

Machine Learning as the Key to Personalized Curation

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<https://github.com/karyafar/openAir2015>

Overview

Etsy

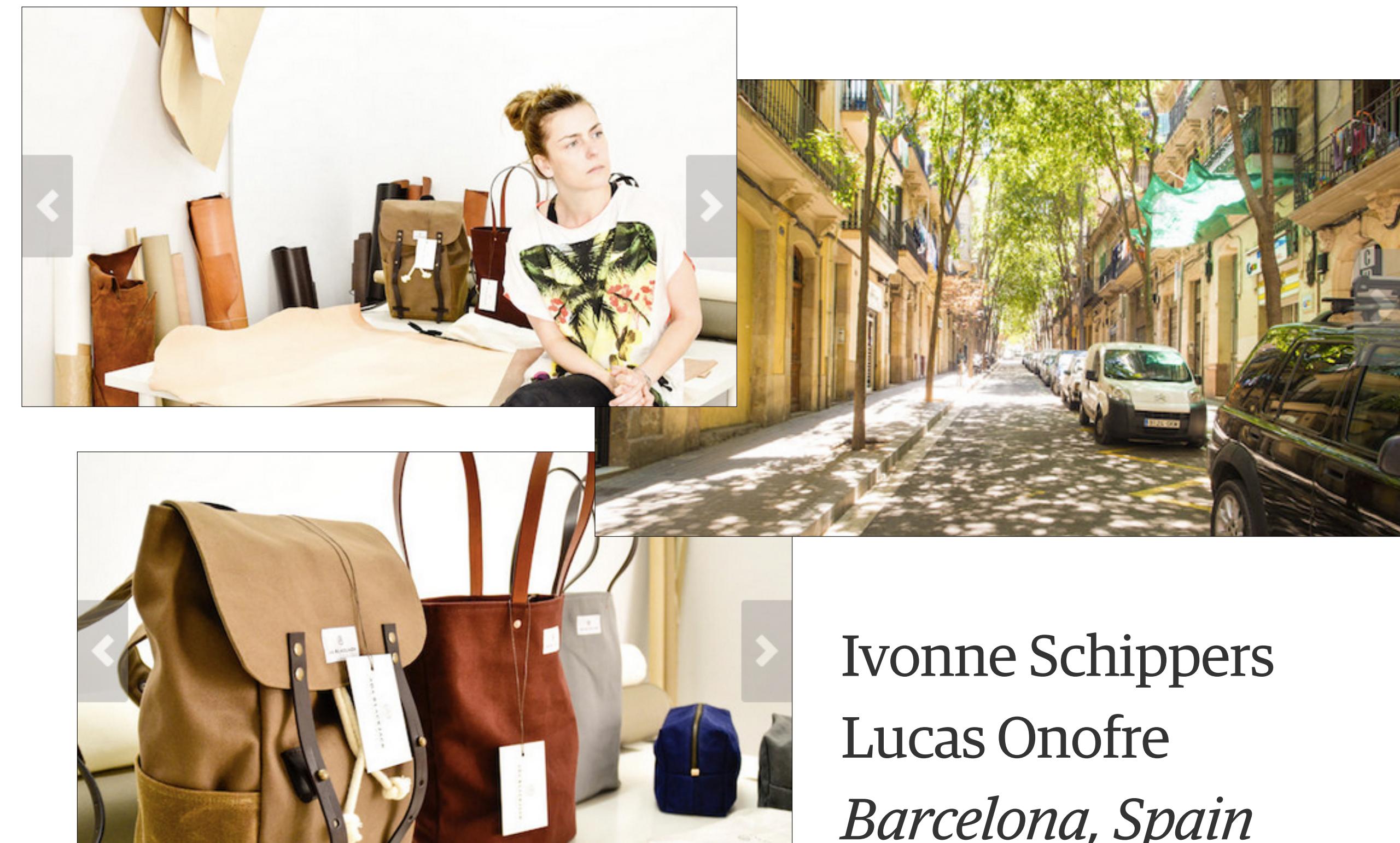
Personalized Recommendations on Etsy

Machine Learning Models @ Etsy

Conclusion

Etsy is an online marketplace where people connect to buy and sell **unique** goods: Handmade, vintage, or craft supplies

The screenshot shows the AdaBlackjack shop page on Etsy. The top navigation bar includes categories like Art, Home & Living, Jewelry, Women, Men, Kids, Vintage, Weddings, and Craft Supplies. The search bar contains "Etsy". The shop's logo is "ADA BLACKJACK BAGS & LEATHER GOODS". The shop owner is Ivonne from Barcelona, Spain. The shop has 122 sales and 2,630 admirers. The "Shop Sections" sidebar lists items: tote (6), pouch (3), satchel (3), wallet (3), backpack (7), and case (3). The "Shop Owner" section shows Ivonne's profile picture and contact information. The "Shop Info" section shows the shop opened on Jan 4, 2012, and provides links for About, Policies, Seller Information, Reviews (42), and Actions (Add to favorites, See who favorites this). The main content area displays featured items from AdaBlackjack, including bags like the No. 2 - Backpack, Dark Grey (\$226.21 USD) and No. 9 - Slim Tote, Auburn (\$130.24 USD). There are also sections for bags like the No. 10 - Satchel and No. 5 - Card Holder.



Ivonne Schippers
Lucas Onofre
Barcelona, Spain

People buy and sell on Etsy from nearly every country in the world.

~21M

Active Buyers

1.4M

Active Sellers

~35M

Listings

Stats as of March 31, 2015

In a 2014 survey of Etsy buyers, 92% agreed that Etsy offers products they cannot find elsewhere.

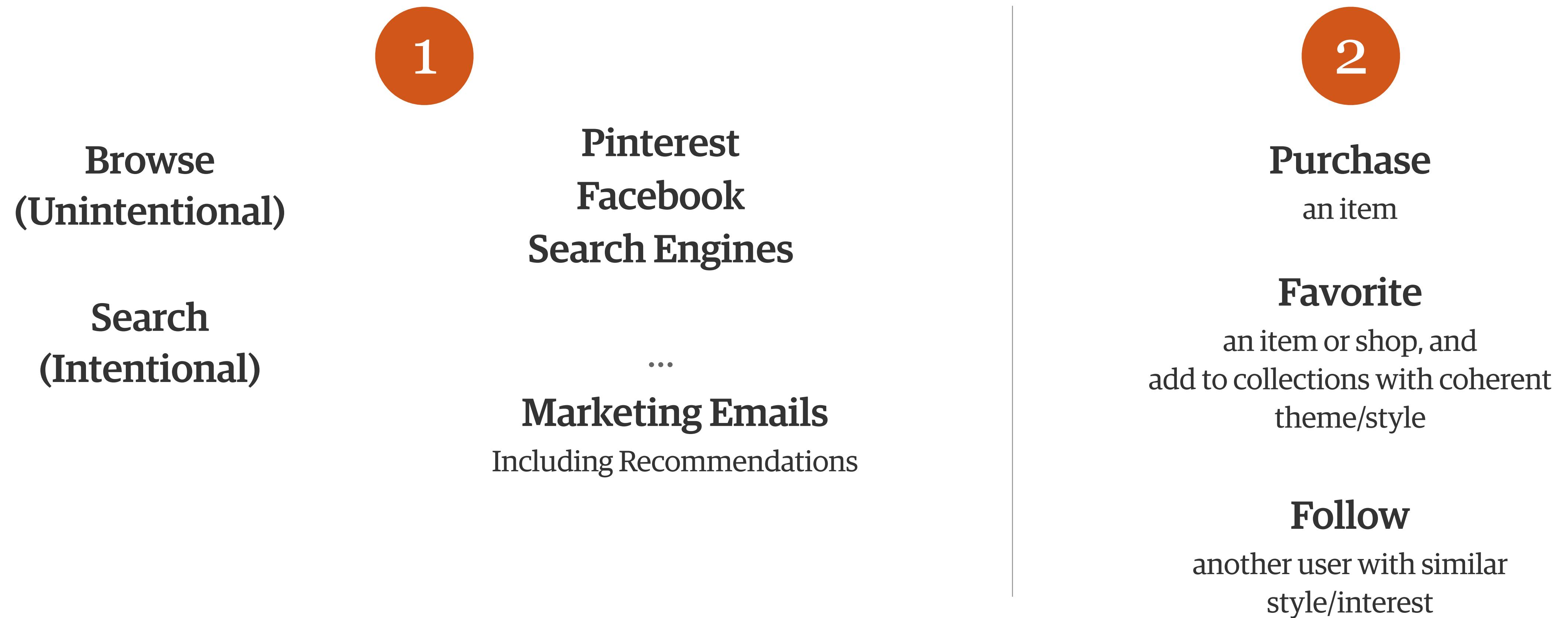


PendantWorld



Circuit Board Pendant!

How do people typically use Etsy?



Etsy Overview

All Categories > "desk lamp" (10,756 Results)

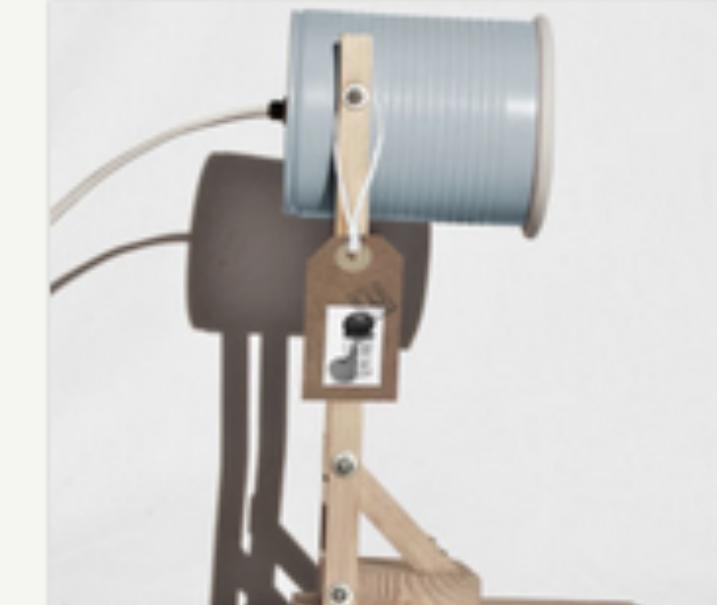
Sort By: Relevancy ▾

 Ad
Edison Lamp Nostalgic - Steampunk ...
Timberson \$95.00 USD

 Ad
Cascade Lamp by LightWater Artisans
LightwaterArtisans \$749.00 USD

 Ad
Brass Branches Desk Lamp w/ Marbl...
brandonlenoir \$199.00 USD

 Ad
Desk Lamp, Nursery Lamp, Bedside ...
EllaMenoPeaDesign \$65.00 USD

 Ad
Desk lamp , pastel light cyan color.....
ILIU \$29.25 USD

 Ad
Mid Century desk lamp vintage yello...
rubyinthesky \$49.99 USD

 Ad
Vintage Mid-Century Desk Lamp
UrbanAmericana \$125.00 USD

 Ad
Industrial Desk Lamp - Mint Green Wi...
IndLights \$89.00 USD

 Ad
Nintendo zapper gun desk lamp
WarriorGameCrafts \$65.00 USD

All Categories > “desk lamp” (10,756 Results)



Edison Lamp Nostalgic - Steampunk ...

Timberson

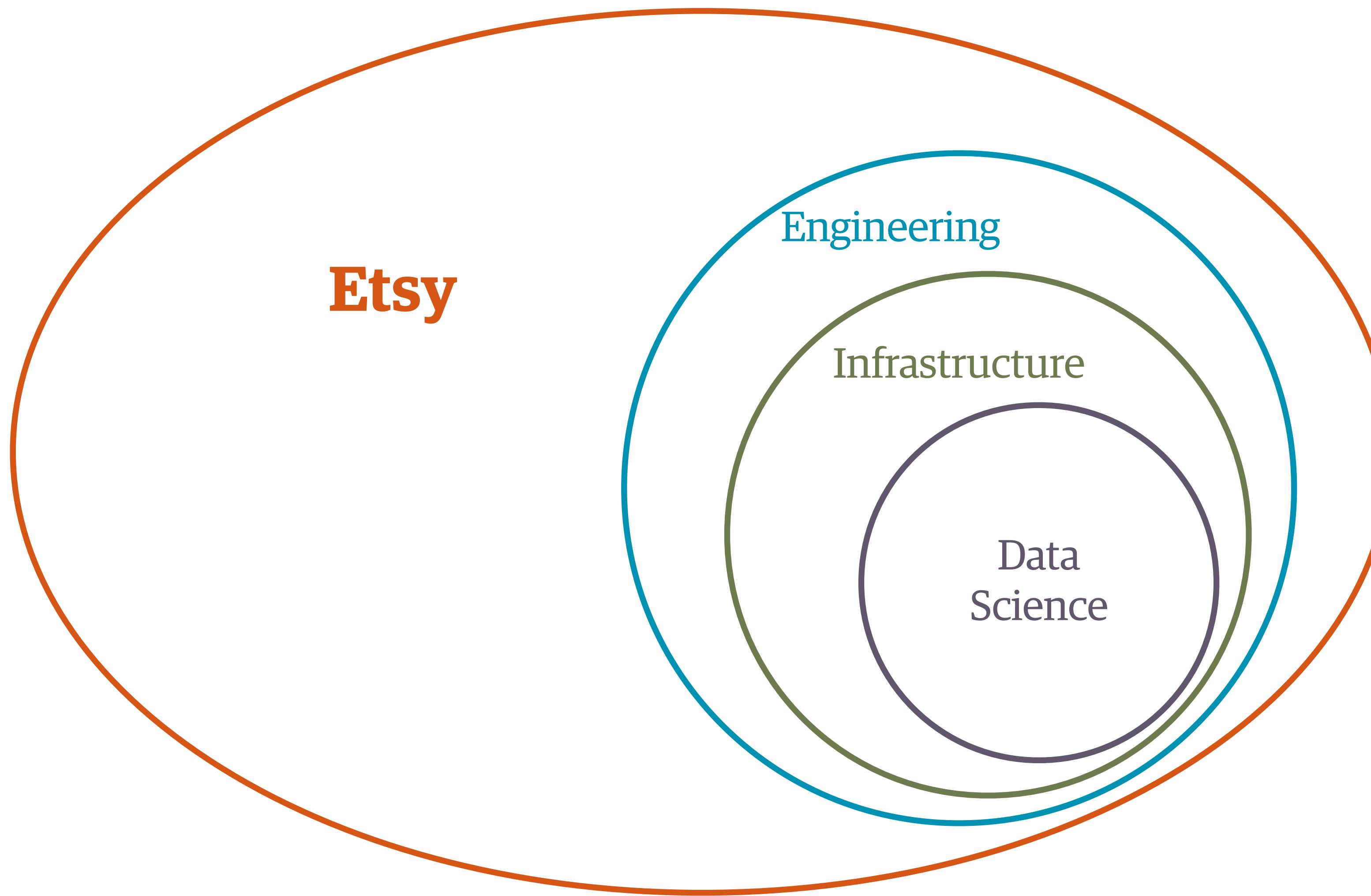
\$95.00 USD



Cascade Lamp by LightWater Artisans

LightwaterArtisans

\$749.00 USD



Data Science



Rob Hall

Search, checkout



Diane Hu

Buyer Experience, Buyer Activation
Manufacturing



Kamelia Aryafar

Security, Marketing, Membership



Josh Attenberg

Team Leader, Local



Andrew Clegg

International, Ops, Security



Corey Lynch

Search, Ads

Recommendations on Etsy

Recommendations on Etsy



Bamboo Honeycomb Place Mat &...

\$51.67 USD | buProducts



Similar to some of your favorites

...

ITEM RECS

Justin Huan
, SG

Follow

1573 favorites >

Has favorites we think you'll enjoy

...

This block displays a user profile for Justin Huan from Singapore. It includes a circular profile picture of a black dog, the user's name and location, a 'Follow' button, and a section showing items liked by the user with a count of 1573.

USER REC

102 items >

RichwoodCreations ★★★★★
Rustic, Functional & Decorative ...

...

Sells items similar to your favorites

...

This block displays recommendations from the shop RichwoodCreations. It shows images of various rustic wooden items like a world map, a monogrammed box, and a clock, along with the shop's rating, description, and other user information.

SHOP REC

Recommendations on Etsy

Hi, Kamelia!

Following Interactions

You have new activity! Click to refresh. X

Looking for your shop activity?



Recently Favorited Items



New Items From Your Favorite Shops



Our Picks For You



TwoGuysBowties
Meet the co-founders
of men's accessories
line Two Guys Bow
Tie Co.
[Read the story and
tour their studio](#)



One-of-a-Kind Gift Ideas

[Shop Now](#)

Browse

Trending Items

Father's Day Gifts

Summer Celebrations

Gift Ideas

Mobile Accessories

Story Behind the Shop [See more](#)

Recommendations on Etsy

iPad 12:32 85%

Your Feed Trending

Jedi Order - Bottle Opener Keychain... £3.30 SARNSTIE

Similar to some of your favorites

Froggy Creations 45 listings

DiceBagChick ★★★★★ (83 reviews)

Sells items similar to your favorites

77 listings

THEARTIELOGANPACK 64 listings

Marketing Emails

It's The Little Things

Etsy <emails@mail.etsy.com>
to me ▾

May 2 (10 days ago) ★ ⏪ ⏴

Etsy

View this email online

Picked for You



Deer Ring Dish - Trinket Di...
£4.75



Mens Squid on a Bike T S...
£12.89



I'M AN
ENGINEER
TO SAVE TIME LET'S JUST
ASSUME THAT I'M NEVER WRONG
Funny Engineer T-Shirt En...
£10.17



Womens VONNEGUT... S...
£12.21



Energy Flow Fitted Hat ma...
£16.96



Mens Vintage Robot Comp...
£13.56

Cart Recommendations

You might also like...



Rose Gold Letter
Necklace, Lower Case
Letter, Rose Gold Initial,
Rose Gold Initial
Necklace, Initial Jewelry

By PROJECTDAHLIA

\$26.00 USD

Add to Cart



Gold Jewelry, Gold Bow
Necklace, dainty
handmade necklace,
everyday, simple,
birthday, wedding,

By PROJECTDAHLIA

\$24.00 USD

Add to Cart



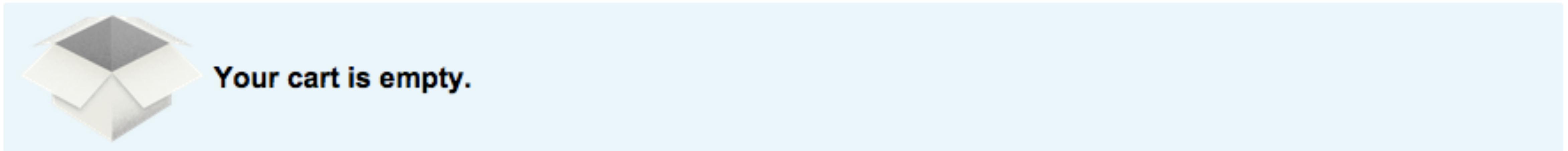
Thin Gold chain necklace
14 - 50 inch small 2mm
gold chain oval links
chain gold plated chain
flat link chain ...

By acanthusjd

\$6.00 USD

Add to Cart

Empty Cart Recommendations



Your cart is empty.

Recommended Items



**Silver, gold, rose gold
Bracelet- Pearl Bracelet-
White Pearl- Dainty Silver
Bracelet- Tiny Pearl
Jewelry- 925...**

By West9th

\$14.00 USD

Add to Cart



**slip cast porcelain
hanging crystal planter**

By Beanandbailey

\$27.00 USD

Add to Cart



**Aqua Mint Earrings Aqua
Dangle Earrings
Bridesmaid Gifts Bridal
Jewelry Drop Earrings
Jewelry Accessories**

By LimonBijoux

\$22.00 USD

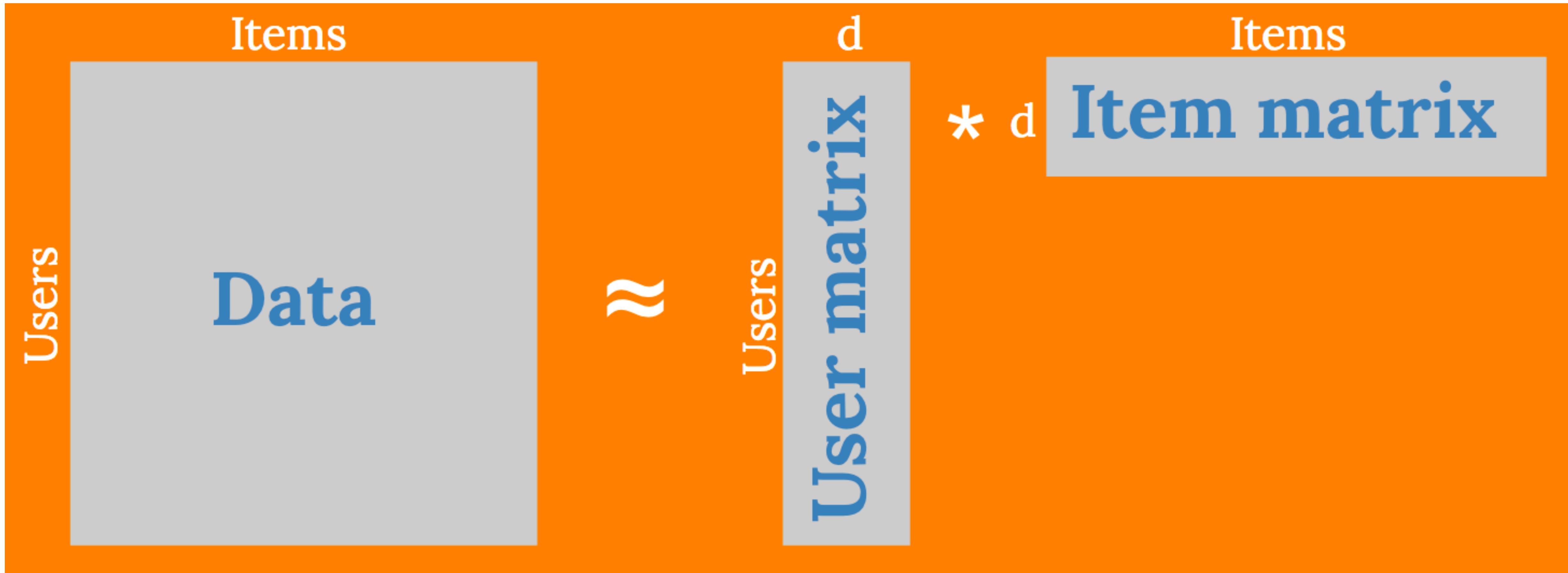
Add to Cart

Machine Learning Models for Personalization

Matrix Factorization (MF)

		Items				
						...
Users	Alice	1	1	0	0	
	Bob	0	0	1	1	
	Corey	1	0	1	0	
	...					

Matrix Factorization (MF)



Users

Alice	0.9	-0.1
Bob	-0.8	0.5
Corey	0.1	0.8

Items

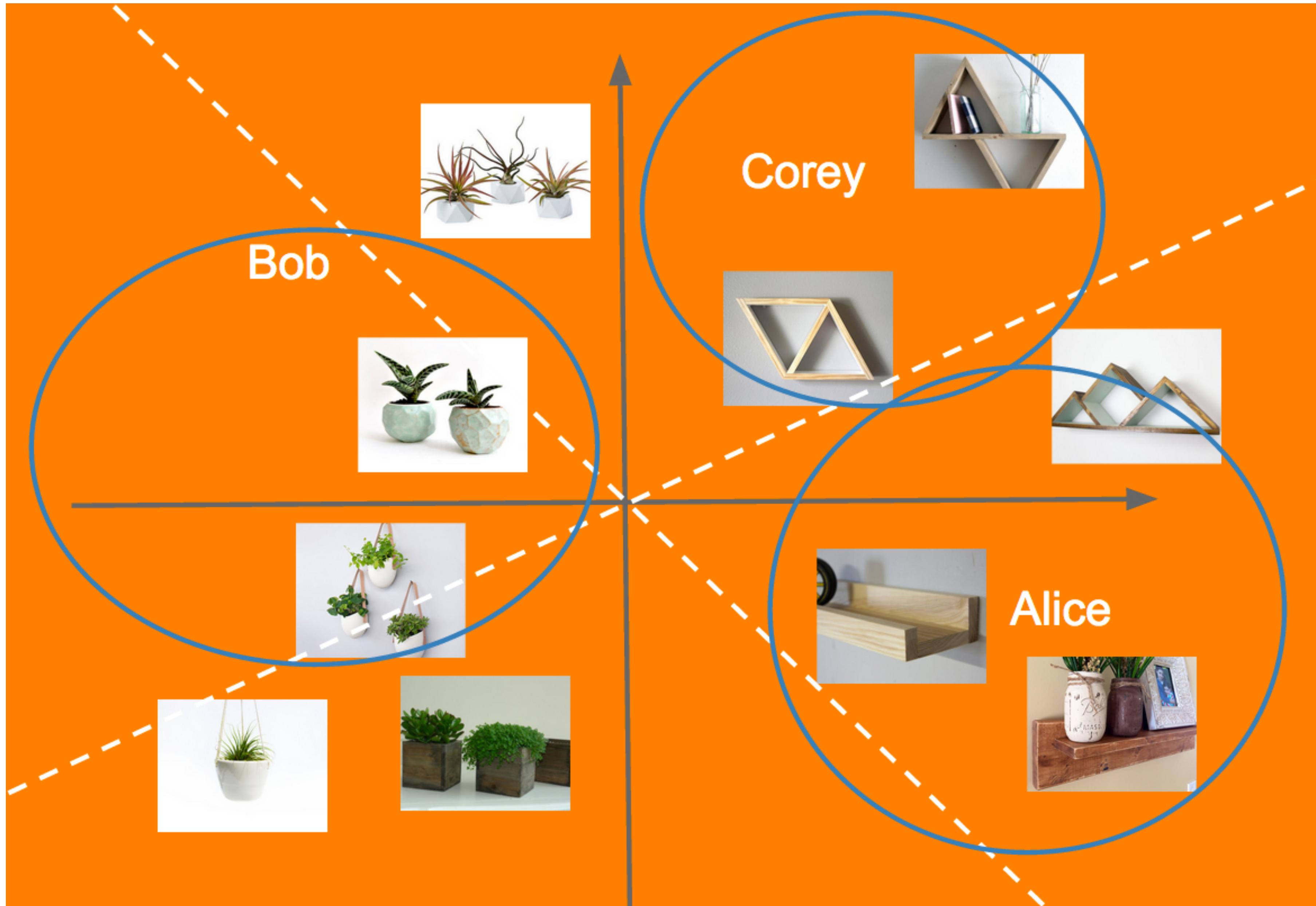
			
0.8	0.9	-0.7	-0.8
0.9	0.1	0.7	-0.5

score[Corey,



$$] = 0.1 * 0.9 + 0.8 * 0.1 = 0.17$$

Locality Sensitive Hashing (LSH)

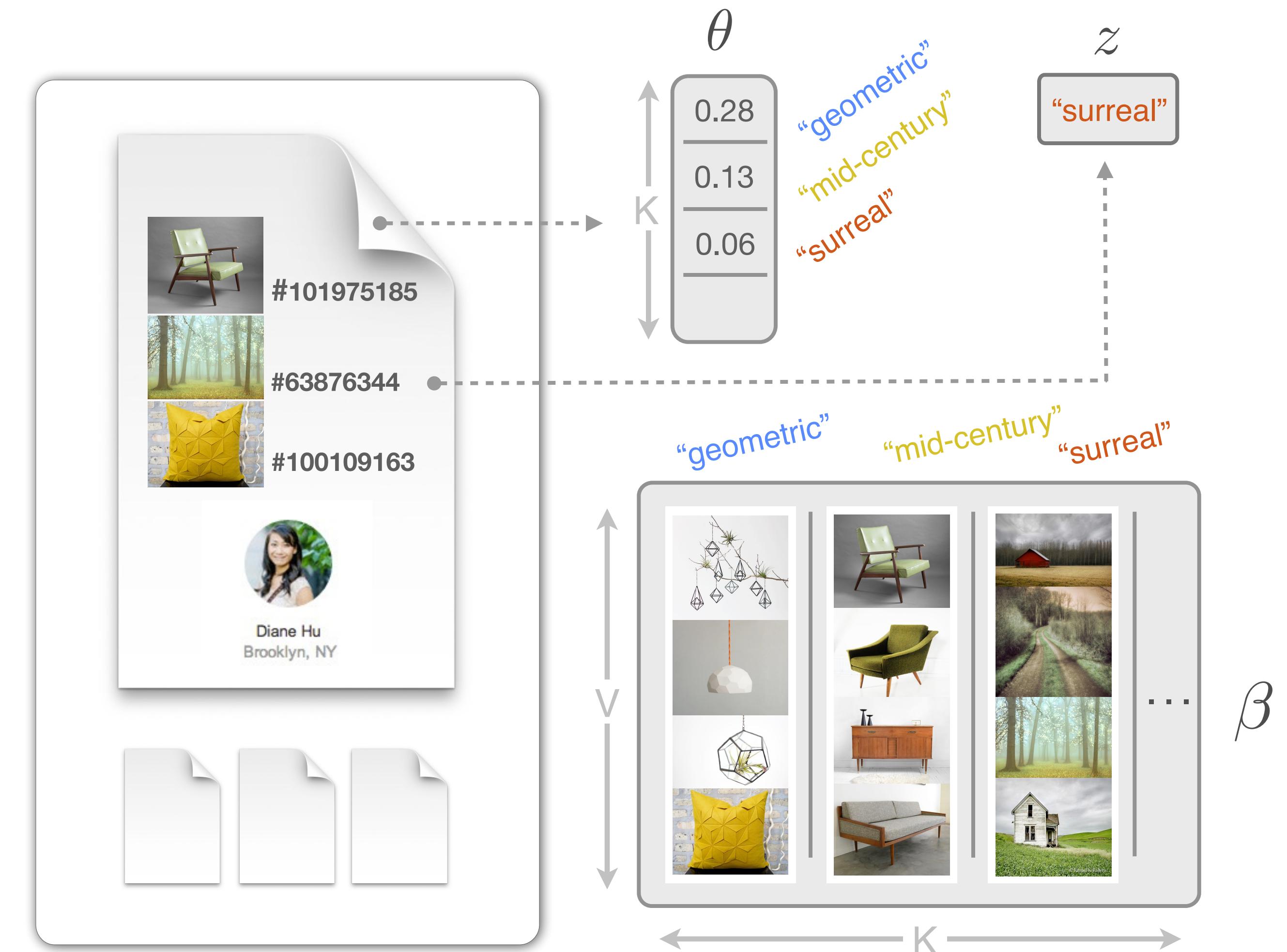


Latent Dirichlet Allocation (LDA)

Assume: Each user's favorited items are generated by this process:

For each user u ,

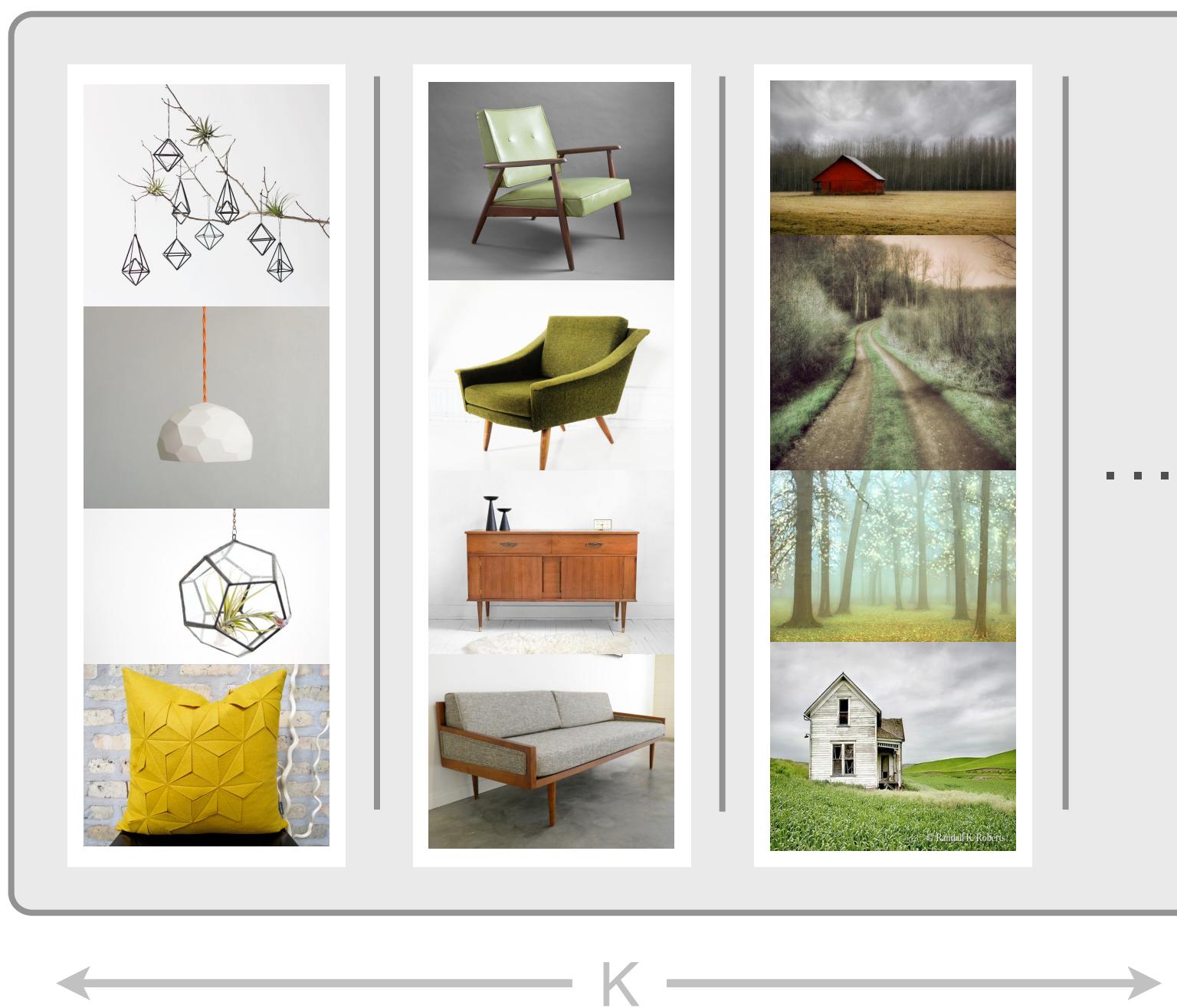
1. Draw a style profile:
 $\theta \sim Dirichlet(\alpha)$
2. For each item, x_n that user u has favorited,
 - (a) Draw a style:
 $z_n \sim Multinomial(\theta)$
 - (b) Draw an item:
 $x_n \sim Multinomial(\beta_{z_n})$



Latent Dirichlet Allocation (LDA)

Discover popular styles on Etsy as a distribution over items

“geometric” “mid-century” “surreal”



Represent each user as a distribution over popular styles, i.e. “style profile”



Discovering User Styles

Different styles discovered by LDA

ANIMALS



TENTACLES



GEOMETRIC

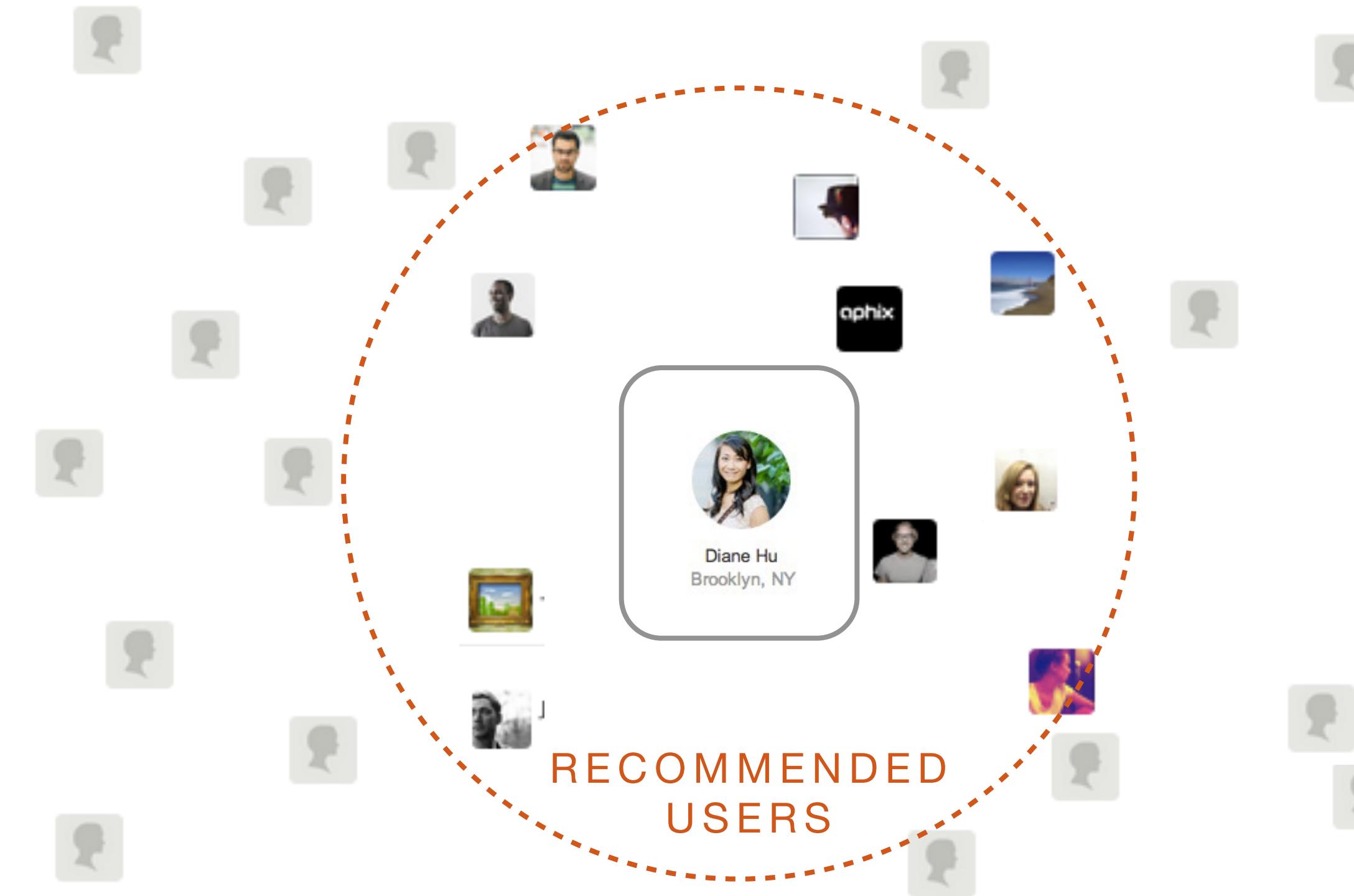


MID-CENTURY MODERN



User Recommendations

Given that each user has a style profile: **Recommend N users with most similar style profiles.**



Generating Recommendations

Given that each user has a style profile: **Sample items most highly weighted styles**

USER'S FAVORITES



ITEM RECOMMENDATIONS



STYLE #428



STYLE #54



STYLE #655



STYLE #87

A/B Testing

Example I:

- **Variant:** LDA
- **Control :** No recommendations
- **Result: Significantly increased all business metrics**

Example II:

- Different variants of LDA compared to Matrix Factorization (using Stochastic SVD)
- **Result: Matrix factorization and LDA comparable across business metrics**

Personalized content best engages users and enhances business metrics.

Personalization through Recommendations:

- Building large-scale recommender systems through **Machine Learning Models**:
 - for multiple content types
 - for enhancing browse experience and matching users with items across the site.
- Improving key business metrics
- A/B testing and evaluating the results

Questions?

Thank you!

<https://github.com/karyafar/openAir2015>

Etsy