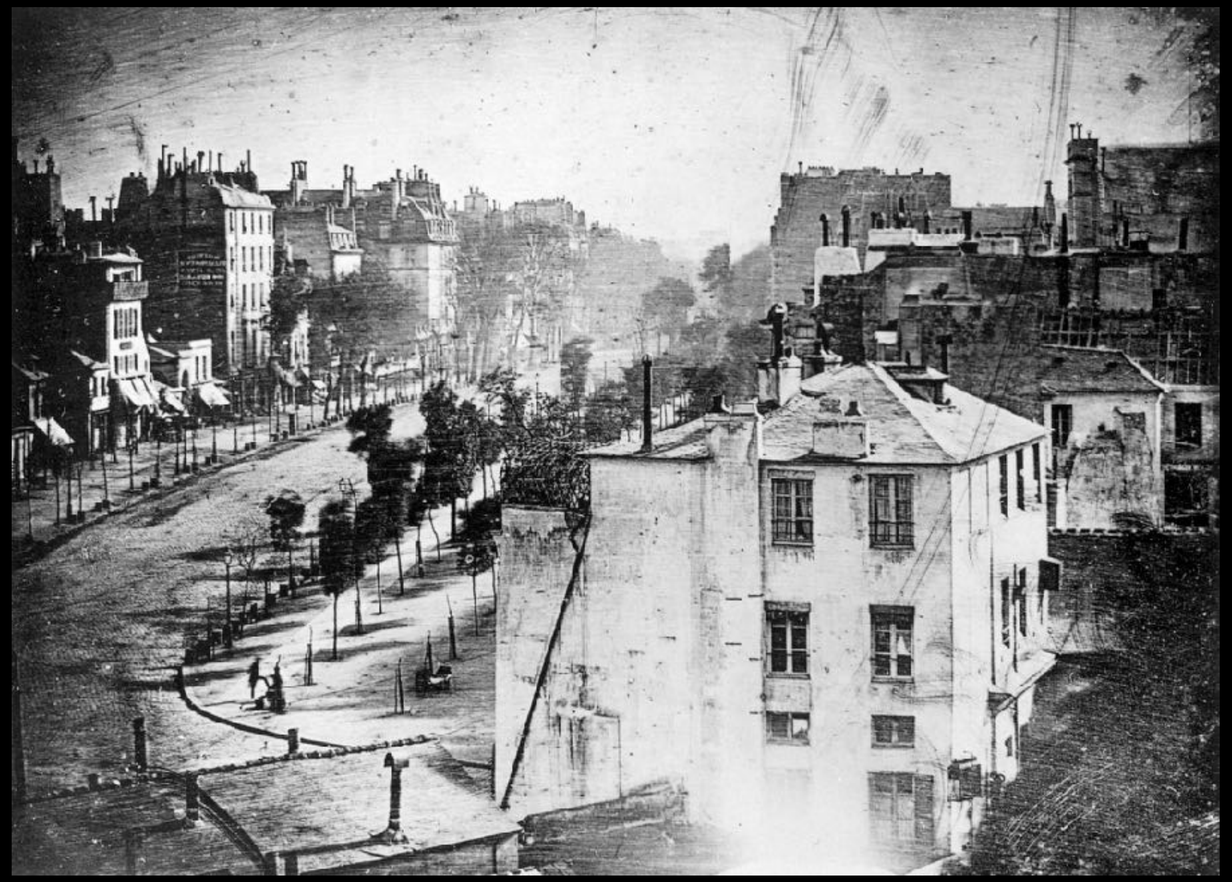
Recording the Visual Mind

Appu Shaji
Head of Research & Development
EyeEm

@panteanaghavi

The Evolution of Photography

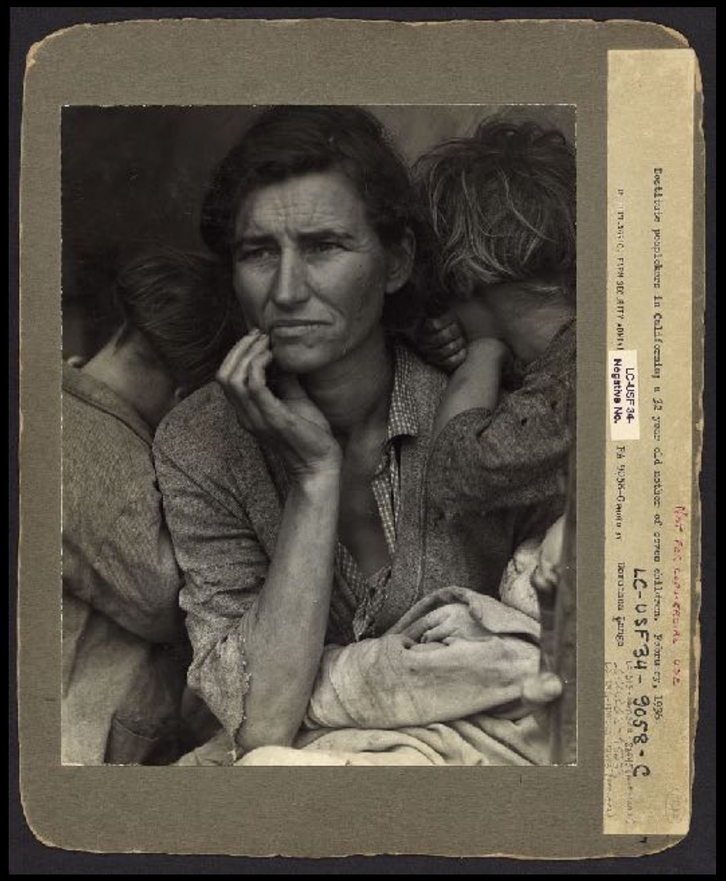


“The Boulevard du Temple”, (1837)

by Louis Daguerre (public domain).

“A Harvest of Death, Gettysburg, Pennsylvania”, (1863)

by Timothy H. O'Sullivan (public domain).



“Migrant Mother”, (1936)

by Dorothy Lange (public domain).

“Earth rise”, (1969)

by William Anders (public domain).

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"Revenge of the goldfish”, (1981)

by Sandy Skoglund (fair use).

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“Paris, Montparnasse”, (1993)

by Andreas Gurksy (fair use).

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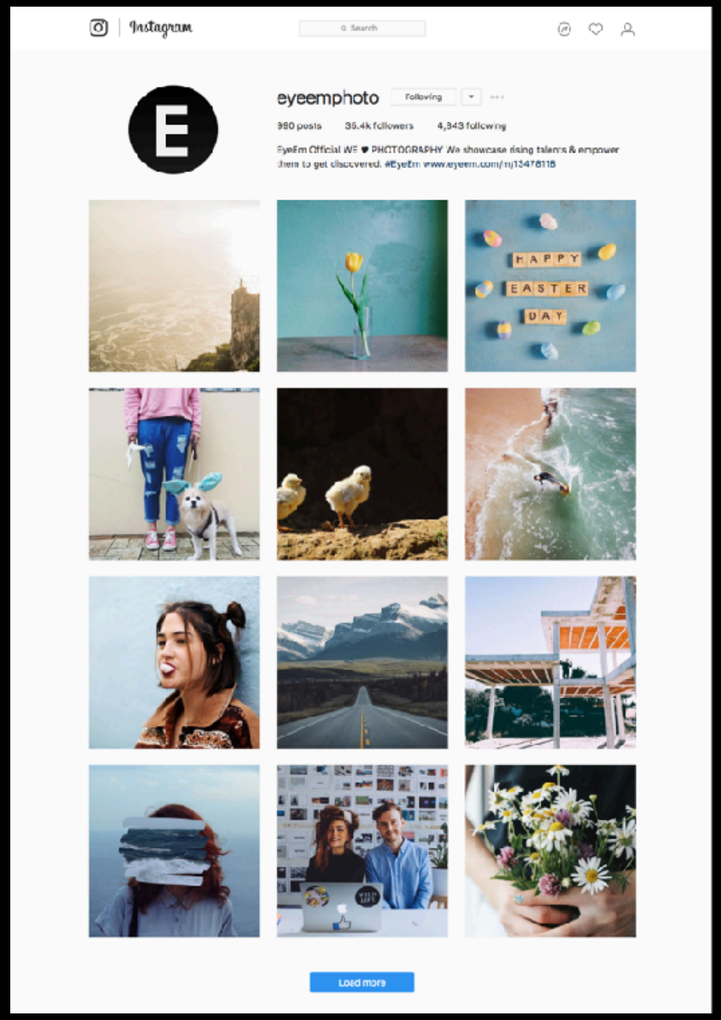
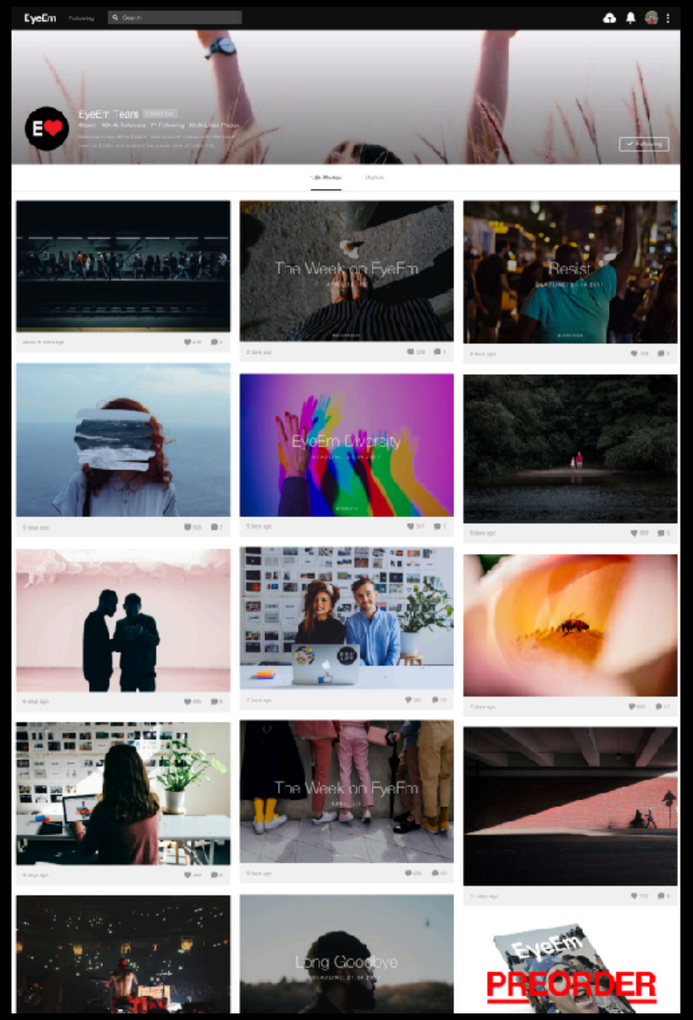
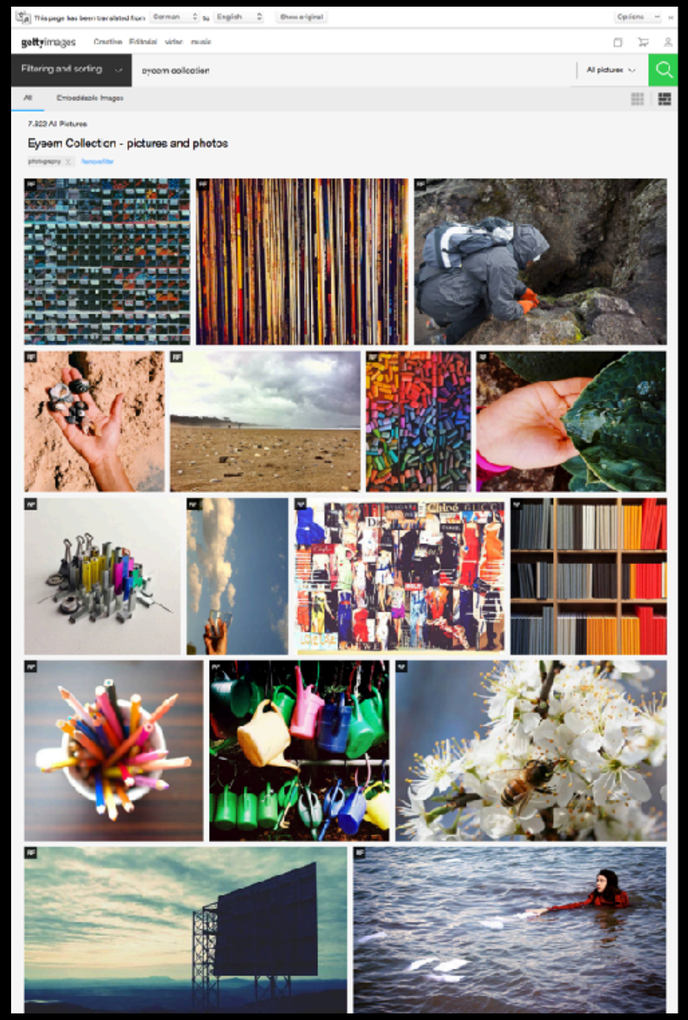

Instagram
eyeemphoto
Following
980 posts
35.4k followers
4,343 following
HAPPY
EASTER
DAY
Load more


EyeEm
The Week on EyeEm
Resist
EyeEm Diversity
The Week on EyeEm
Long Goodbye
PREORDER


gettyimages
Filtering and sorting
All pictures
Eyeem Collection - pictures and photos

EyeEm

AT THE CORE

Storytelling

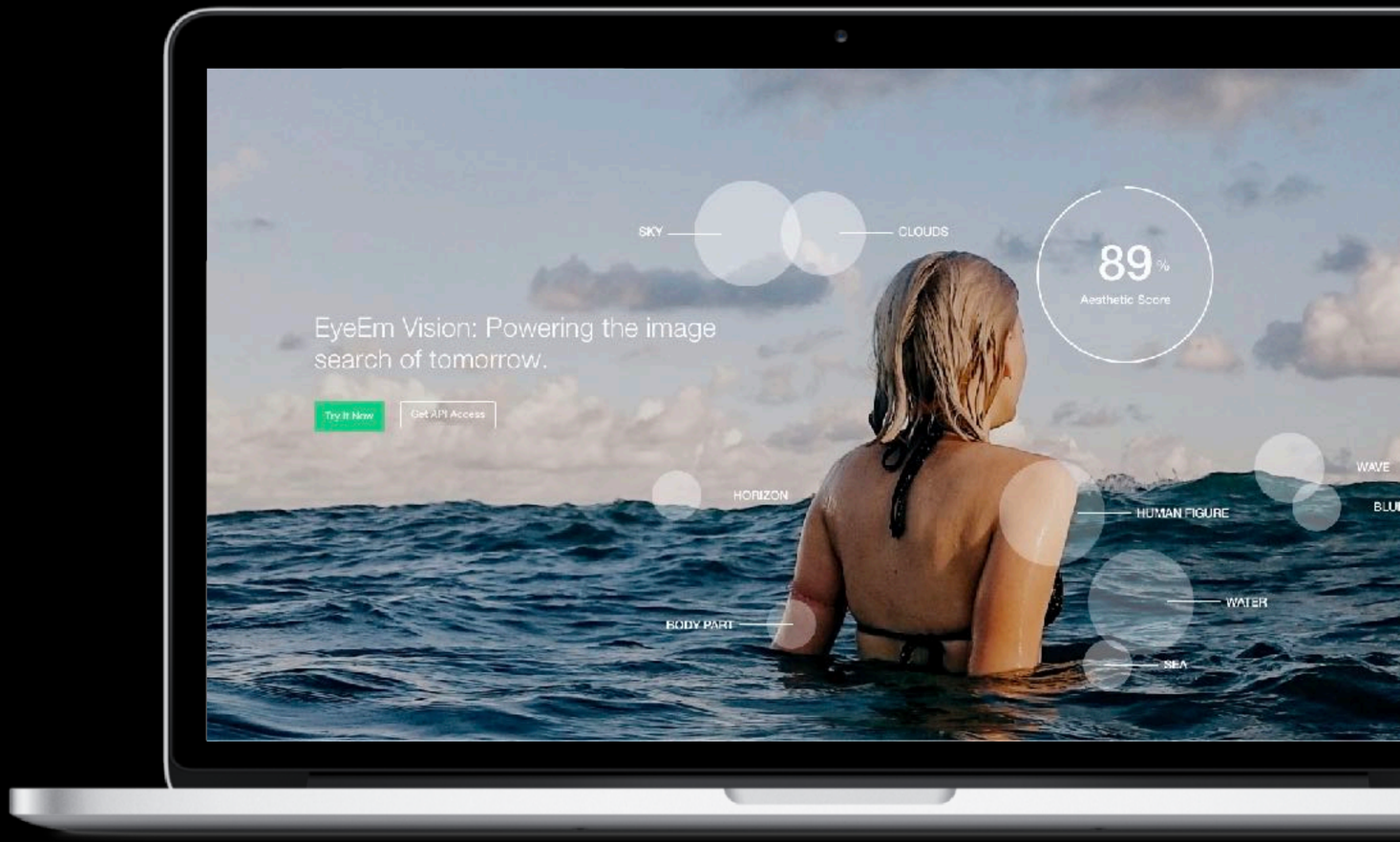
A story
behind
every
image.

EyeEm

EYEEM

Vision

Towards
uncovering
the stories
within an image.



https://www.eyeem.com/tech

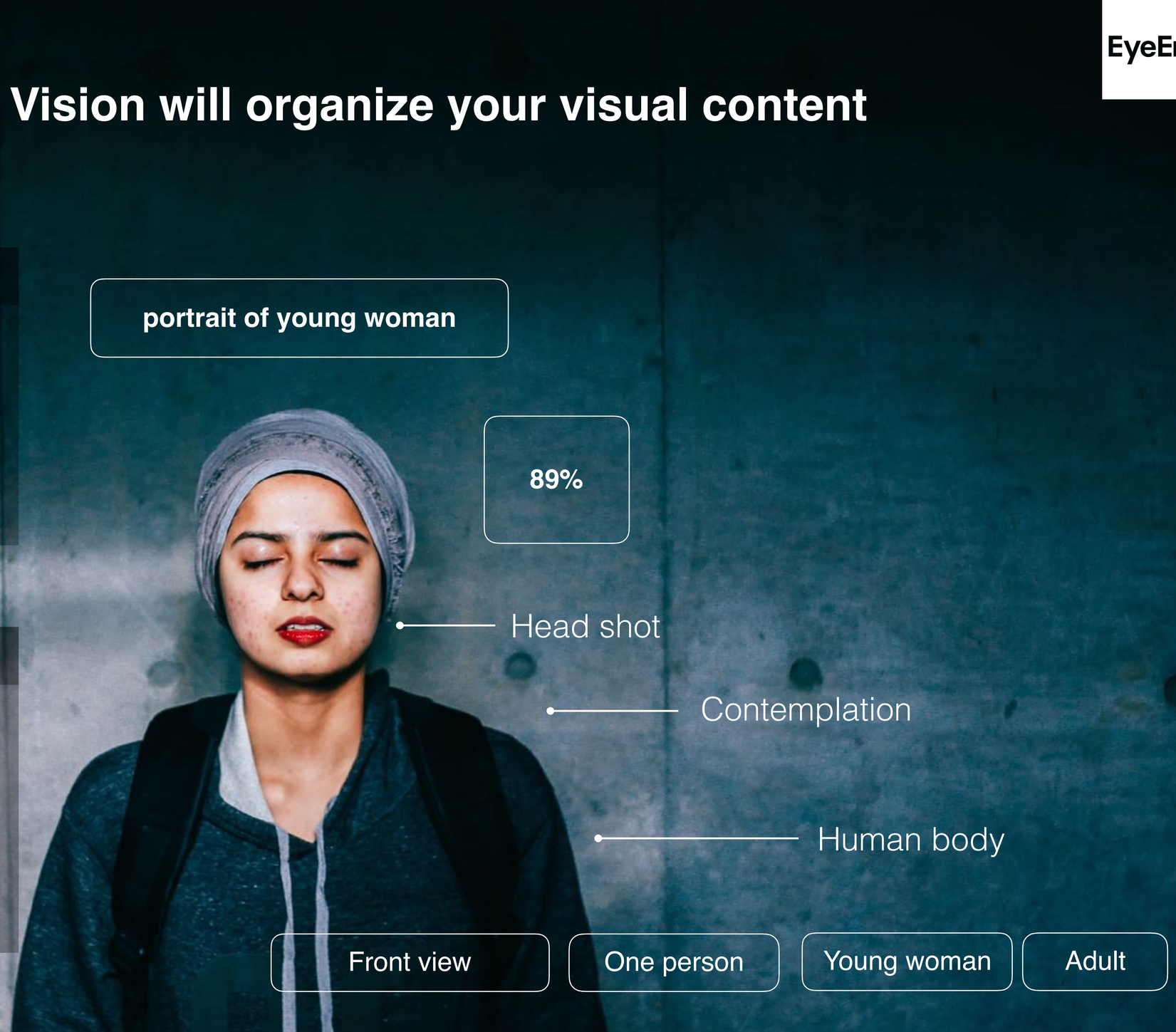
EyeEm Vision will organize your visual content

Tags & Caption

- ✓ Identify all relevant concepts
- ✓ See the story in a headline

Aesthetics

- ✓ The aesthetic score ranks the quality of images
- ✓ Trained on visual trends and feedback from EyeEm community



EyeEm

WE ARE A

Community

20 million
PHOTOGRAPHERS

Marketplace
AUTHENTIC PHOTOGRAPHY

150
COUNTRIES

Technology
SEARCH & DISCOVERY

@BettinaDarger

EyeEm

IN SHORT

EyeEm is

EyeEm is a **photography company.**

We build the world's leading **computer vision technology** to connect our **global creative community** with **iconic brands.**

@LAX2NRT

EyeEm

AT THE CORE

Storytelling

A story
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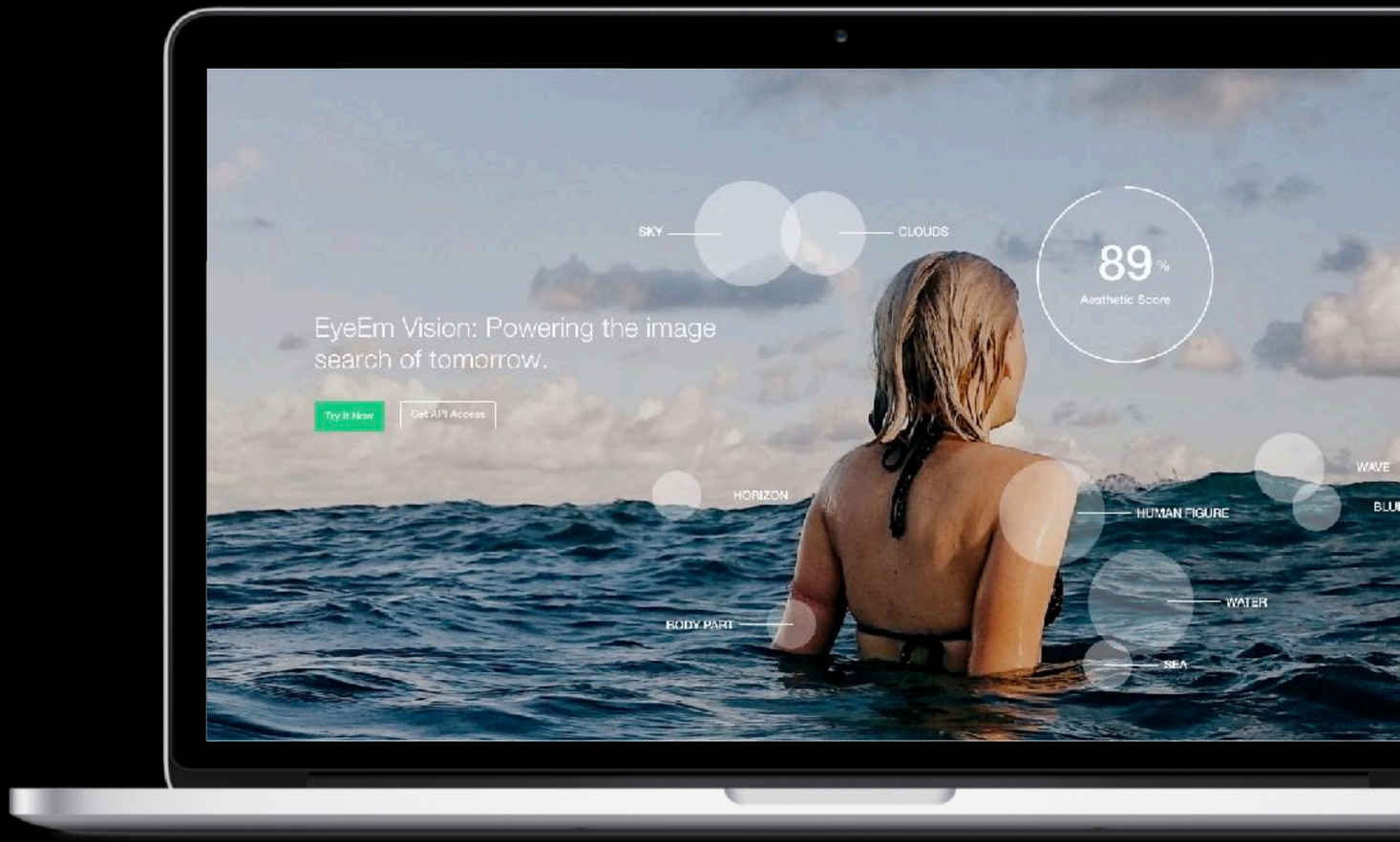
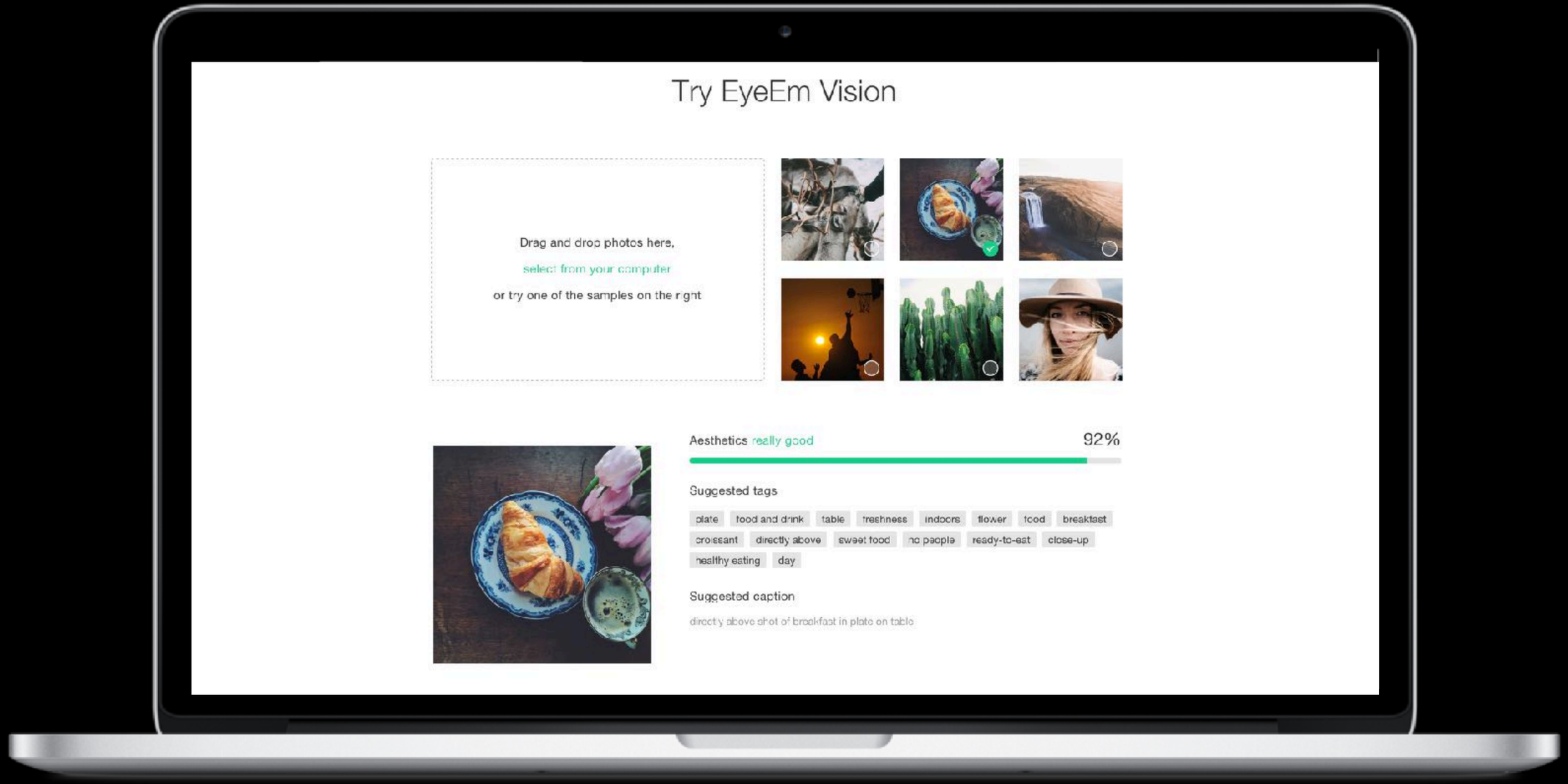
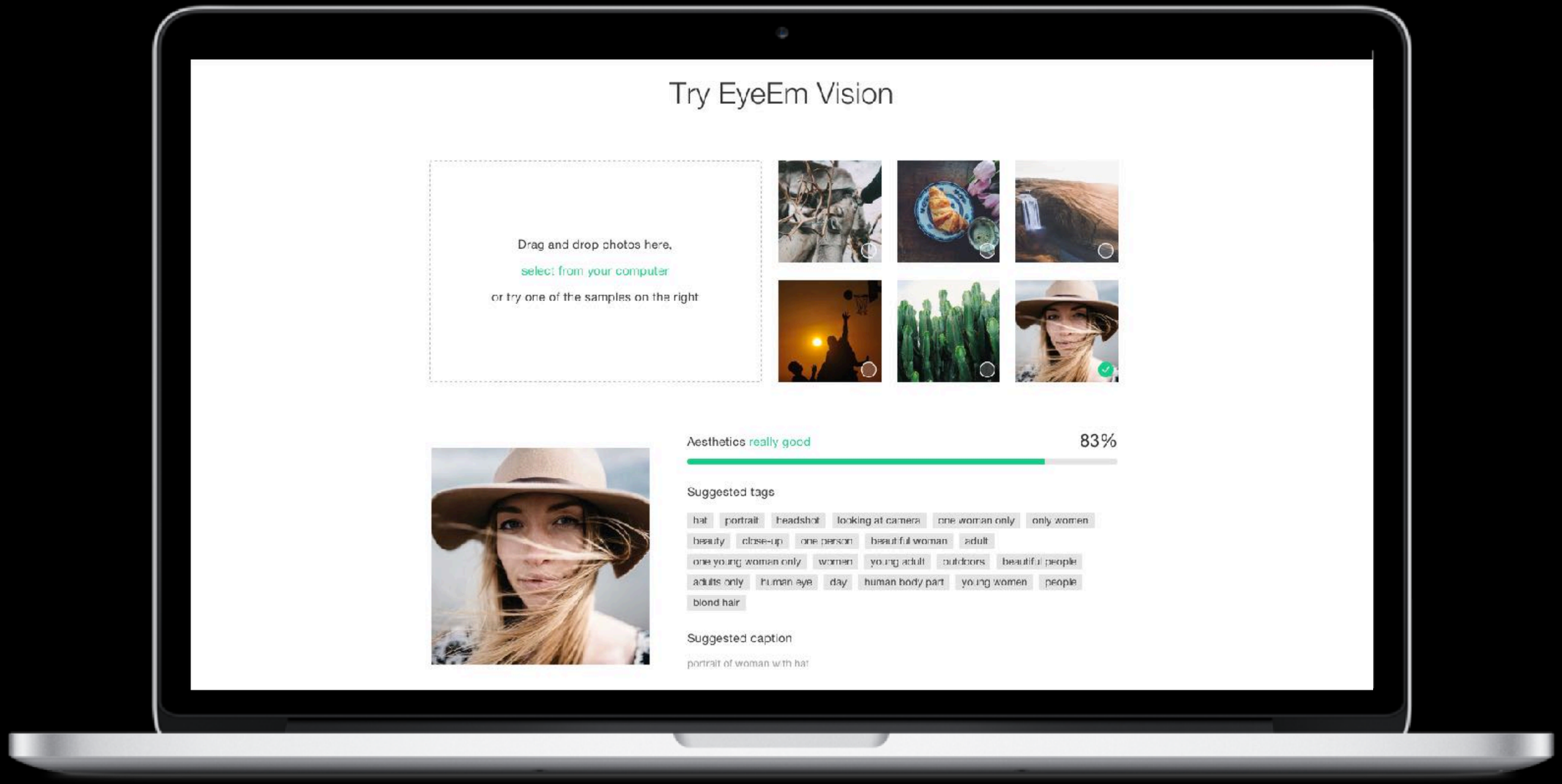


EyeEm



http://www.eyeem.com/tech

EyeEm



http://www.eyeem.com/tech

Understanding Aesthetics.

@Aadnan

EyeEm

Can we learn from
the masters ?

EyeEm

Bombay Churchgate Station, (1994)

by Raghu Rai (fair use).

EyeEm

Bombay Churchgate Station, (1995)

by Sebastião Salgado (fair use).

Bombay Churchgate Station, (2011)

by Randy Olson (fair use).

EyeEm

Bombay Churchgate Station, (unknown)

from Google Image Search

EyeEm

What is **common** among them ?

What **differentiates** them ?

Steve McCurry

David Uzochukwu

Me :-)

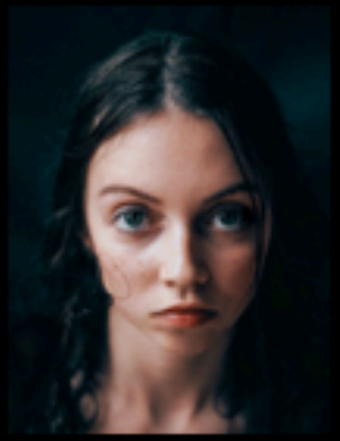
EyeEm

Photographs by EyeEm users @nicanorgarcia, @cocu_liu , and me.

EyeEm

$\text{Dist}(\phi(p_1), \phi(p_3))$

$\text{Dist}(\phi(p_1), \phi(p_2))$



$$\text{Dist}(\phi(p_1), \phi(p_2)) \leq \text{Dist}(\phi(p_1), \phi(p_3))$$

$$\text{loss} = \max(0, c - \text{Dist}(\psi(p_1), \psi(p_2)) + \text{Dist}(\psi(p_1), \psi(p_3)))$$

EyeEm

Data

- Aesthetics are hard to express.
- Aesthetics differ from person to person.
- However, experts often find a common language to define and communicate about aesthetics, after considerable conversation and debate.

4 million

Photographs curated by Experts

3 years

and ongoing

Crowdsourced — Social Data — Community — Expertly Curated

EyeEm

PERSONALIZED

Aesthetics

Isn't

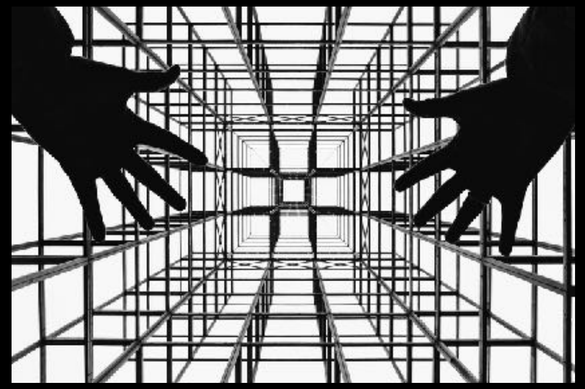
Aesthetics

Subjective ?

EyeEm

BCG
THE BOSTON CONSULTING GROUP

@jackyczj2010



@KatePhellini

@itchban

@ken_kou

INTERNATIONAL CENTER OF PHOTOGRAPHY

@sayjor

@idjphotography

@ArifNurhakim

@svanteberg

EyeEm

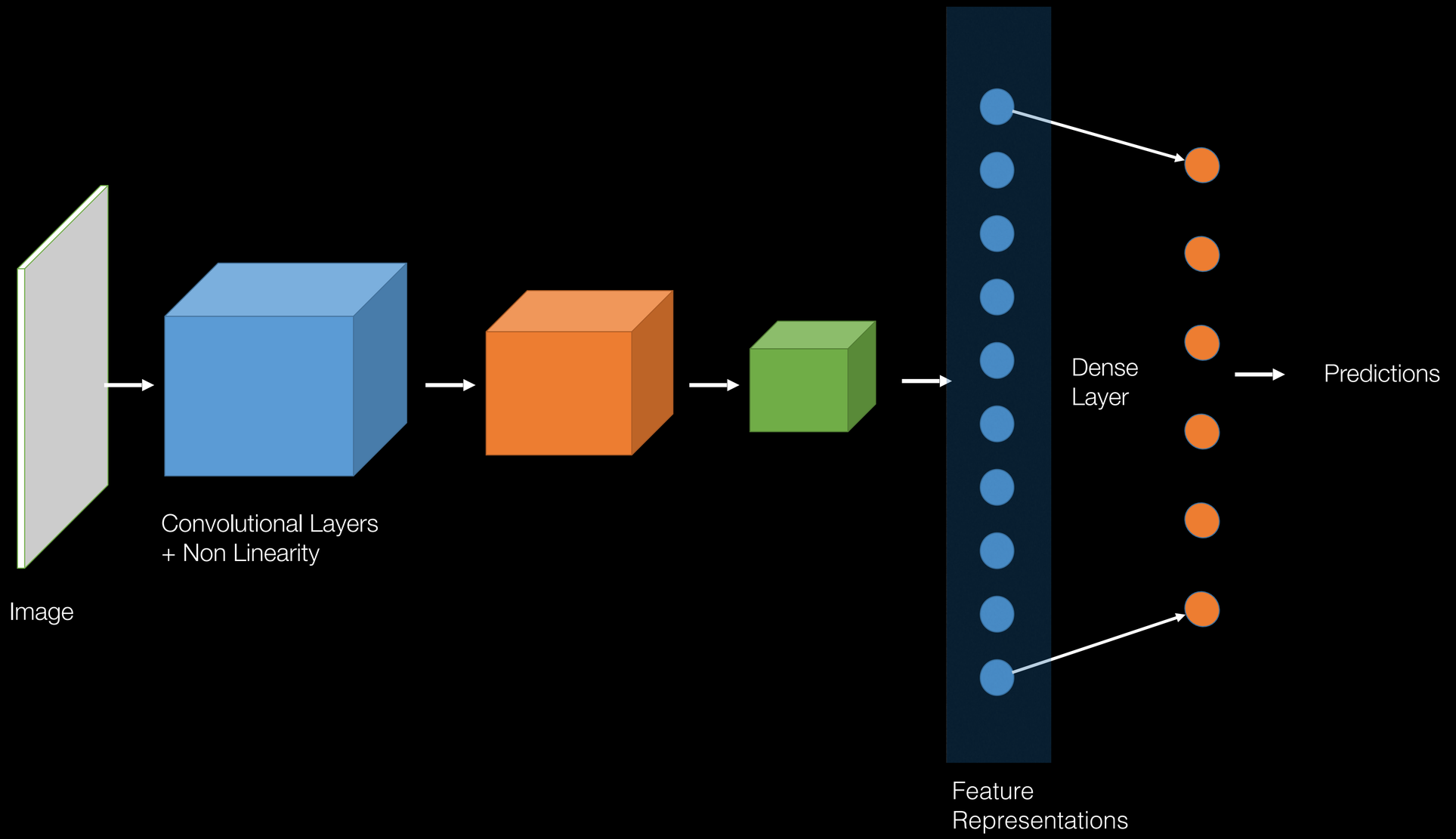
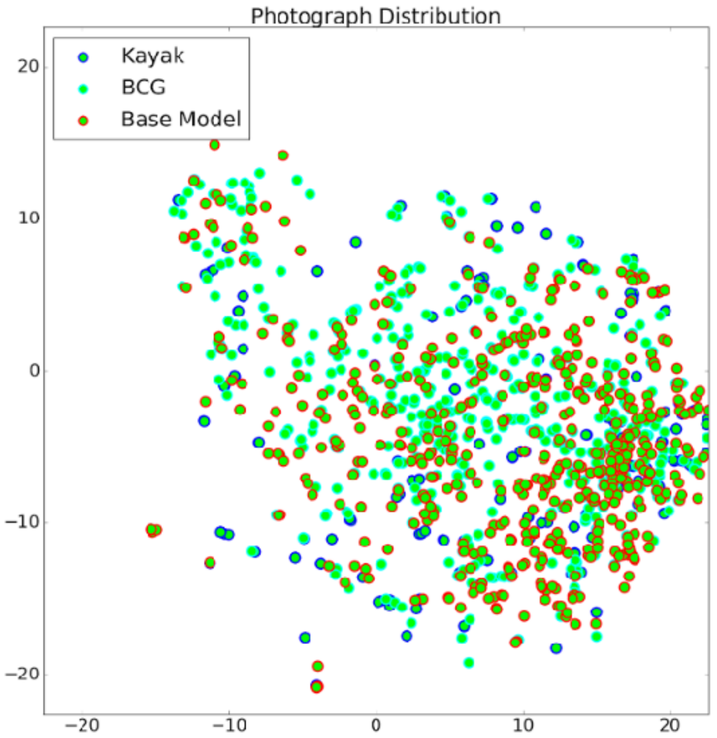


Image
Convolutional Layers
+ Non Linearity
Feature
Representations
Dense
Layer
Predictions

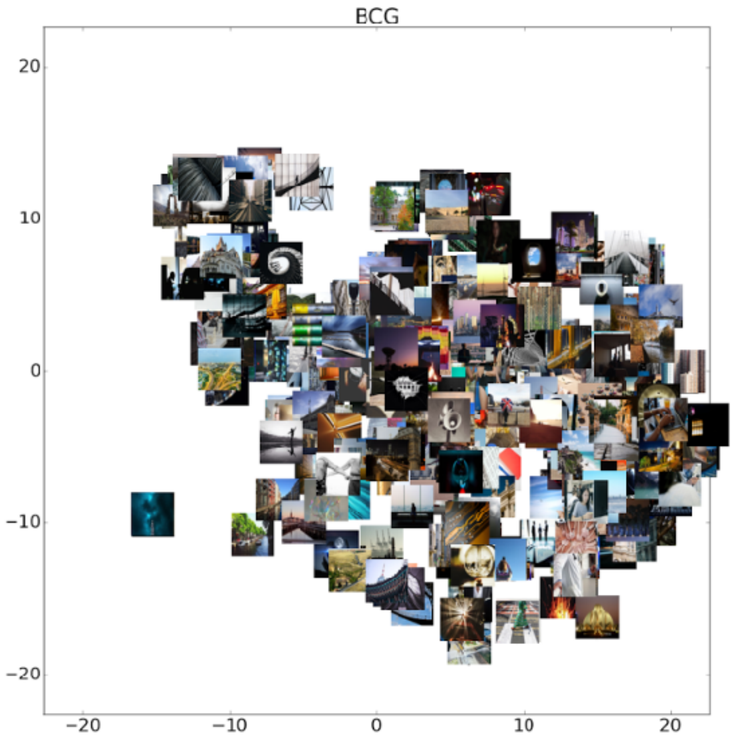
EyeEm

Feature Representations

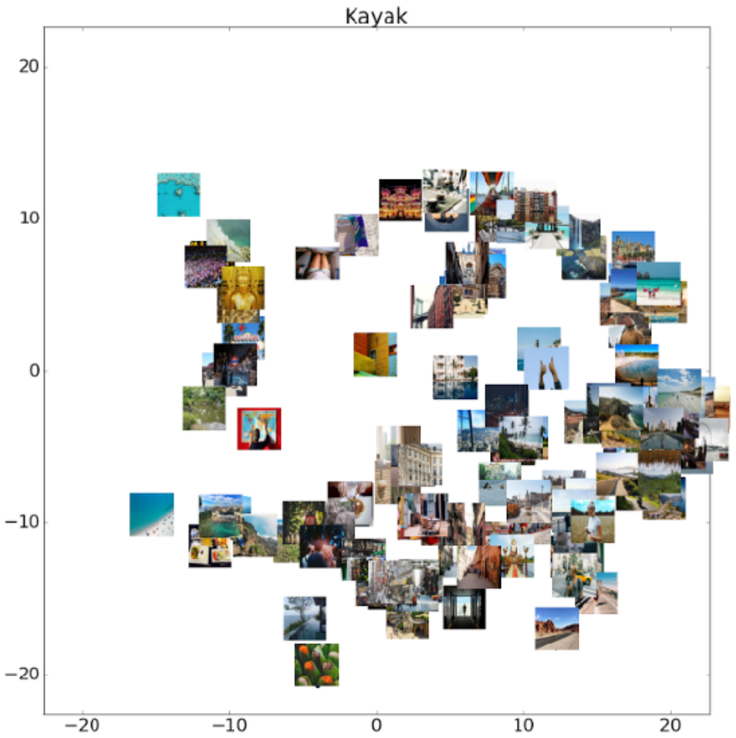
All Images

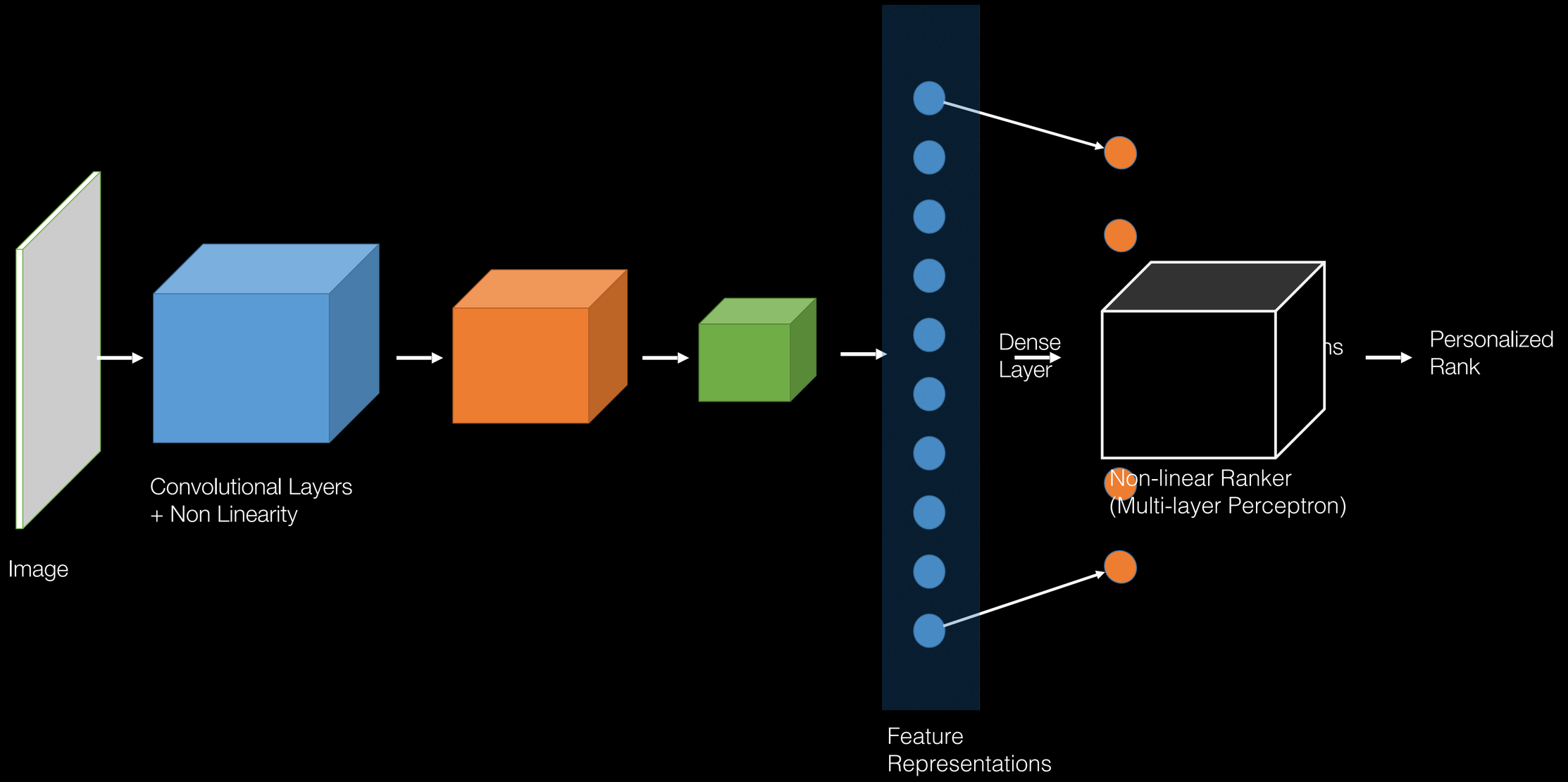


BCG



Kayak

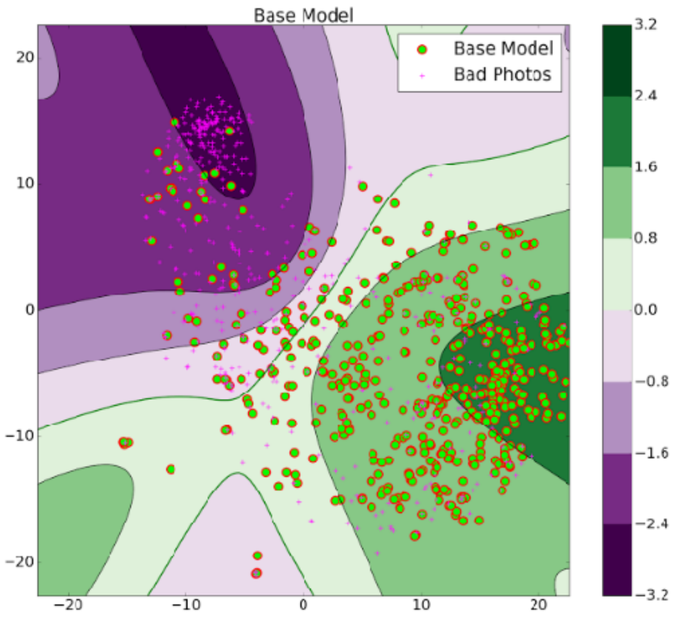



EyeEm
Image
Convolutional Layers
+ Non Linearity
Feature
Representations
Dense
Layer
Non-linear Ranker
(Multi-layer Perceptron)
Personalized
Rank

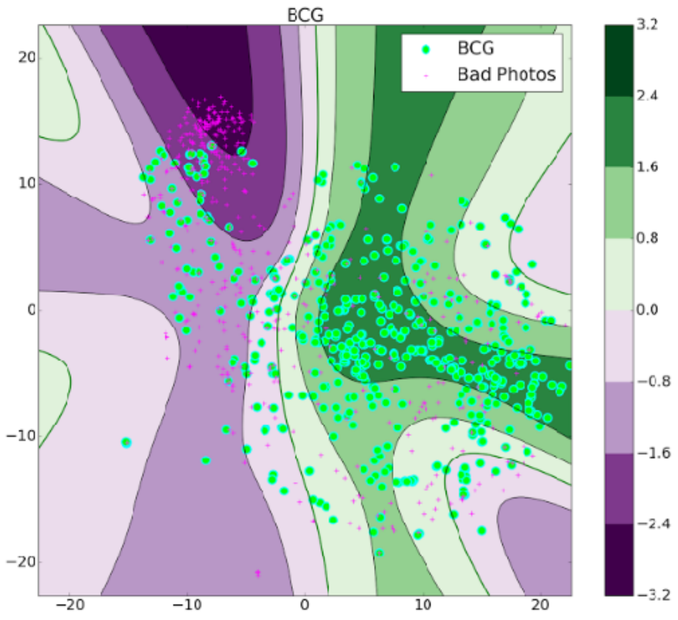
EyeEm

Energy Surface

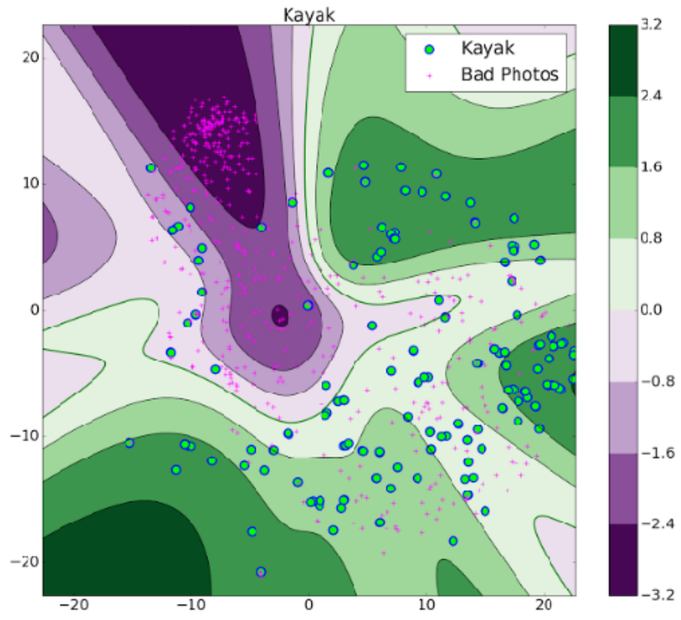
All Images



BCG



Kayak



EyeEm

3 ~ 4 secs

Train a New Personalized Layer (in Titan GPU)

200,000

Photos can be scored in a sec.

EyeEm

Personalized Aesthetics Demo

Start Personalization

https://www.youtube.com/watch?v=IYFKqoekP_0

EyeEm

COMPUTER VISION AND MACHINE LEARNING RESEARCH

At EyeEm

(Hint : It is about answering questions with no easy answers)

Data

- What kind of data should we collect ?
- How do you understand the data ? Human thinking is non-linear, and any given selection is prone to biases.
- How do you sample the data ?
- How do you evaluate & analyze the results ?
- How much data is enough ?
- How do you fill in data gaps ?

Algorithms

- How do you pose the problem ?
- What do you look for in good feature representations ?
- Will the architecture engineered for classification task be the best for aesthetics ?
- What is the network learning ?

Efficiency

- How do you make your networks faster ?
- How do you make your networks smaller ?
- Can we transfer learn effectively what we have learned in the past ?

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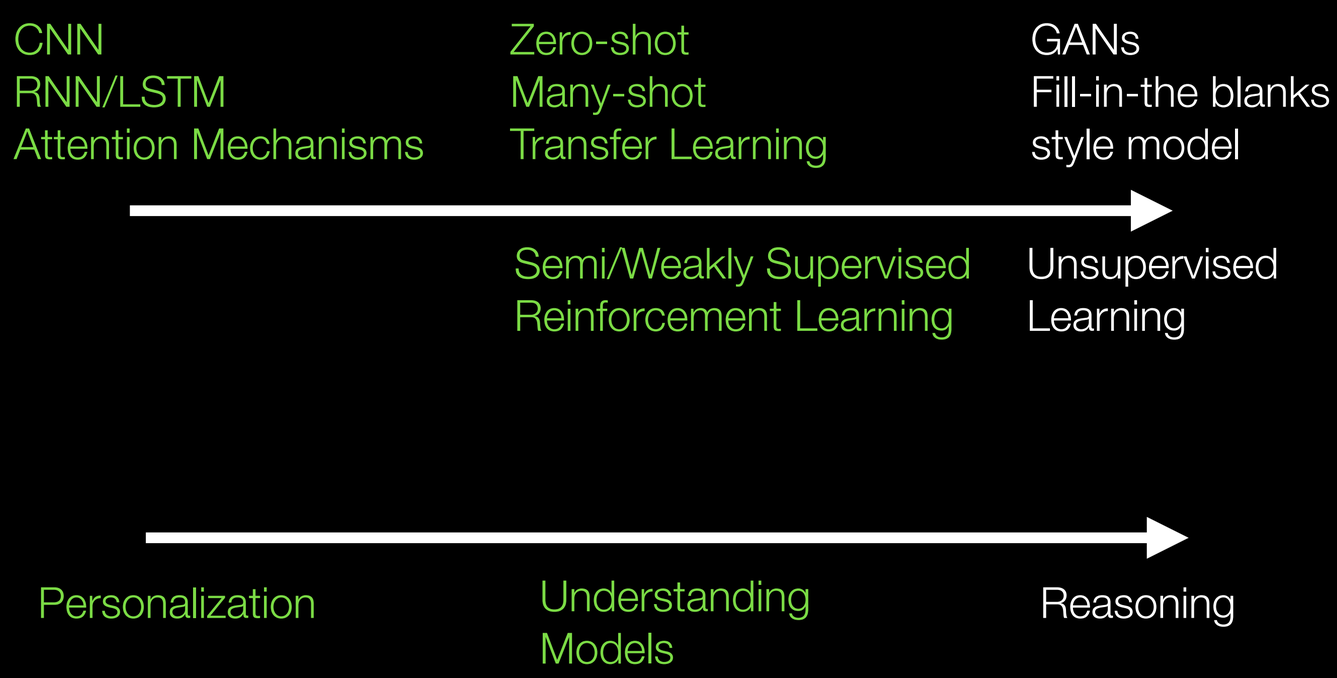
Research **Directions**



EyeEm

Technology

Product

ASK LORENZ

EyeEm

Photos

Technology

Community

EyeEm

Joint Work With

- **Dr. Gökhan Yildrim**
- **Harsimrat Sandhawalia**
- **Ludwig Schmidt-Hackenberg**
- **Dr. Hicham Badri**
- **Dr. Praveen Kulkarnai**
- **Nour Karessli**
- **Dr. Josip Krapac**
- **Fulya Neubert**

Thanks

- **Photography Team @ EyeEm**
- **Core Engineering @ EyeEm**
- **Clients @ EyeEm**

And yes, we are hiring (https://www.eyeem.com/jobs).

A photograph exists in past, present and future; and magic can happen in any of these times!

appu@eyeem.com

@evanscsmith