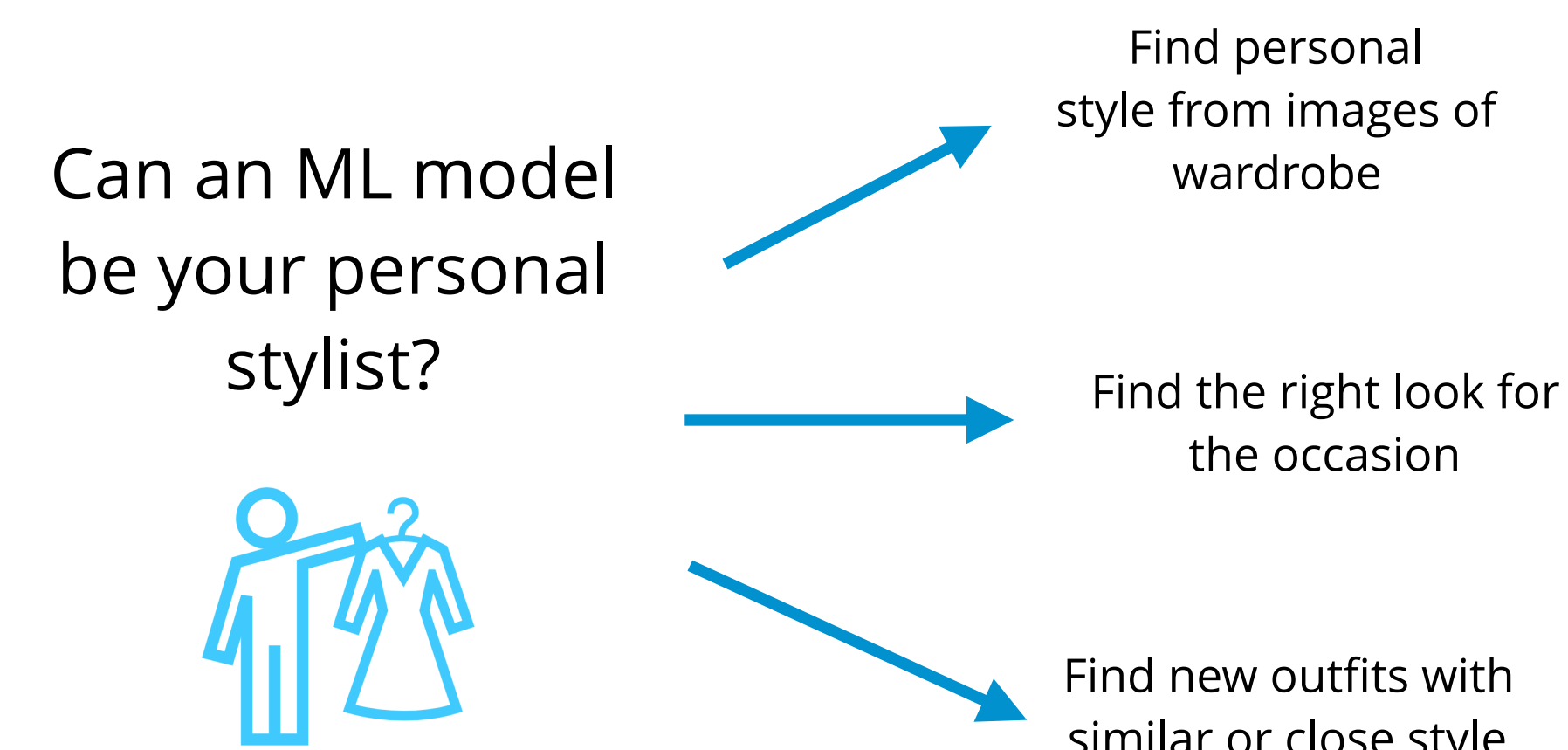


Discovering Latent “Style”

An Approach to Recommending and Matching Clothes

Urvashi Uberoy, Khyati Agrawal, Andrew Zeng

Motivation



Goals

- Capturing relationships between attributes of clothing (such as cut, color, fabric) and latent “looks” (such as “professional”, “formal”, “casual”)
- Quantifying similarity between clothing items based on latent attributes and using this to match items of clothing.

Dataset

Deep Fashion Attribute Prediction Dataset



289,222 number of **clothes images**

Images of **tops** and **bottoms**

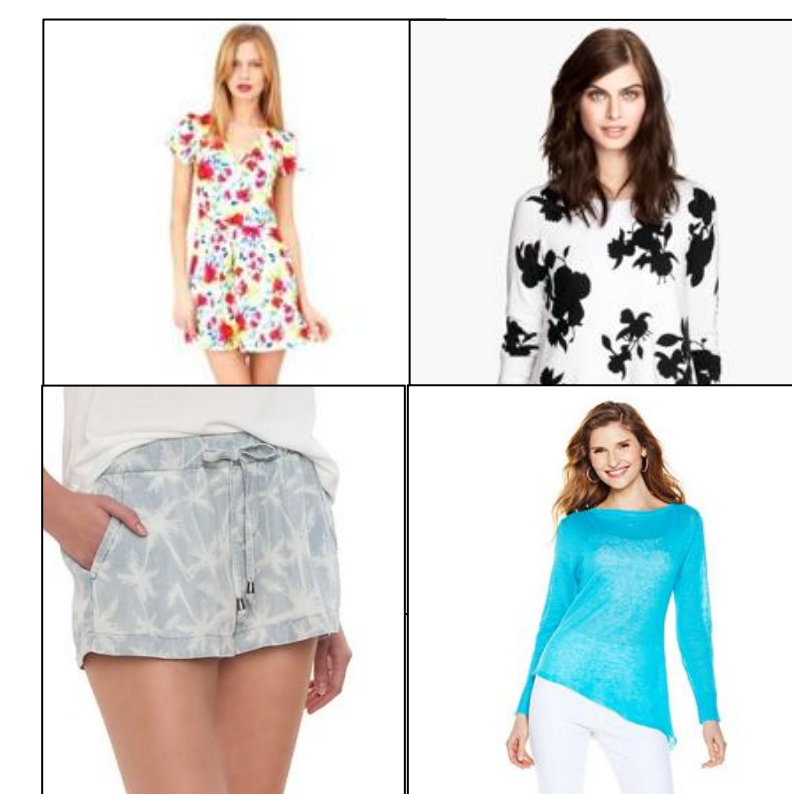
1,000 number of **clothing attributes**

Example data point



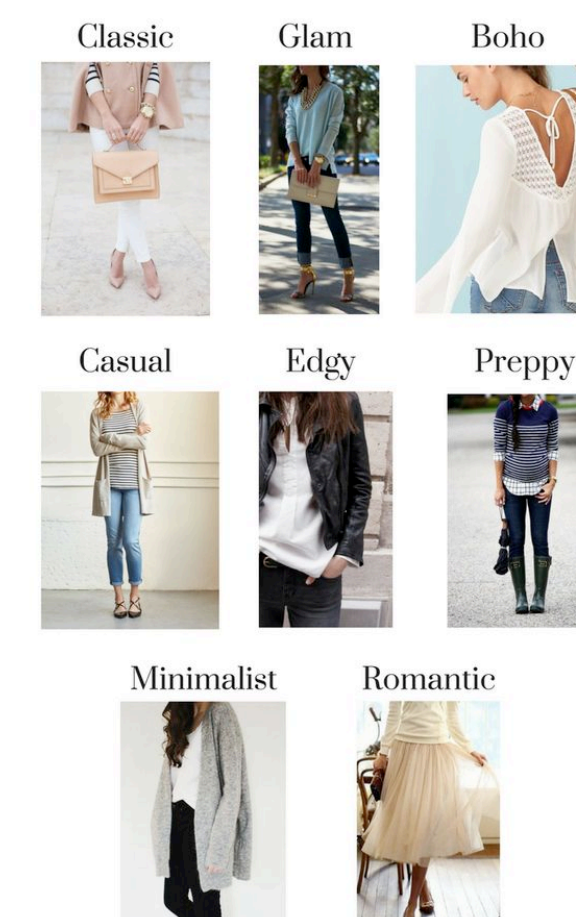
Approach

Unsupervised Learning: Topic Modeling



Documents =
collections of
attributes for a image

Words = semantic
visual attributes



Topic =
fashion style

Implementation

Latent Dirichlet Allocation (LDA):

- Hyperparameters:* Number of components, Learning rate Cross validated on sets [5, 10, 15] and [0.5, 0.7, 0.9]

Non-negative Matrix Factorization (NMF):

- Hyperparameters:* Number of components

Restricted Boltzmann Machine (RBM):

- Hyperparameters:* Learning rate, Number of training iterations, Number of latent variable: Cross validated in [0.1, 0.01, 0.001] and [20, 40, 80]

Methods for matching and finding similar clothing:

- Experimented with L2, L1 and hamming distance between items in the latent variable space
- Used a random matching scheme as a baseline

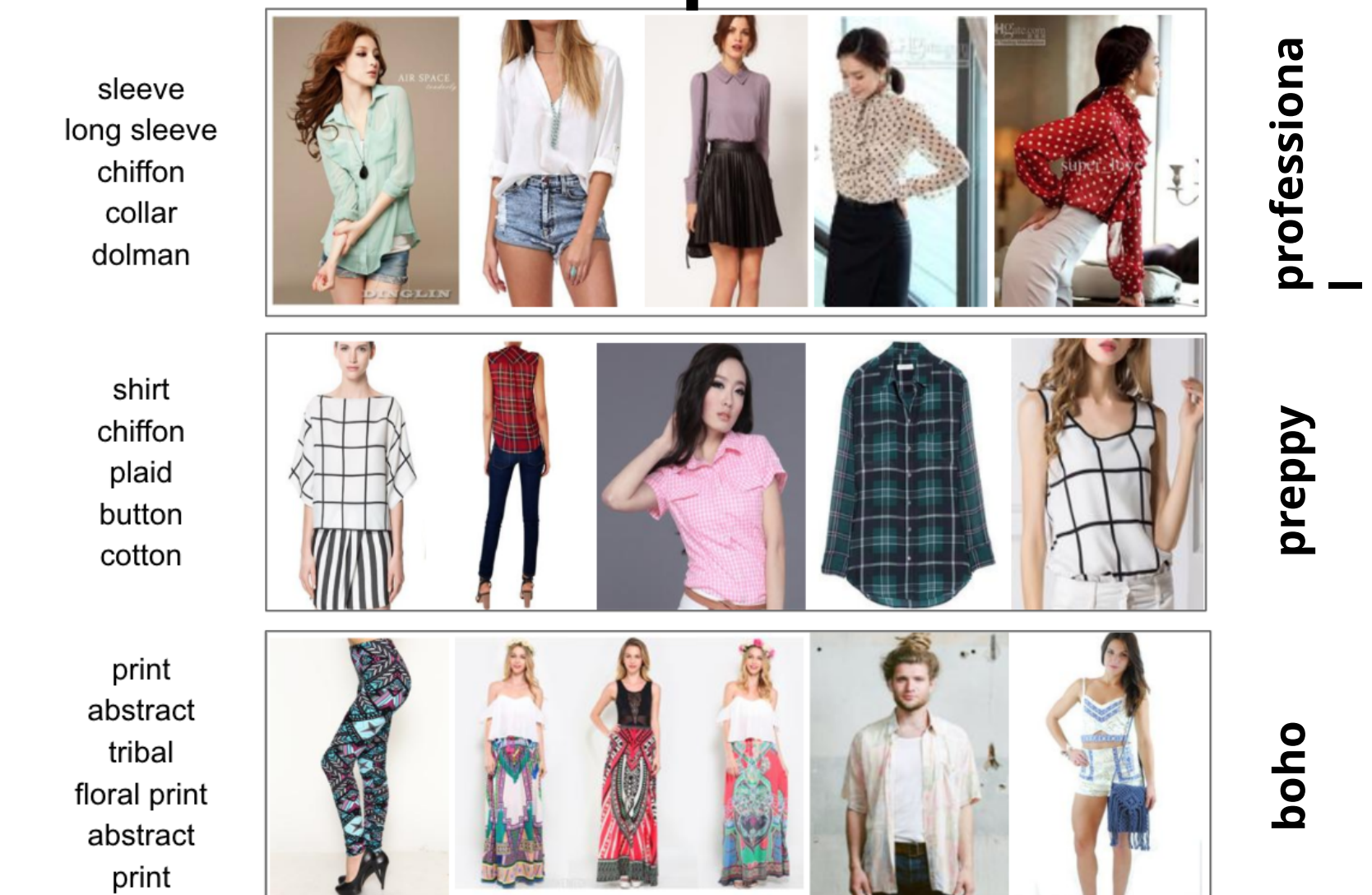
Results

Metric: Average Reconstruction Error (per sample)

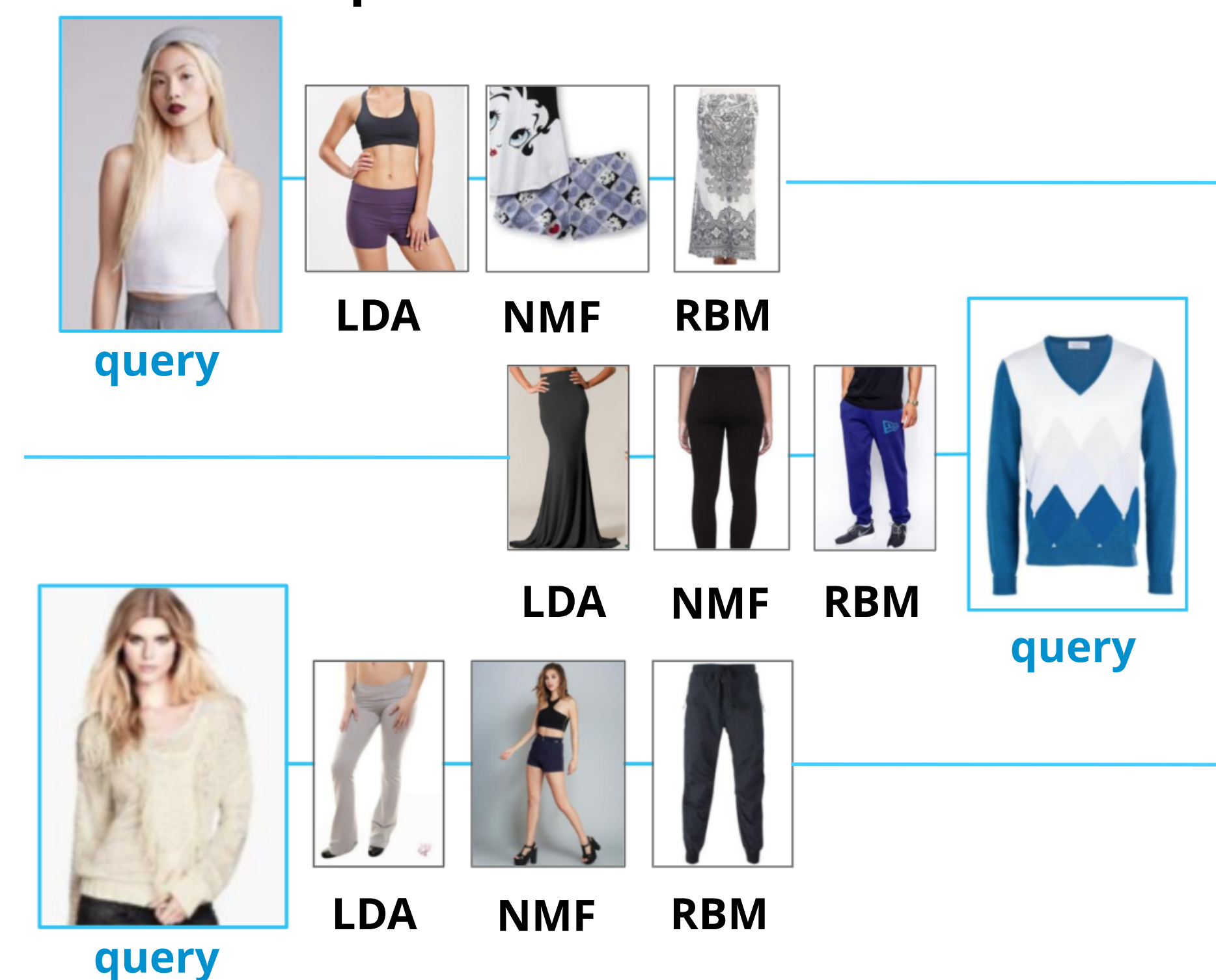
	LDA	NMF	BRBM
Train Error	0.0063	0.0056	0.0062
Test Error	0.0126	0.0112	0.0125

Latent Style and Matching

Similar Topics for NMF



Sample Matches across Models



Discussion & Conclusion

Key conclusions:

- All three models were able to capture broad latent styles like "casual", "floral/summery", "formal"
- NMF and RBM performed better at matching tops and bottoms than LDA.
- Our approach is appropriate for finding items sharing "style" for out-of-sample (test) examples.

Observations:

- Matching appears to be better for women's clothing than men's clothing because of more training data.