



Collaborative Feature Learning from Social Media

Hailin Jin | Principal Scientist | Adobe Research



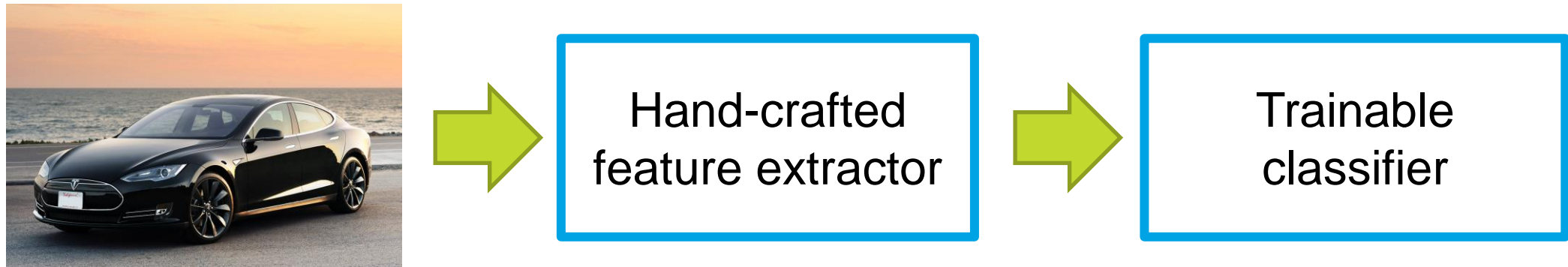
Bē
Natalie Shau

Collaborators

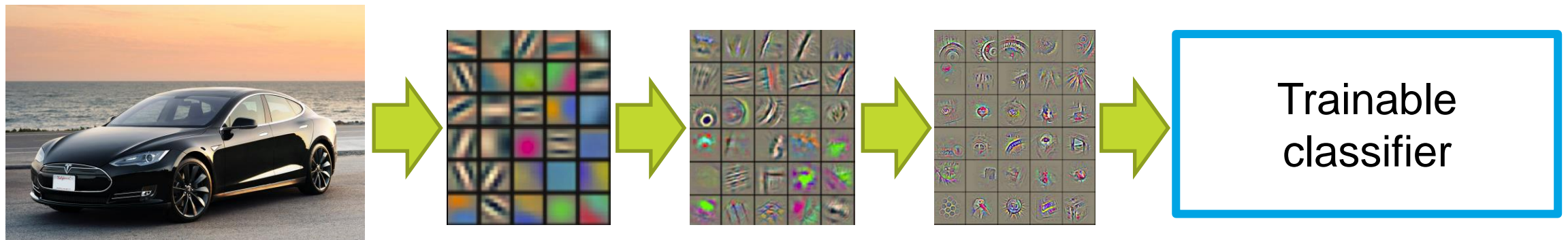
- Chen Fang (Dartmouth)
- Jianchao Yang and Zhe Lin (Adobe)

Deep Learning

- Traditional model of learning
 - Fixed/engineered features (or kernels) + trainable classifiers

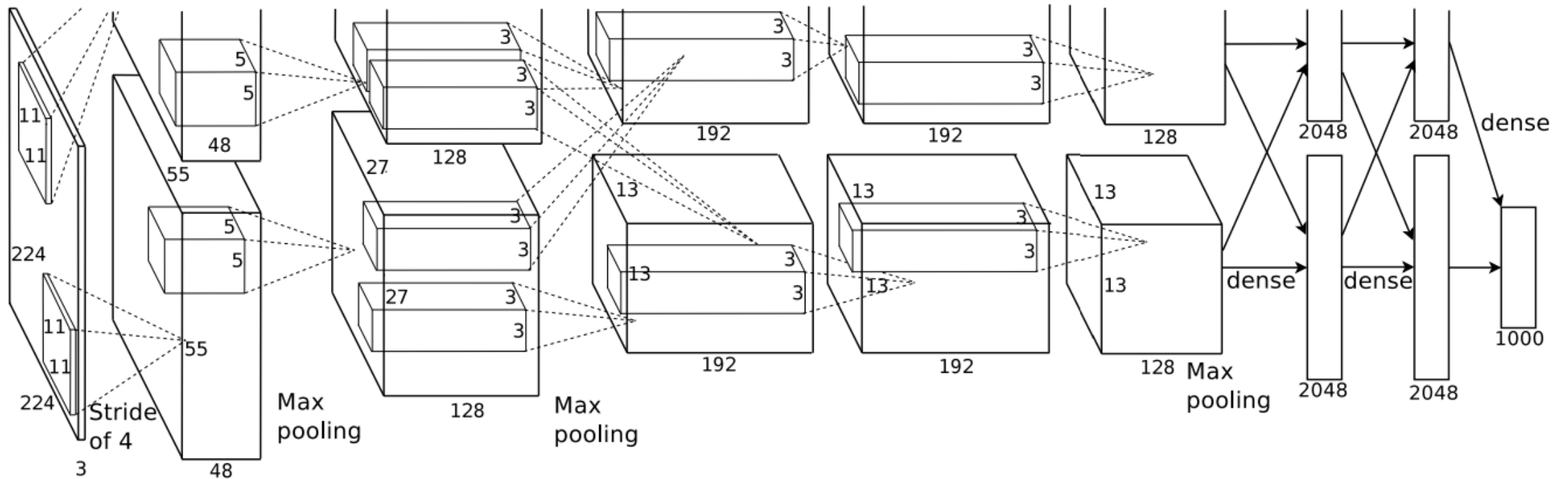


- Deep Learning: End-to-end learning from data
 - Trainable features (or kernels) + trainable classifiers



Deep convolutional neural networks

- A. Krizhevsky, I. Sutskever, and G. E. Hinton.
ImageNet Classification with Deep Convolutional Neural Networks.
Neural Information Processing Systems (NIPS), 2012.



ImageNet large-scale image classification challenge

- Data
 - 1000 categories
 - 1.2M images for training
 - 150K images for validation and testing
- Task
 - Classification



flamingo



cock



ruffed grouse



quail



partridge

...



pill bottle



beer bottle



wine bottle



water bottle



pop bottle

...



race car



wagon



minivan



jeep



cab

...

ImageNet large-scale image classification challenge

- Best top-5 error rate
 - ~6%
- Human performance
 - ~5%

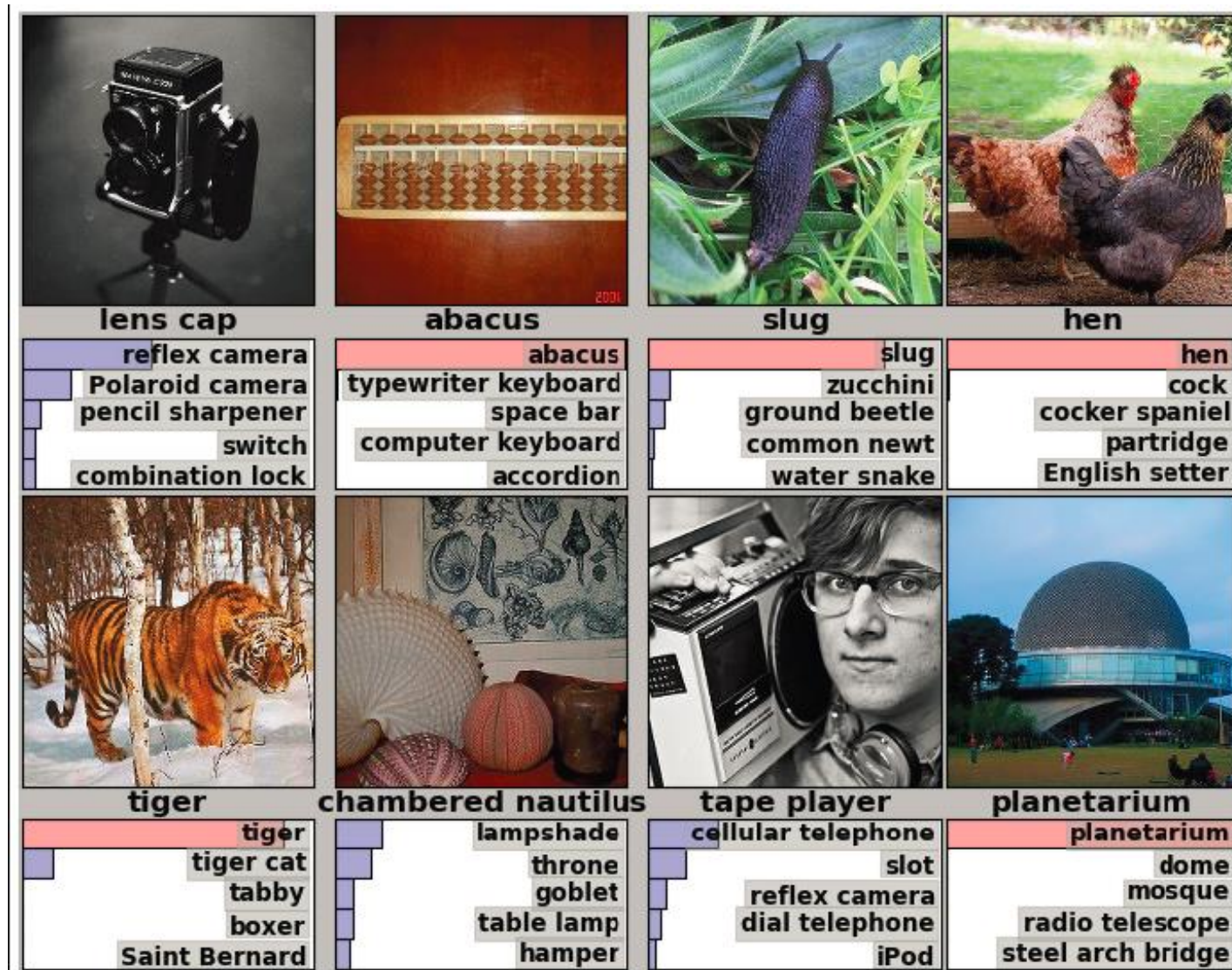
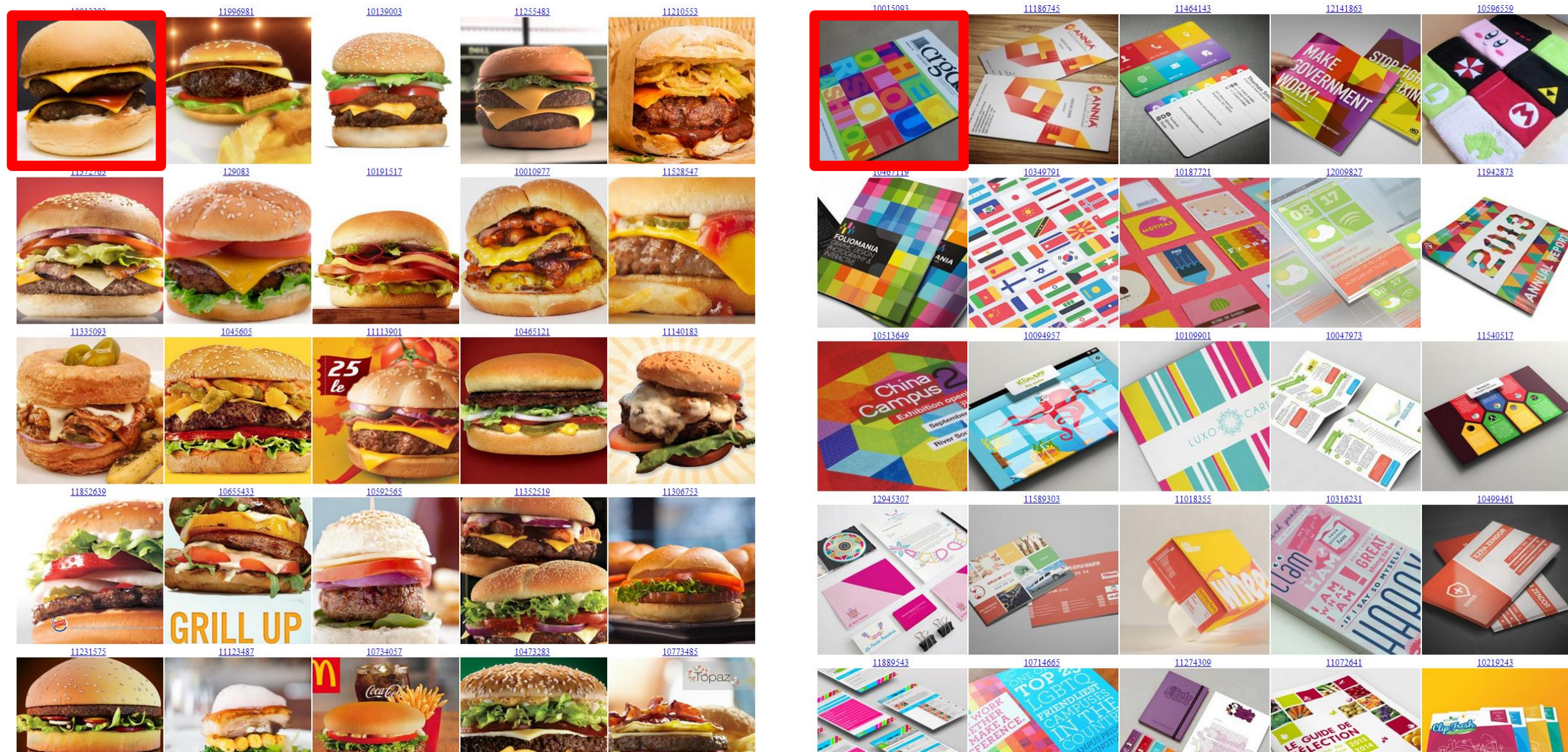


Image similarity



Learning beyond labeled data

- Supervised learning
 - Powerful model
 - Lots of data
- Unsupervised and semi-supervised learning
- Transfer learning


- Can we use other kinds of “labels?”

Projects

All Creative Fields

Creative Index

Worldwide

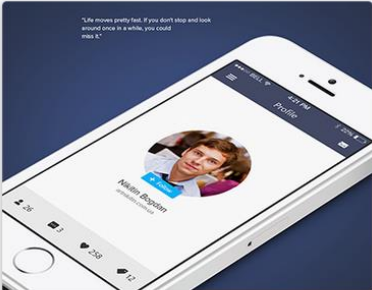


ElectroWave

by Multiple Owners

Advertising, Branding, Graphi...

11656 56811




Social network

by Bogdan Nikitin

Art Direction, UI/UX, Web Des...

10453 93030




Fine Line Art

by Alex Konahin

Drawing, Fine Arts, Illustration

3972 61622



Google Visual Assets Guidelines - Part 1

by Multiple Owners

Branding, Graphic Design, Ico...

23152 412027

Talent Search Mode ☒

PREMIUM FILTERS

BRAND/COMPANY

AWARDS


YOUR CREATIVE FIELDS

FILTER BY

SCHOOLS

TOOLS USED

COLOR




Pipelines

by David McLeod

Digital Art, Illustration, Motion ...

1263 11431




Management von Kunstgalerien

by Studio Hausherr

Editorial Design, Print Design, ...

456 4745




99frames 2K15 Trailer

by Rich Nosworthy

Animation, Character Design, ...

472 4005




Refinery 29

by Luke Choice

Calligraphy, Fashion, Typogra...

957 7036




TRISTE OU MAGNIFIQUE - Iceland

by Daniel Reuber

Art Direction, Fine Arts, Photo...

826 8636

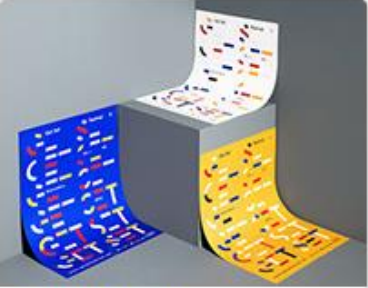


Twin Peaks Tribute

by MUTI

Character Design, Digital Art, I...

600 7311




Get Set Festival

by Epiforma Design

Branding, Graphic Design, We...

541 6209




The Wilder Things

by Angela Rizza

Digital Art, Drawing, Illustration

687 6686




6/6

by Akatre Studio

Art Direction, Branding, Packa...

380 6429




Book Jacket 3

by Hiroyuki Izutsu

Drawing, Illustration, Painting

323 3839




DREAMLAND

by Vassilis Tangoulis

Advertising, Digital Photograph...

689 7193



LES MONSTRES

by Seb NIARK1 FERAUT

Character Design, Digital Art, I...

993 7424

Social data on Behance.net

Bēhance

Activity

Discover

My Portfolio

Jobs

Add Work

Talent Search

Adobe

Peter Jaworowski

Executive Creative Director,
Founding Partner
Ars Thanea

Warsaw, Poland

www.arsthanea.com

Follow

Message

Creative Index Info

ALL NETWORK

Top 1%

DIGITAL ART

Top 1%

SIMILAR CREATIVES

Ars Thanea

Warsaw, Poland

Peter Kolus

Warsaw, Poland

Karol Kolodzinski

Warsaw, Poland

View more similar creatives →

Add to Talent Search

ProjectsWIPAppreciated

HBO: The Oscars Night 2015

by Multiple Owners

Advertising, Art Direction, Illus...

10096428

Ars Thanea Website

by Multiple Owners

Art Direction, Web Design, W...

94412603

Nike Basketball Apparel 2015

by Multiple Owners

Advertising, Art Direction, Digi...

381629710

CDP.pl - Outstanding shopping experience

by Multiple Owners

Art Direction, Branding, Web ...

114217619

Ars Thanea Portraits

by Multiple Owners

Art Direction, Branding, Photo...

EDB Singapore

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Advertising, Art Direction, Illus...

Circus Fight Camo

by Peter Jaworowski

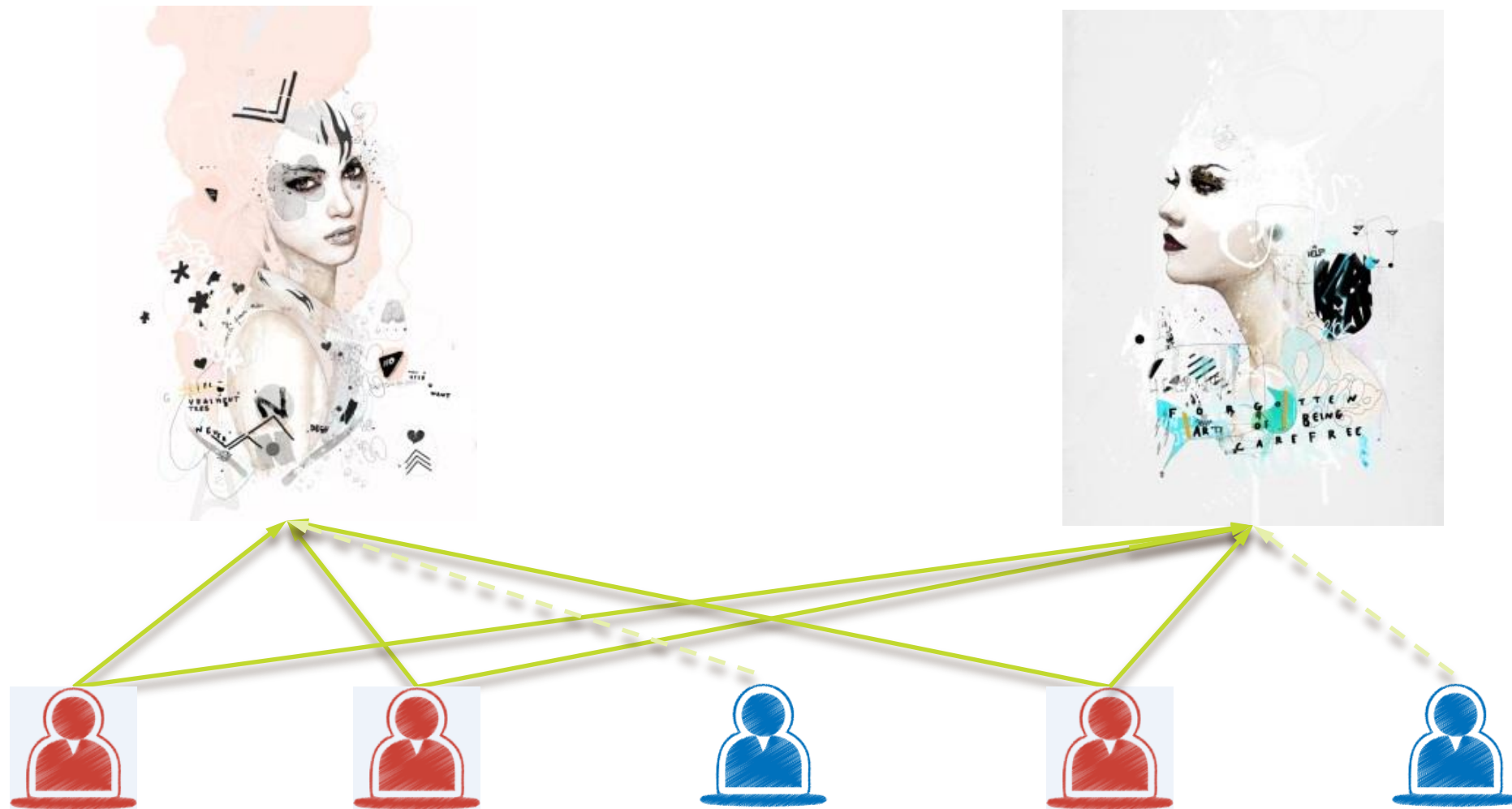
Art Direction, Digital Art, Reto...

HBO Game of Thrones - Seven Kingdoms Weather App

by Multiple Owners

Advertising, Art Direction, Inte...

Visual information in social data



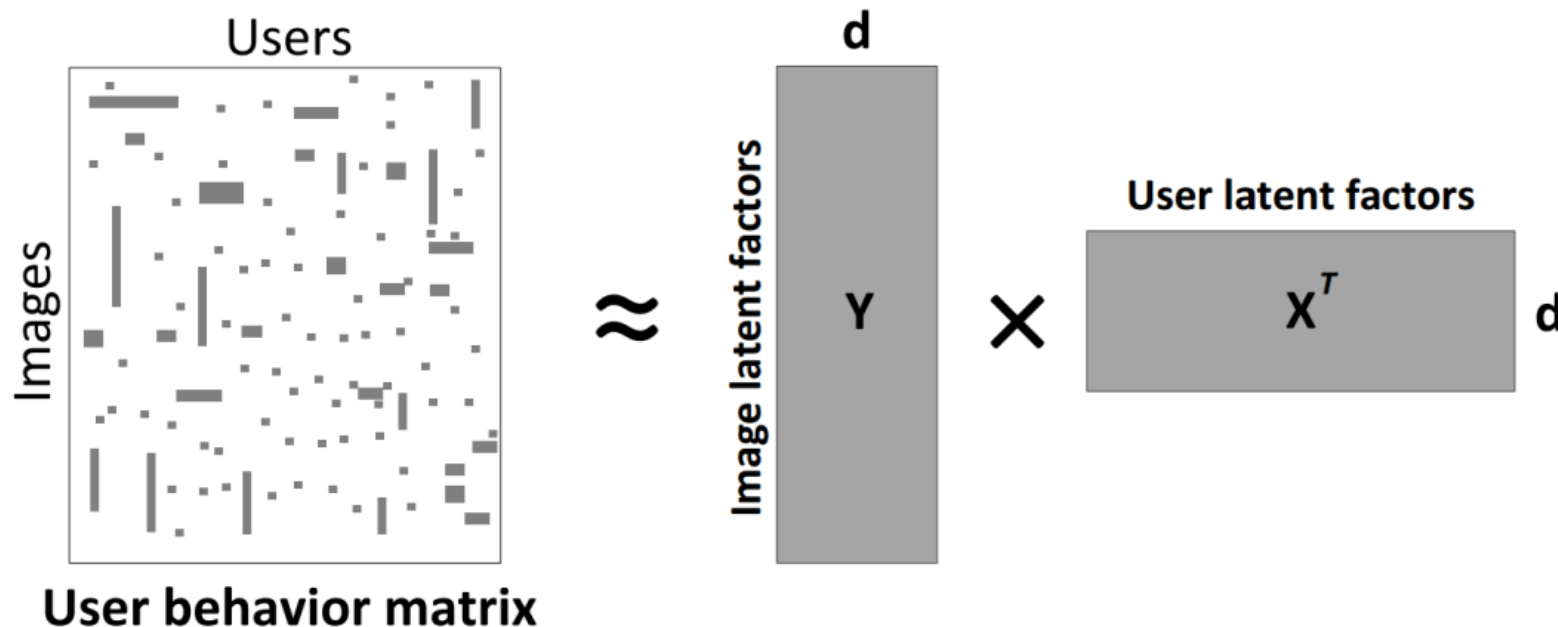
User-project matrix (views, appreciations, comments, ownership)

	u1	u2	u3	u4	u5	u6	u7	u8	u9	u10	u11	u12	u13	u14	u15	u16
p1	✓		✓		✓			✓	✓							
p2			✓						✓		✓					✓
p3						✓						✓		✓		
p4				✓		✓				✓		✓		✓		
p5		✓														
p6	✓			✓			✓			✓			✓		✓	
p7	✓							✓			✓					
p8			✓	✓			✓				✓		✓		✓	
p9		✓				✓			✓							
p10					✓	✓						✓		✓		

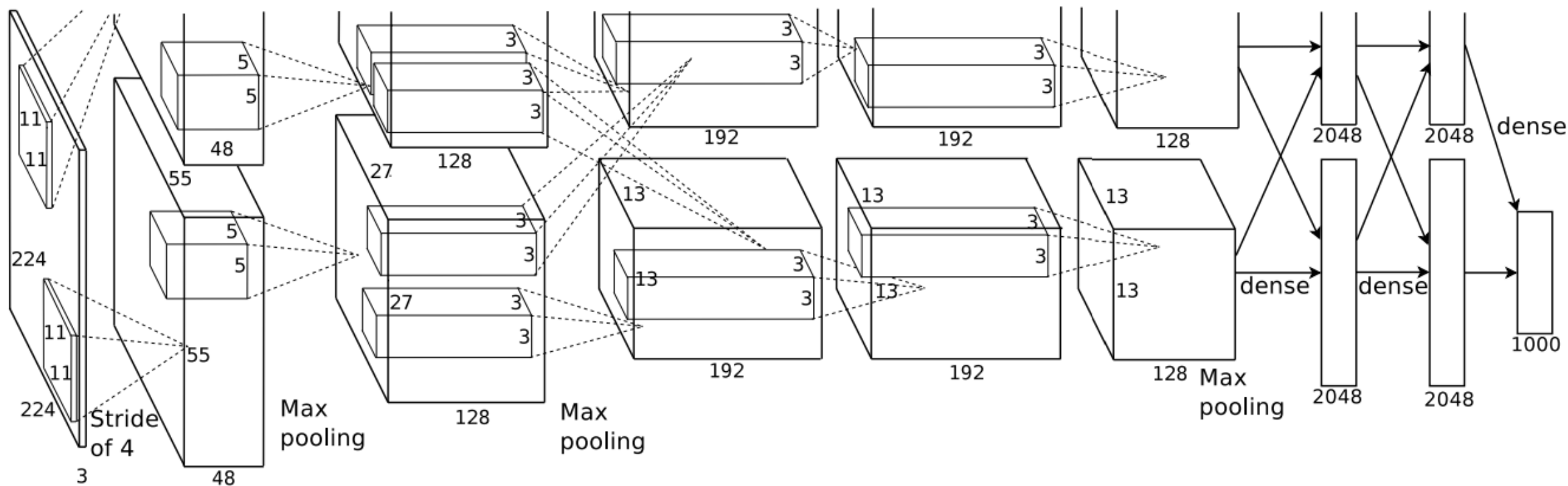
Recommender systems

- Matrix factorization – filling in missing information
- Discover user and project latent factors

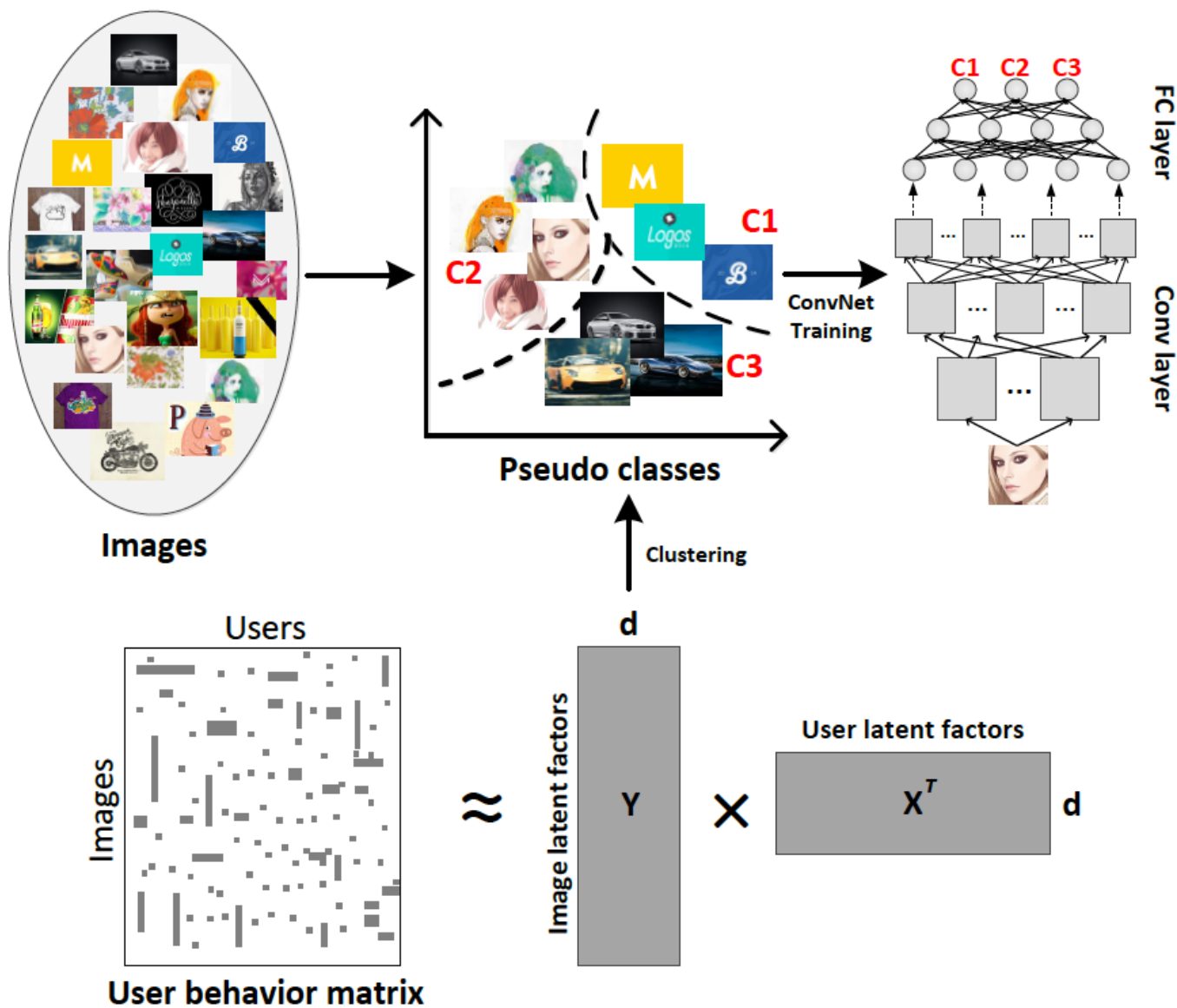
$$\min_{x_*, y_*} \sum_{V_{ij} \neq -1} (V_{ij} - y_i^T x_j)^2 + \lambda(||x_j||^2 + ||y_i||^2)$$



Regression using deep convolutional neural network

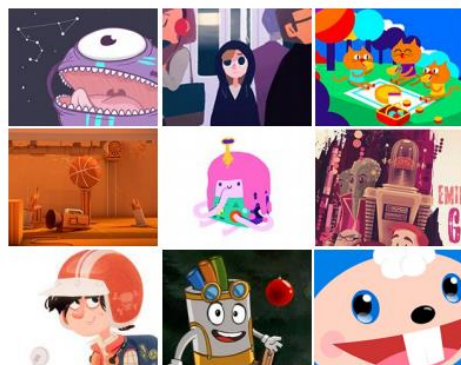


Algorithm overview

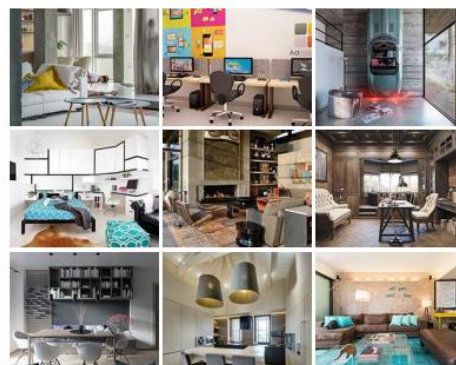


Behance 2M dataset

- 1.9M users and 1.9M projects
- 45M appreciations and 273M views
- Matrix density: 0.0013% and 0.0091%



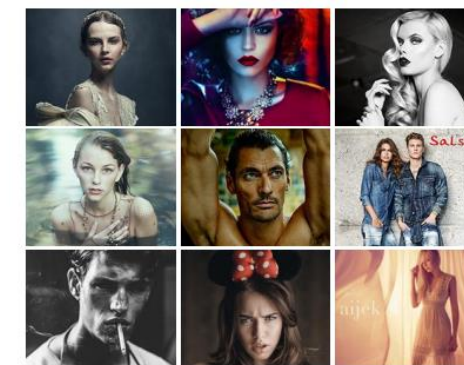
Animation



Interior design



Automotive design



Fashion



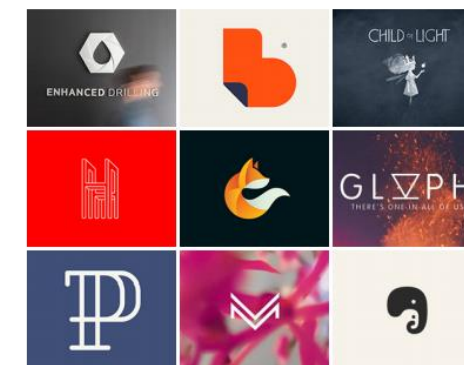
Sculpting



Calligraphy



Culinary arts



Branding

Social data pre-processing

- Remove least and most popular projects and users
- Processed data:
 - 309K users and 423K projects
 - 31M appreciations (70%) and 178M views (65%)
 - Matrix density: 0.03% and 0.16%

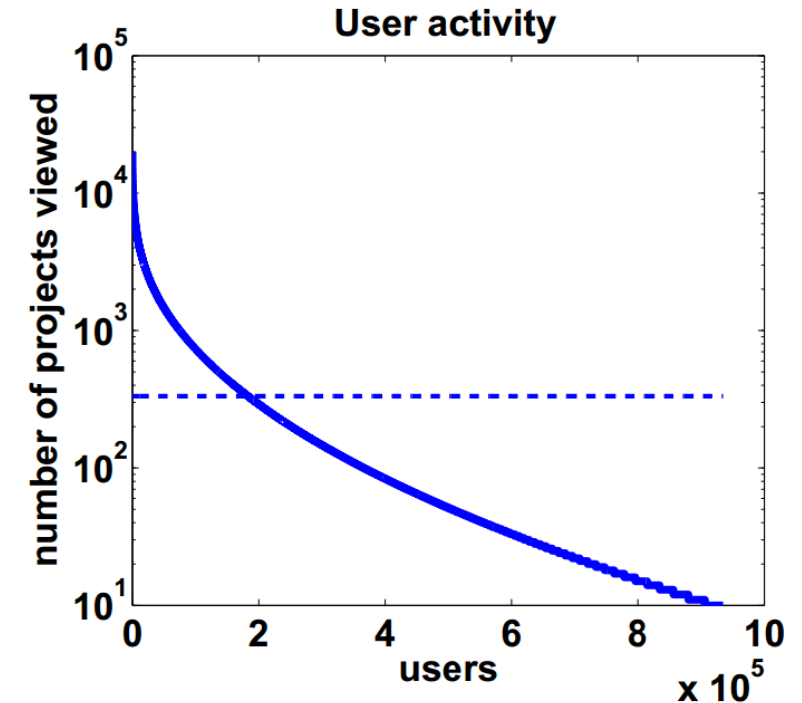
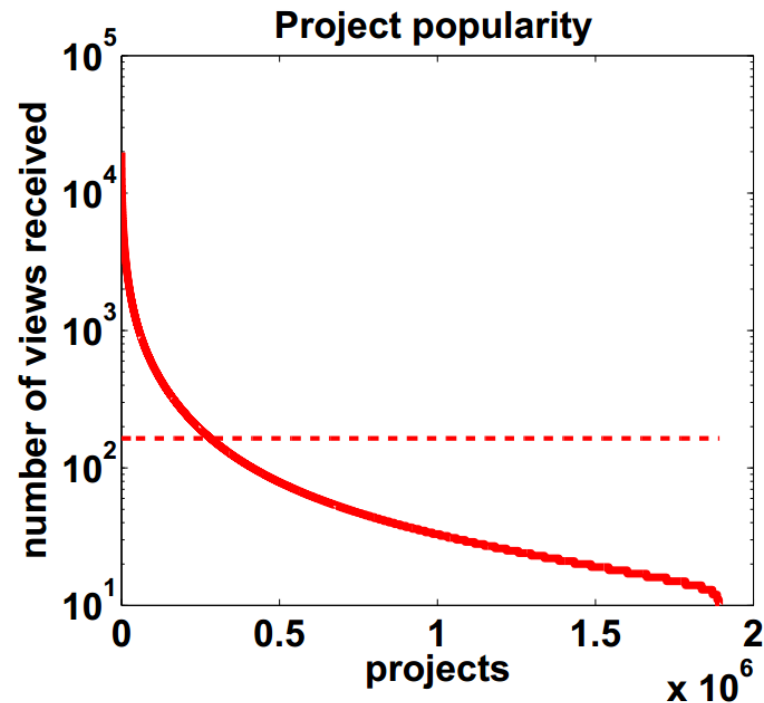


Image similarity in latent space



beauty
portrait
woman
hair



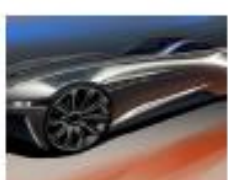
wedding
photography



elegant
graceful
neat
refined



automotive
classic



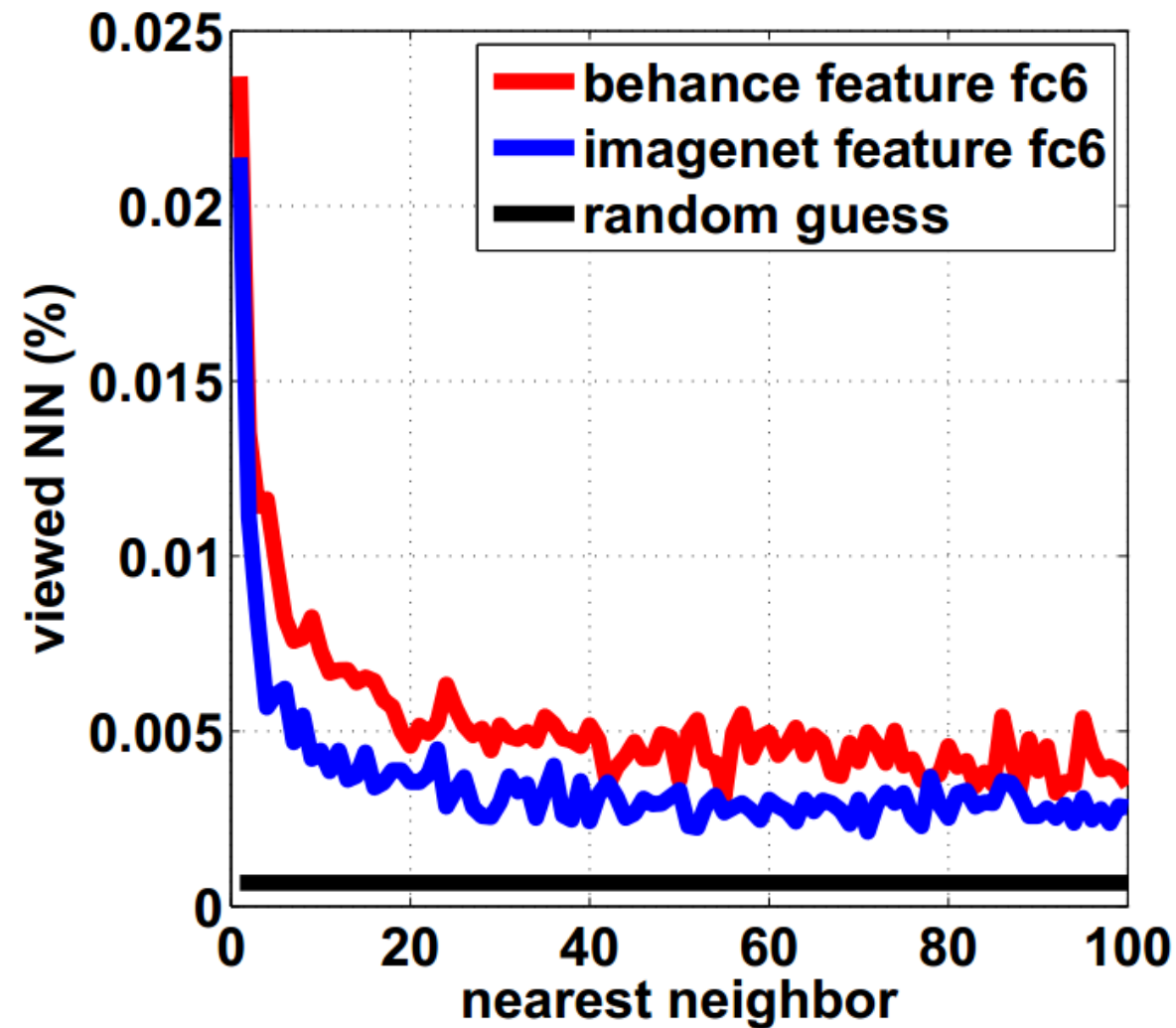
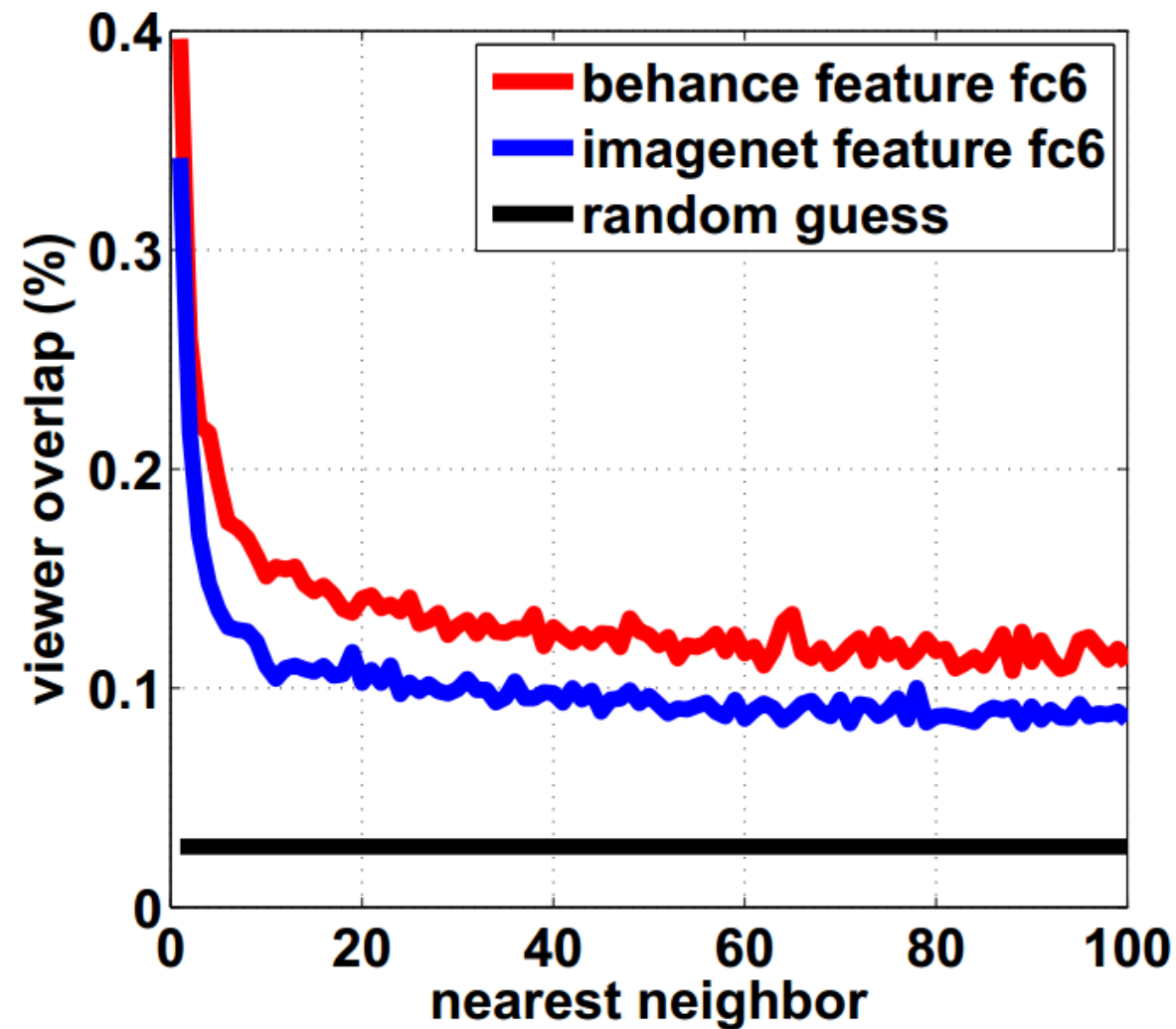
automotive
design
industrial
transportation



Casa La Encantada
house



Image retrieval



Feature comparison

	Collaborative	ImageNet	Meta-class
Flickr style	37.2	37.1	32.8
Wiki Paintings	41.4	40.7	38.6
AVA style	56.0	51.3	53.9
Caltech 256	57.6	68.9	48.9

Summary

- Learn image feature from social data and images
- No labels are needed
- Scale to billions of users/images/views
- To be presented at CVPR 2015



Adobe