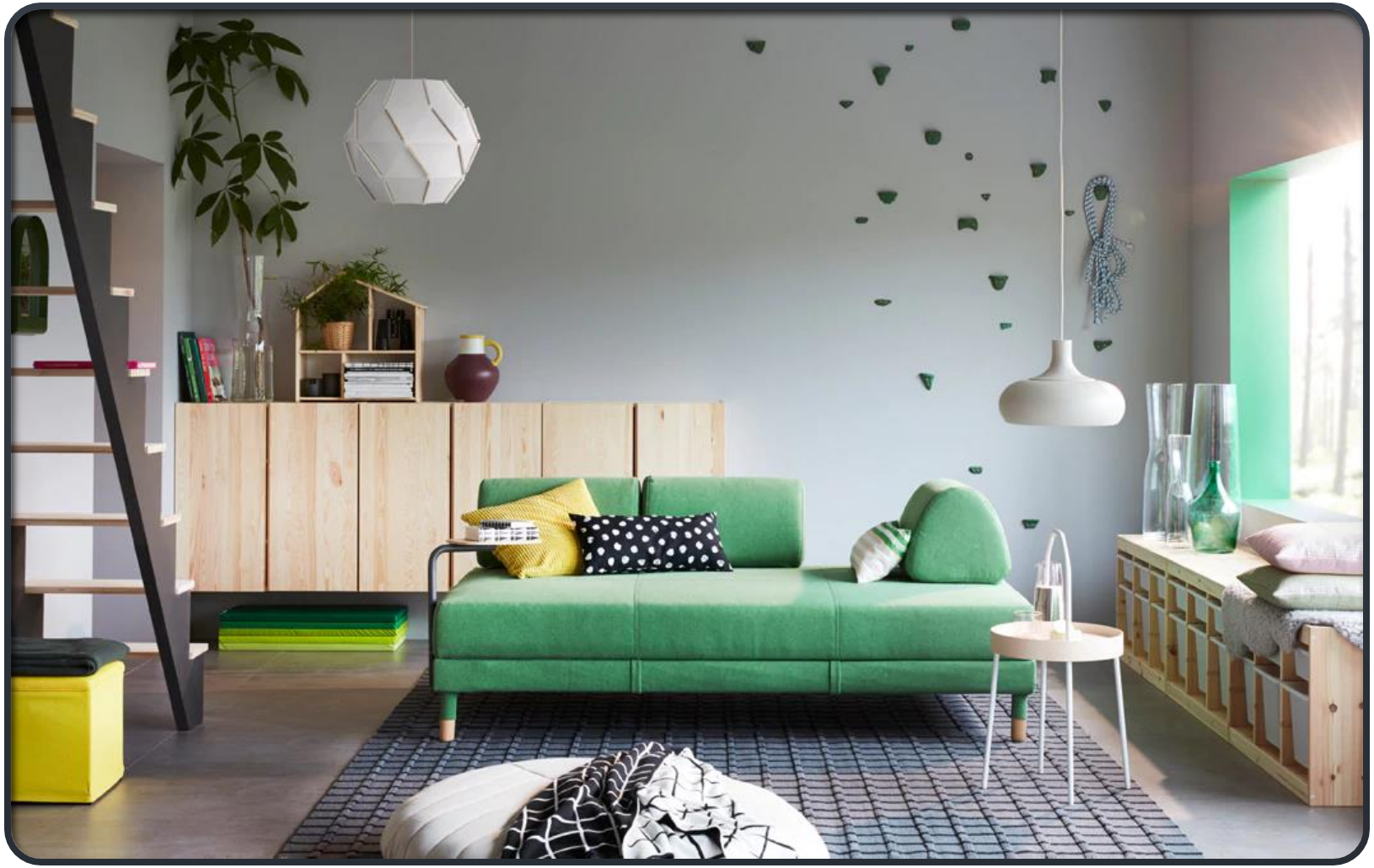


NEXT STEPS

Deep Product Search on Furniture

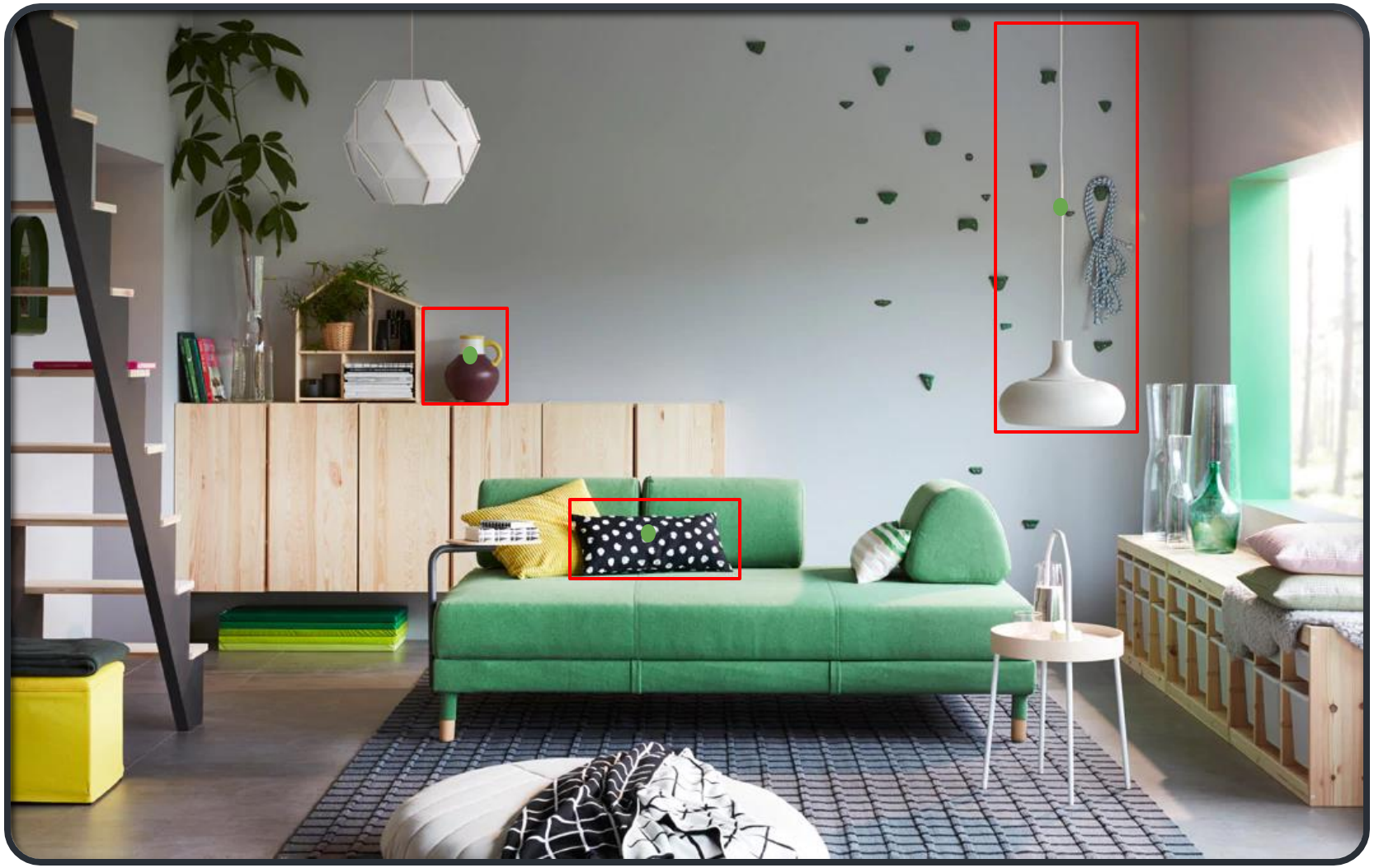
DPS ON FURNITURE

QUERY IMAGE



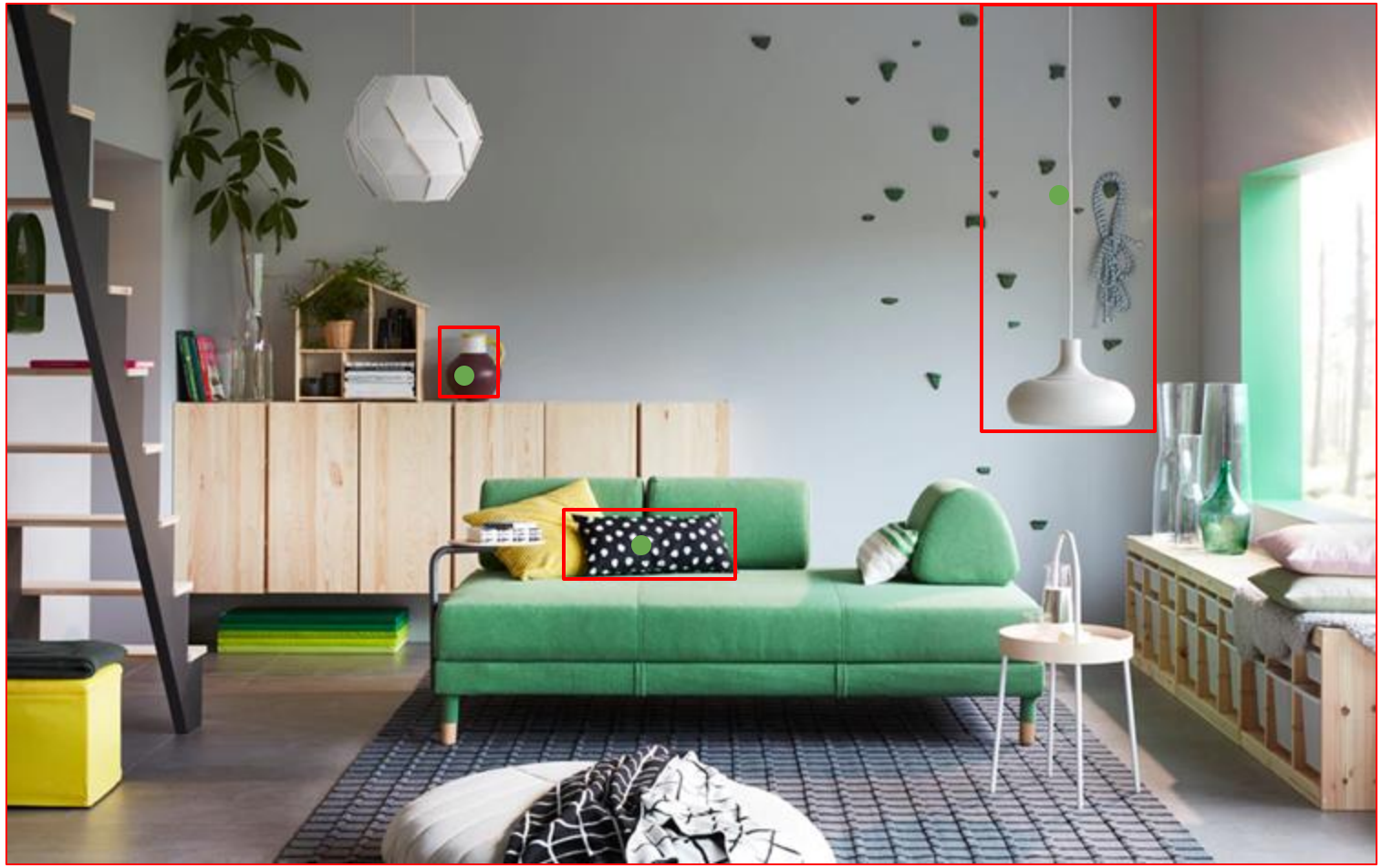
DPS ON FURNITURE

HOTSPOTS DETECTED

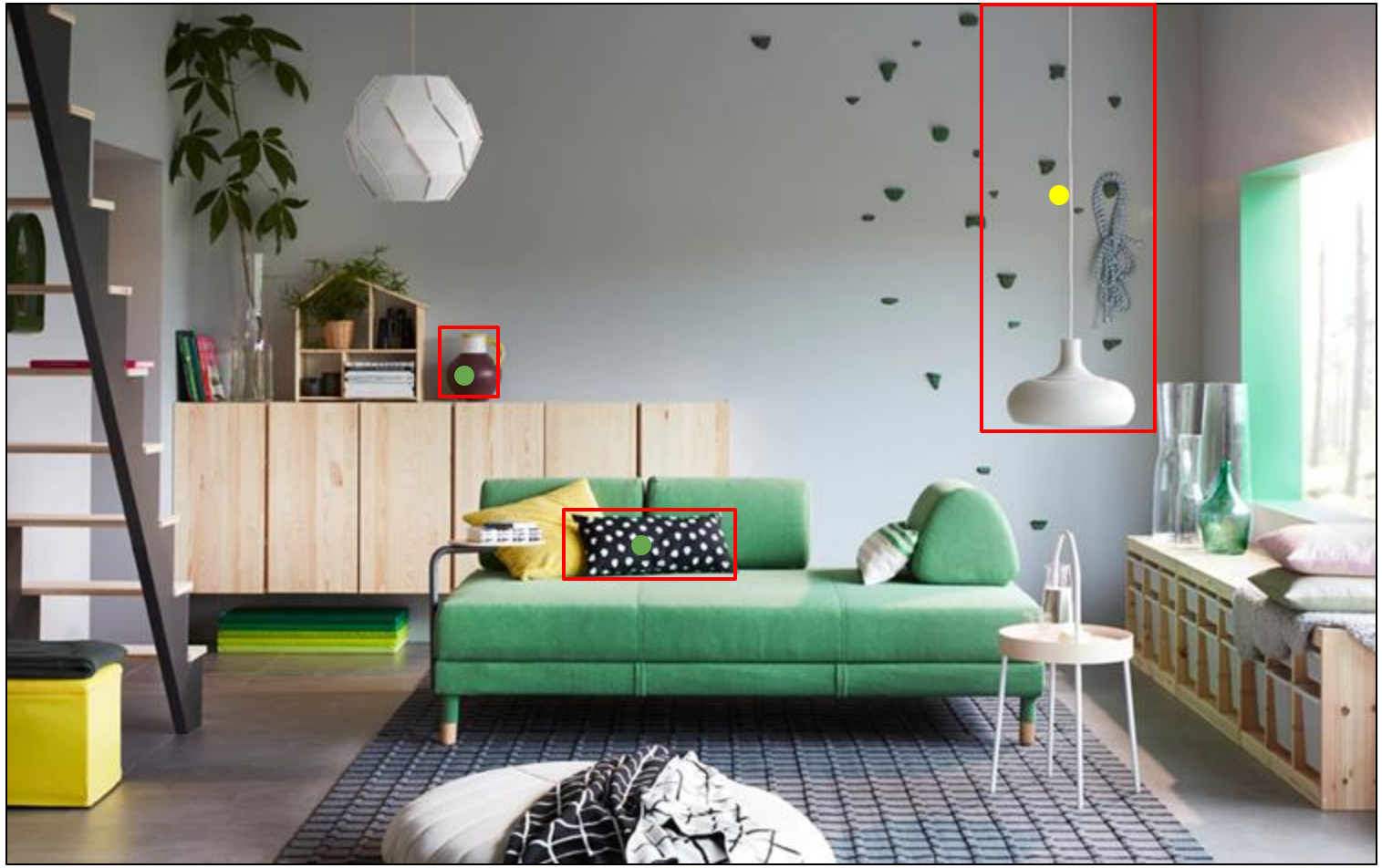


63

Query Image with detected product bounding boxes



Query Image with detected product bounding boxes

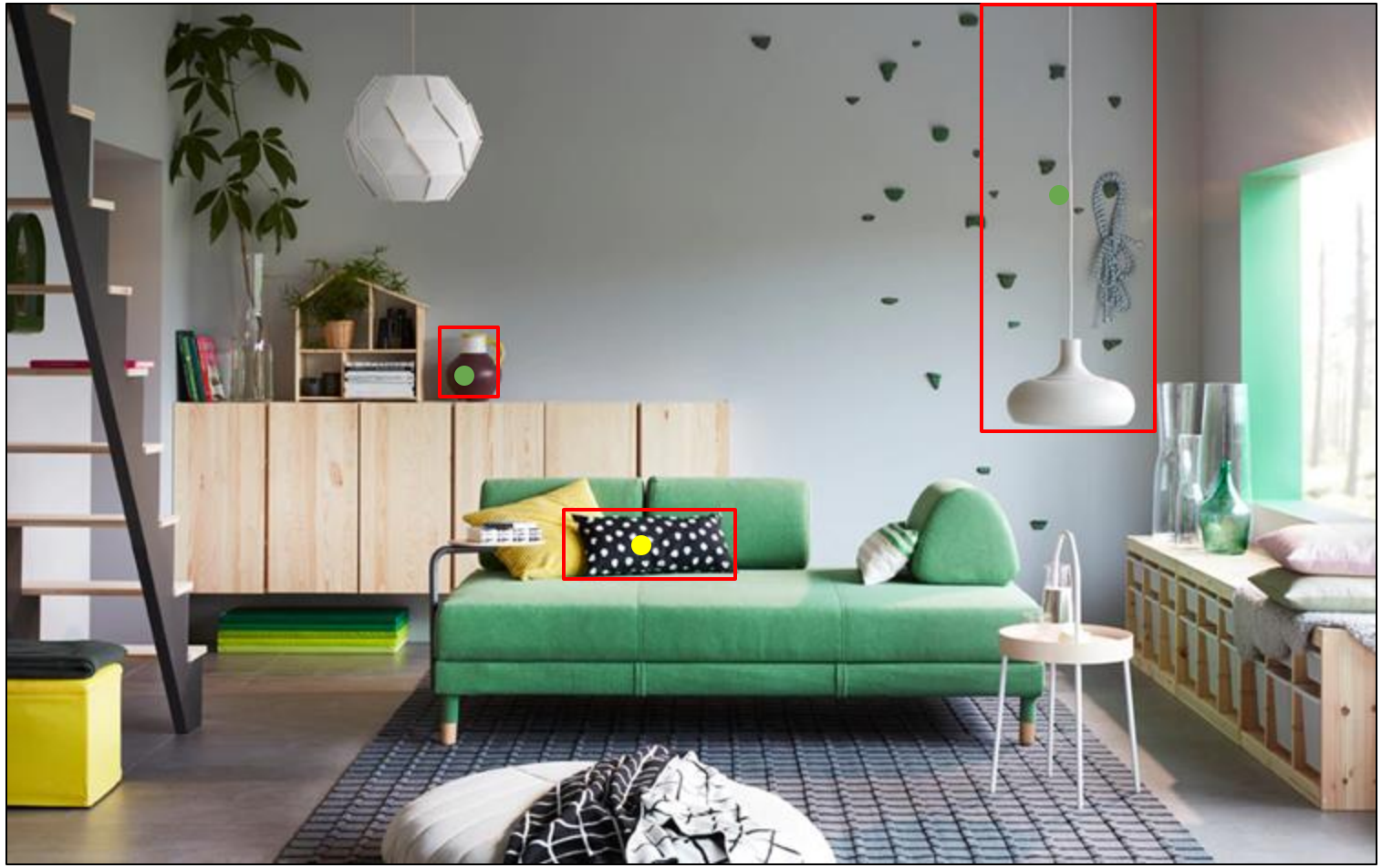


Retrieved Images

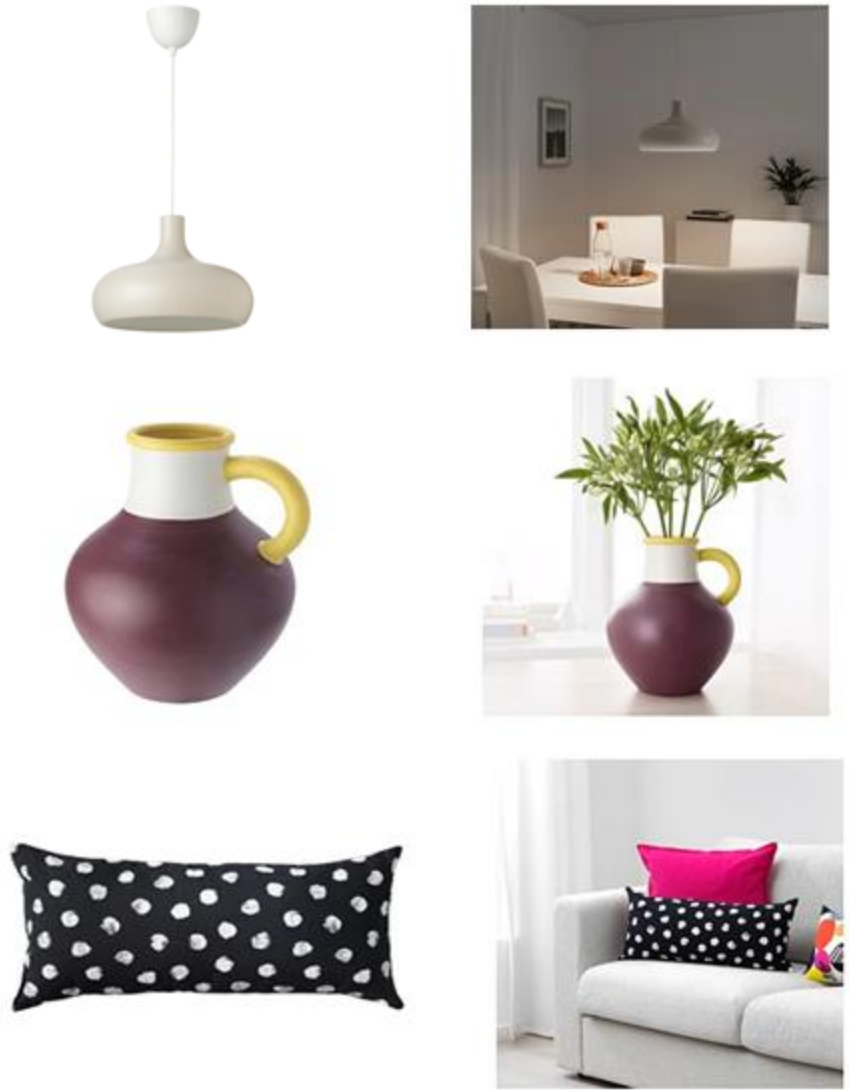
Query Image with detected product bounding boxes

Retrieved Images

Query Image with detected product bounding boxes



Retrieved Images



KNOW MORE

1. Wiki – https://wiki.corp.adobe.com/display/DMSArchitecture/Deep+Product+Search+Overview
2. Demo – https://git.corp.adobe.com/mdsr/DPS_demo
3. API - https://wiki.corp.adobe.com/display/DMSArchitecture/DPS-API

REACH US

1. DPS @ Tech Fair – 5th Feb, 6 – 9 PM
2. Team Leads – Balaji K (kbalaji), Mausoom Sarkar (msarkar)


Adobe


Adobe