Boosting Recommender Systems with Deep Learning

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Platform for
Luxury Fashion

230 Countries

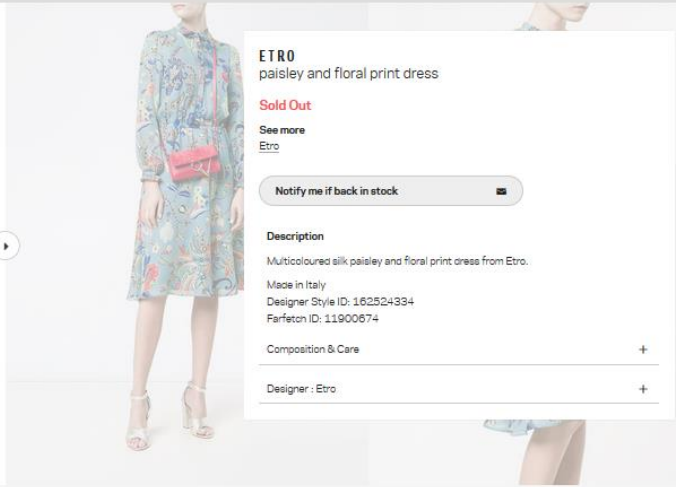
2500 Brands
500 Boutiques

300K Products
4M users

200 clickstream
events / sec

1800+ employees
20+ in Data Science

Visual Similarity



ETRO

paisley and floral print dress

Sold Out

See more

Etro

Notify me if back in stock

Description

Multicoloured silk paisley and floral print dress from Etro.

Made in Italy

Designer Style ID: 162524334

Farfetch ID: 11900674

Composition & Care +

Designer : Etro +

YOU MAY ALSO LIKE

RECOMMENDATIONS RECENTLY VIEWED

MARC JACOBS

floral wrap dress

BORGO DE NOR

kimono belted dress

ALBERTA FERRETTI

ruffle dress with keynole neckline

ISSEY MIYAKE

textured high-neck dress

MARNI

Trellis print midi dress

Visual similarity

Deep Learning for **feature extraction**

Off-the-shelf Model

- ResNet-50 pre-trained on ImageNet
- Previous to last layer for the embeddings

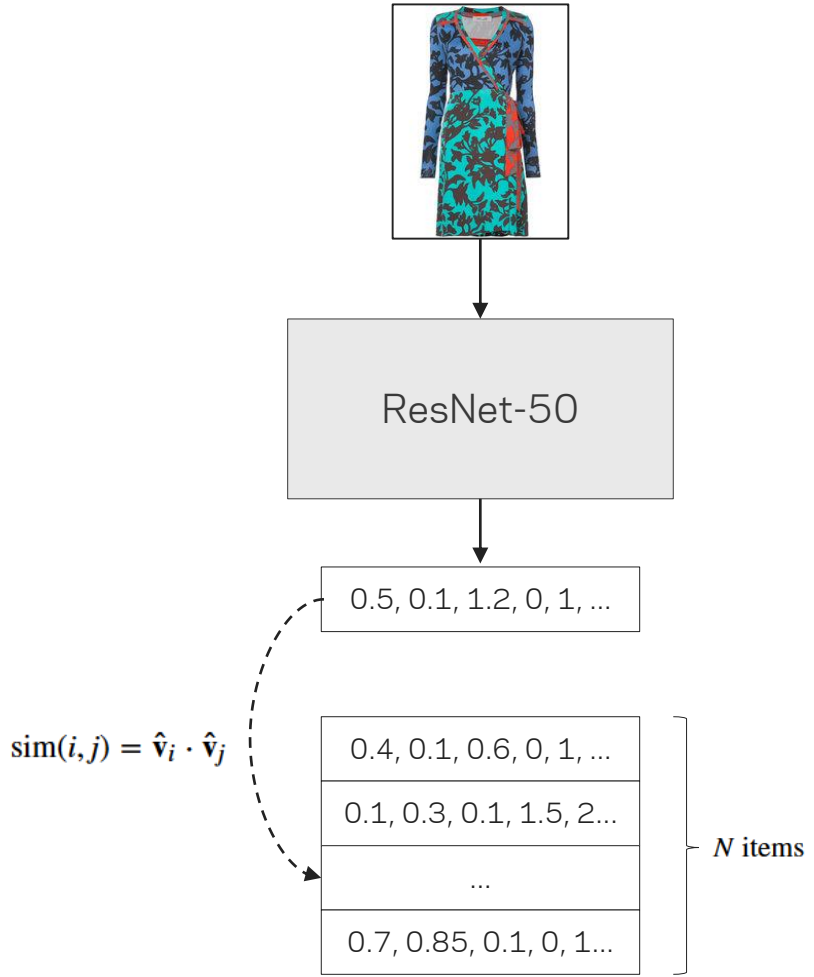
Find similar items

- Nearest neighbours with cosine similarity

Easy, fast, testable

Useful in some contexts

- Out of stock replacement
- Smart mirror in a fitting room



FARFETCH

FARFETCH

Train for another objective

Extend network to predict categories

- Start with ResNet
- Add more dense layers

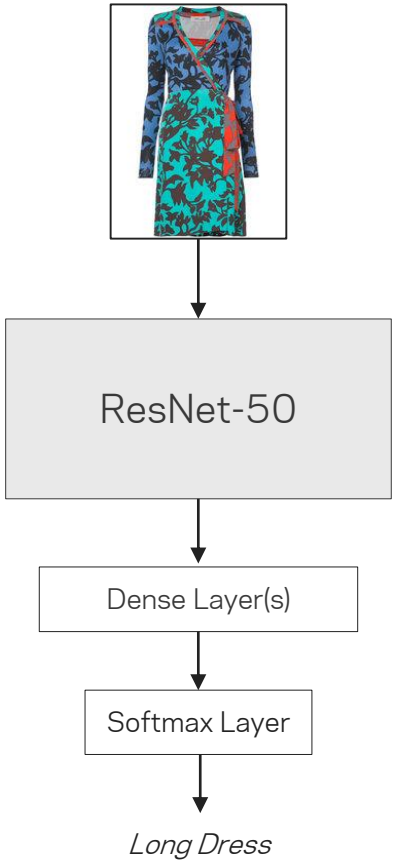
Retrain

- Start with pre-trained weights
- Fine-tune last layers of ResNet

Use new predictions

- Find and fix catalog erros
- Cross learn item attributes

Use new embeddings



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Complementary Products

A more complex problem

Can we model complex stylistic relationships?

Pairwise complementarity score

- Learn a function y = f (i , j) that takes a pair of items, and outputs a score

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Deep Siamese Neural Network

Embeddings

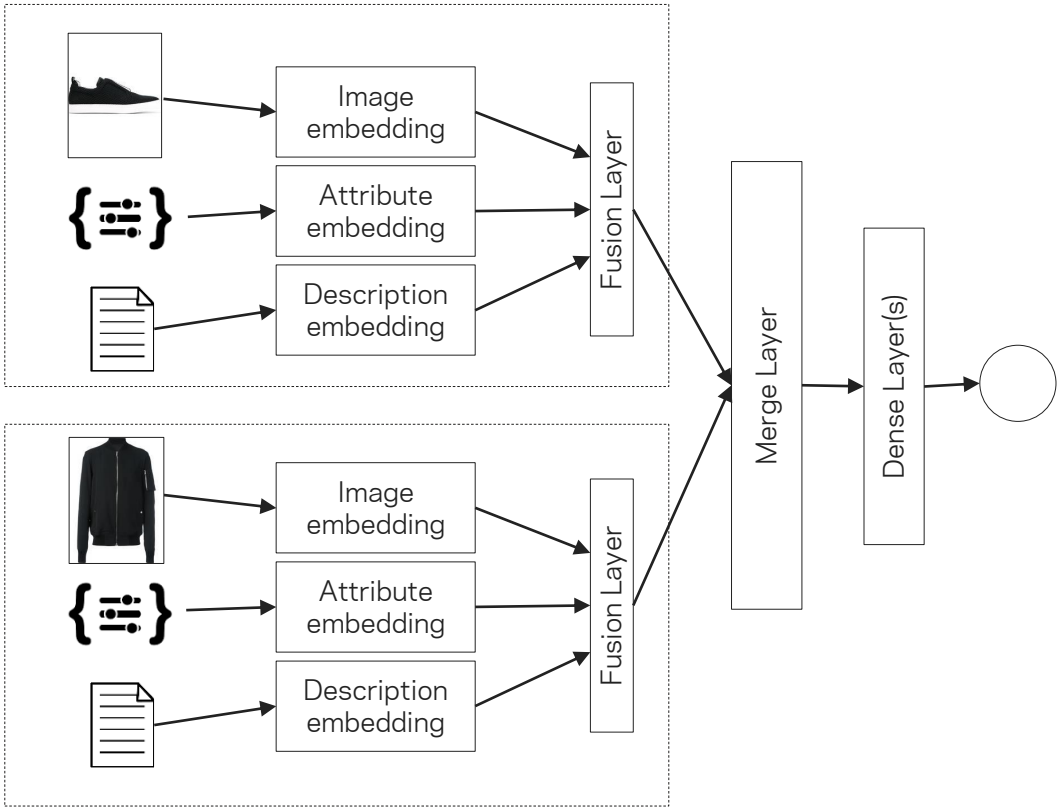
- Shared between both legs
- Weights are learned

Fusion Layer

- Concatenation

Merge Layer

- Concatenation
- Element-wise max/min/sum/avg



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Training data

Positive pairs

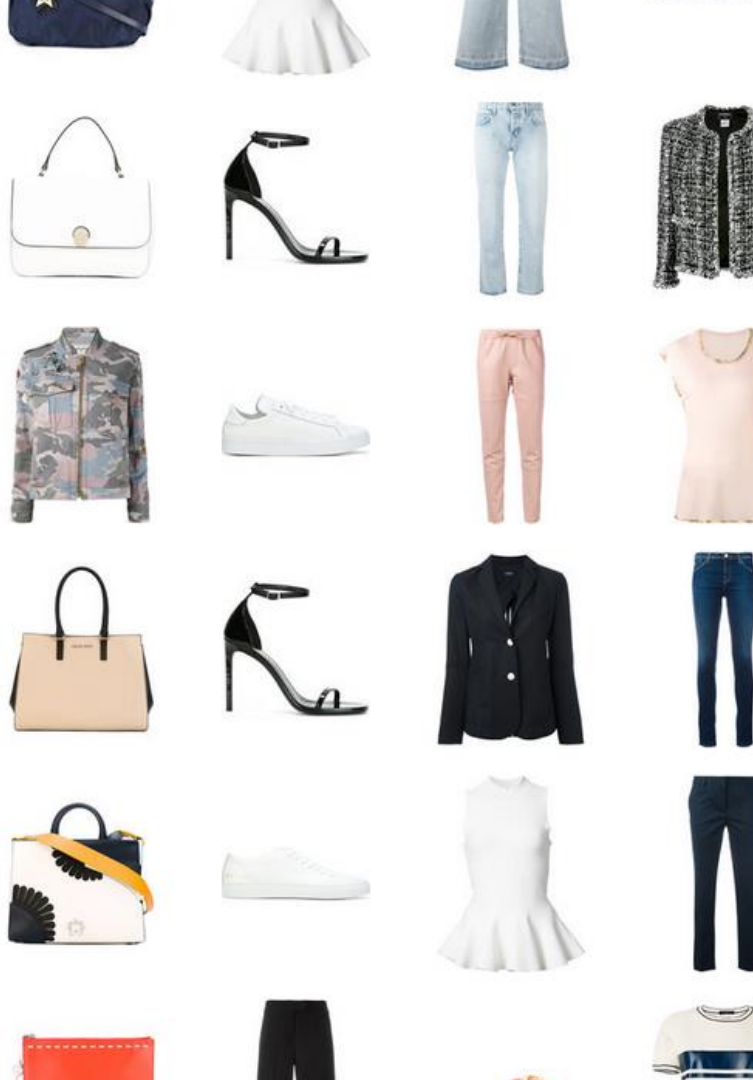
- Next-click / same-basket / same-session pairs are noise day
- We use our collection of >100k **manually curated outfits**
- External datasets

Negative pairs

- Random may work (if you have enough data)
- Manually labeled data is better

Data augmentation to expand

- Find pairs with items similar to observations
- Image translation, rotation, noise will make the network more robust



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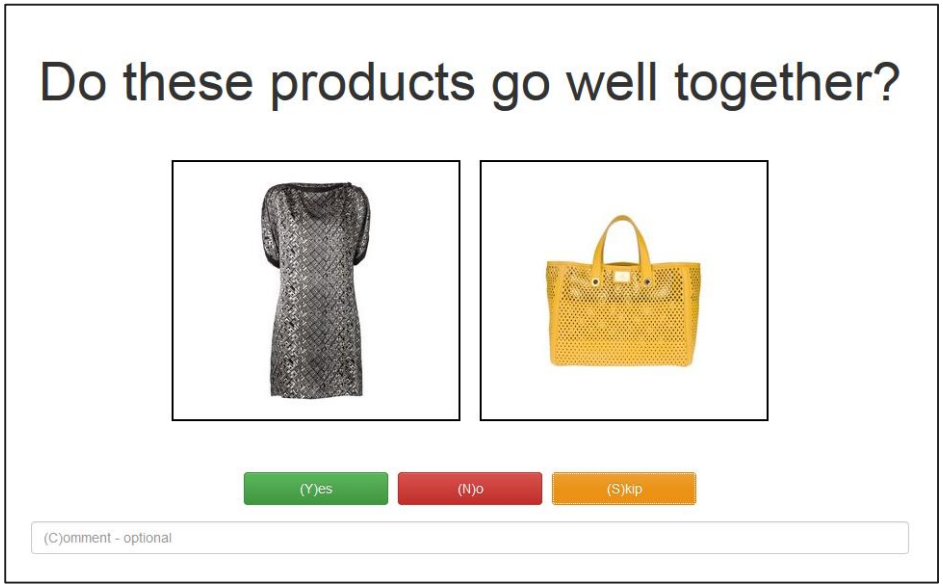
Human in the loop



Good, reliable, **labeled data is a competitive advantage**. Involve your company in your problem!

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GIVENCHY

SALVATORE FERRAGAMO

RICK OWENS

PIERRE HARDY

FASHION CLINIC TIMELESS

LANVIN

LANVIN

SIMON MILLER

FARFETCH

Conclusions

Next Steps

Outfit generation

- Pairwise function is not sufficient
- find a function f(i, j , k...) that takes a set of products and **outputs goodness of outfit**
- Extend our siamese network with more legs

Use DL embeddings in current recommendation models

- In content-based and hybrid models
- **As side information in MF**
- To solve item cold-start problem

Personalized recommendations with end-to-end DL

- Exciting approaches seen at DLRS!

Conclusions

Deep learning is not trivial, but it isn't hard to get started

- You can do incremental improvements to many components of your rec-sys
- Start simple, try off the shelf models
- Fine tune to your problem

Get good data

- Involve your company's experts
- Crowdsource

Deep network engineering is fun!

- Great potential for innovation

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Thank you!

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We're hiring!

Get in touch for research collaborations