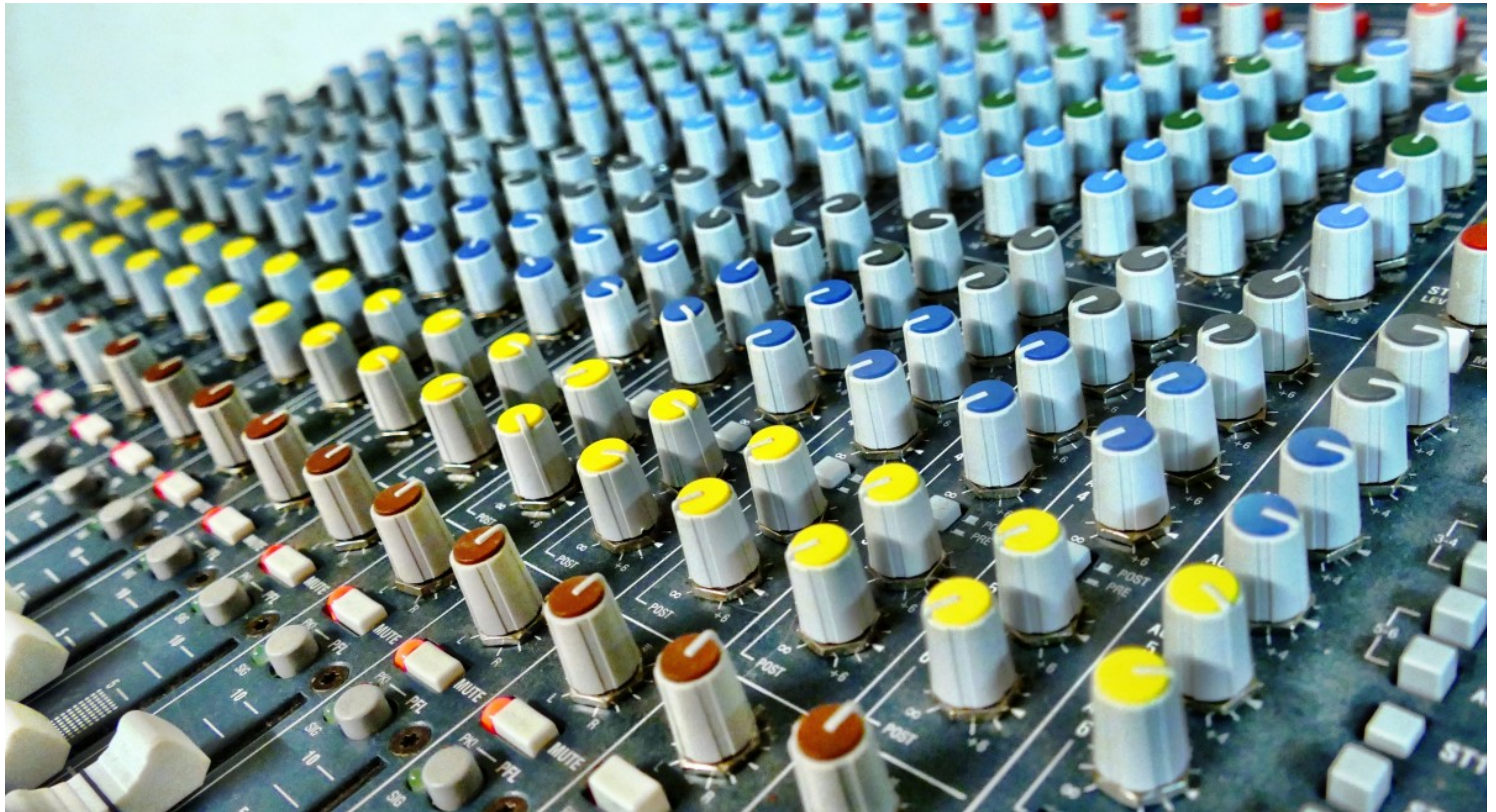


Neural Art

Dániel Varga
Prezi / Rényi Institute

What is a neural network?

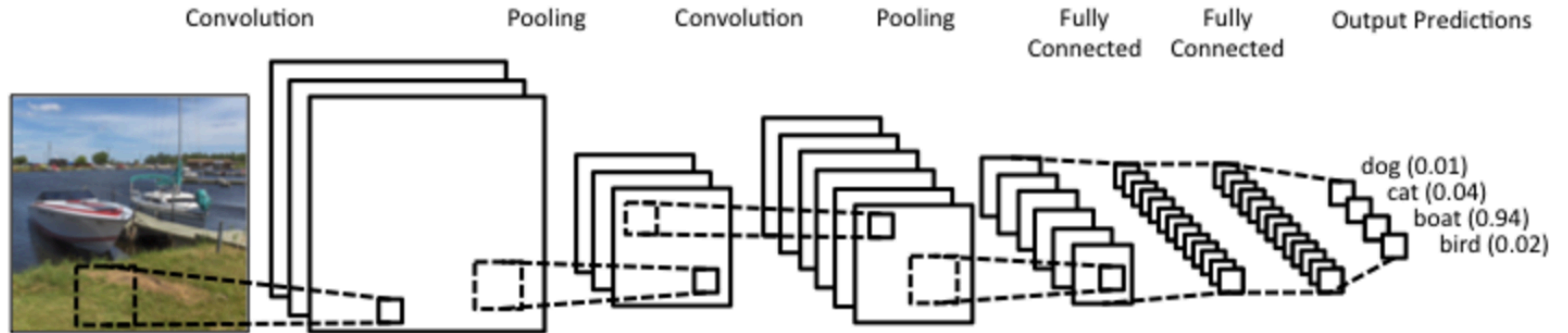
A black box with lots of unlabeled sliders



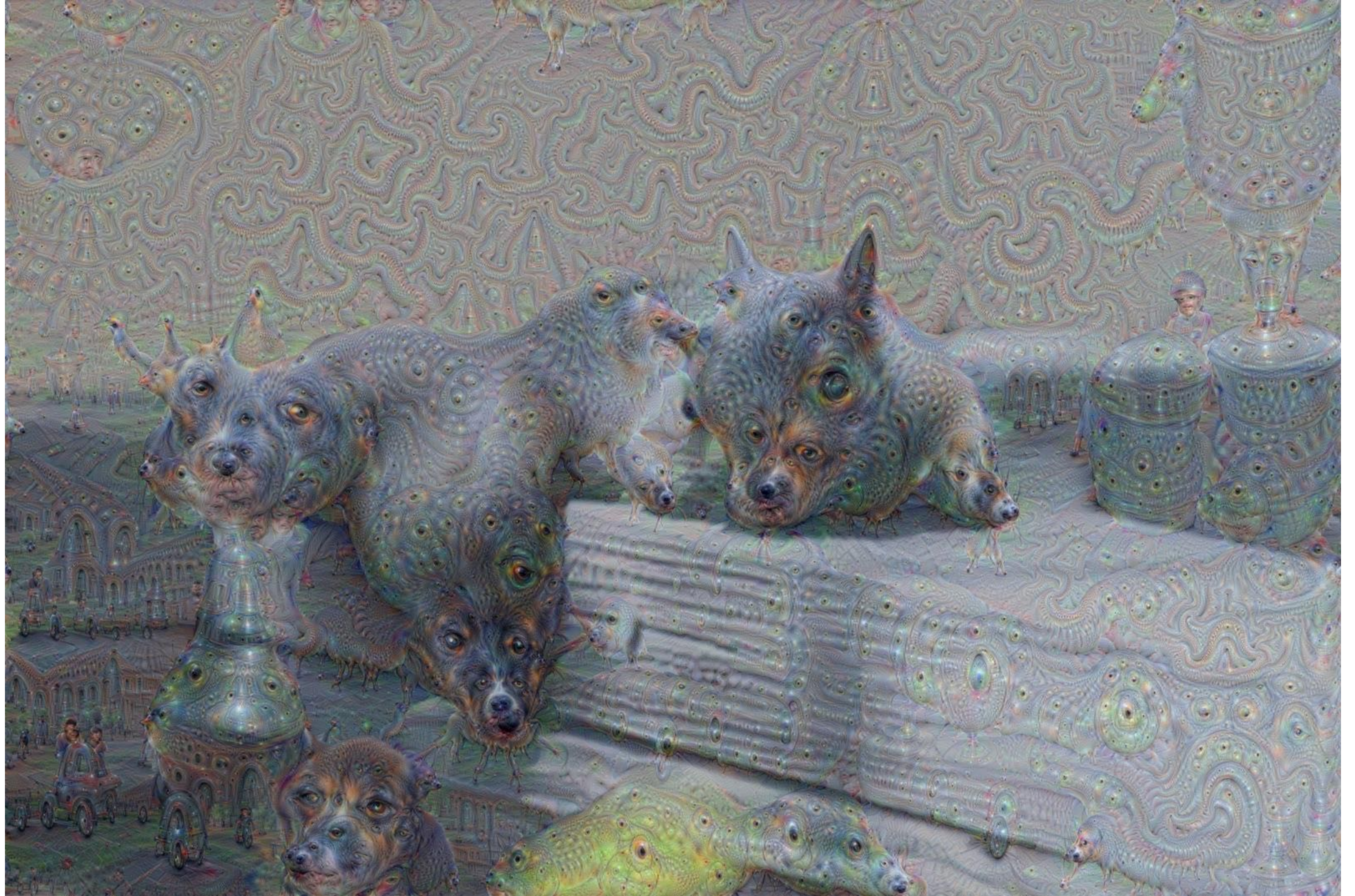
Okay, a bit more detail

- Inputs, outputs
- Neurons, activation
- Layers
- Classifier
- Training

Network layers



Deep Dream



Grocery trip

Pareidolia



Deep Dream - the code

```
def render_naive(t_obj, img0=img_noise, iter_n=20, step=1.0):
    t_score = tf.reduce_mean(t_obj) # defining the optimization objective
    t_grad = tf.gradients(t_score, t_input)[0] # behold the power of automatic differentiation!

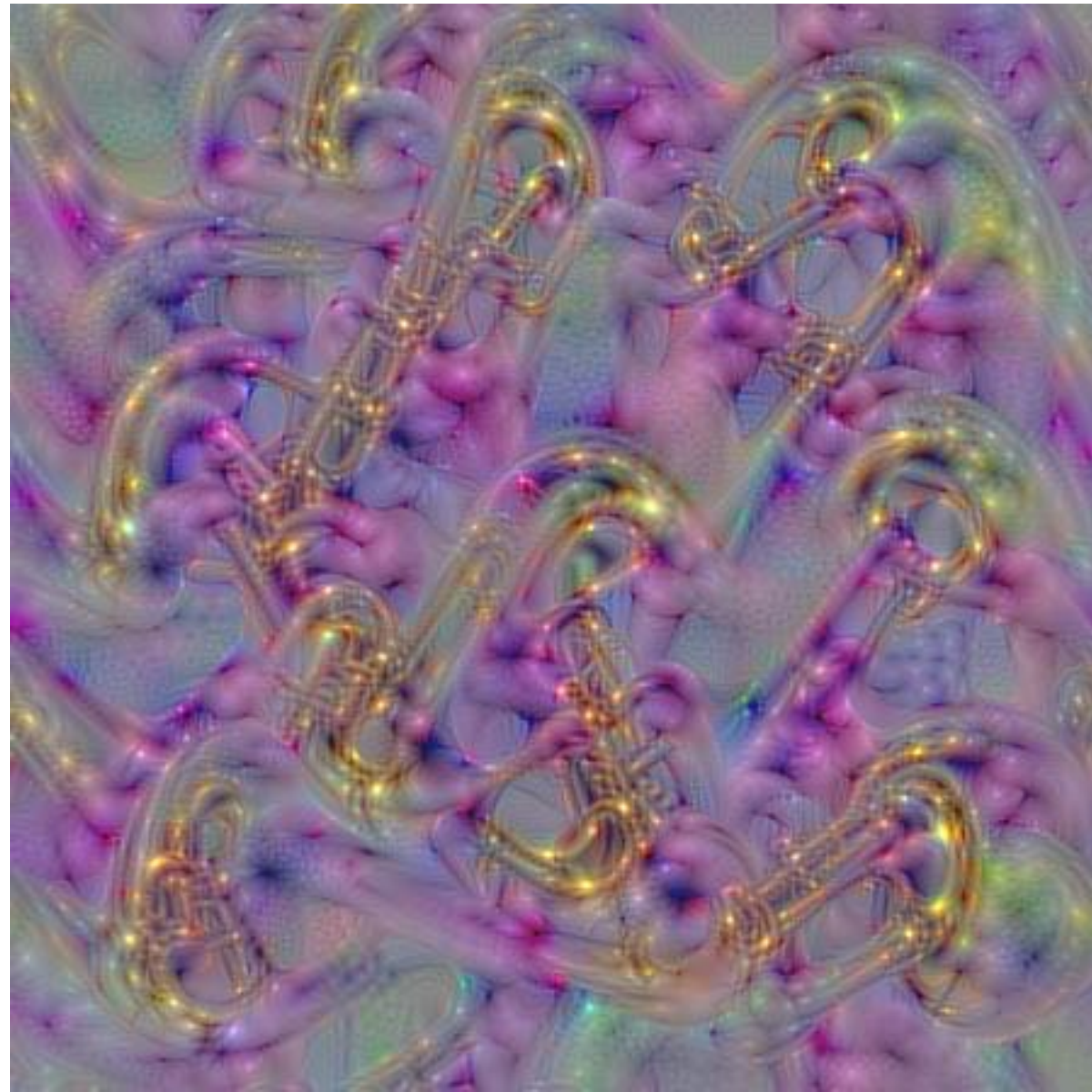
    img = img0.copy()
    for i in range(iter_n):
        g, score = sess.run([t_grad, t_score], {t_input:img})
        # normalizing the gradient, so the same step size should work
        g /= g.std()+1e-8 # for different layers and networks
        img += g*step
        print(score, end = ' ')
    clear_output()
    showarray(visstd(img))

render_naive(T(layer)[:,:,:,:channel])
```

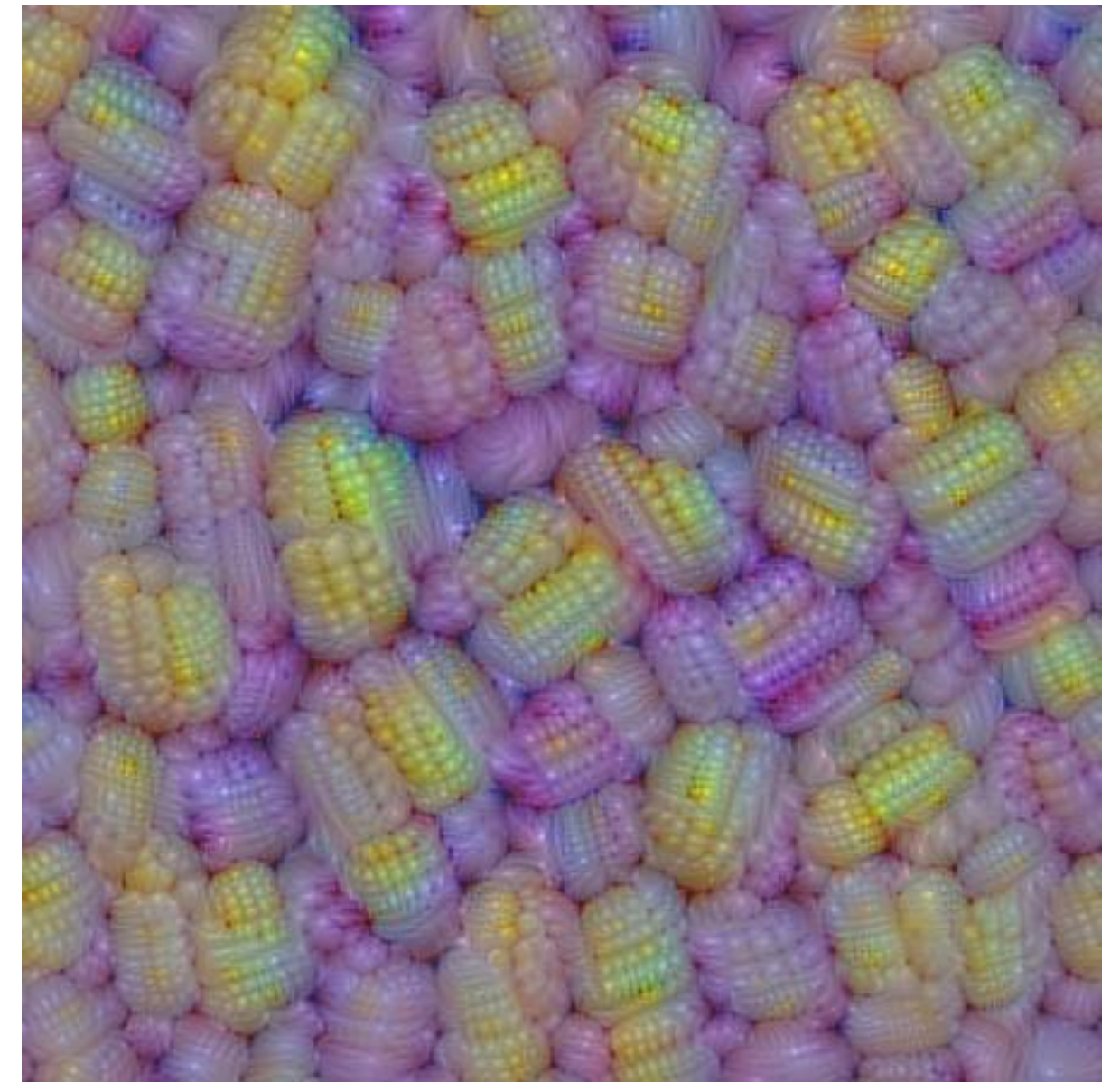
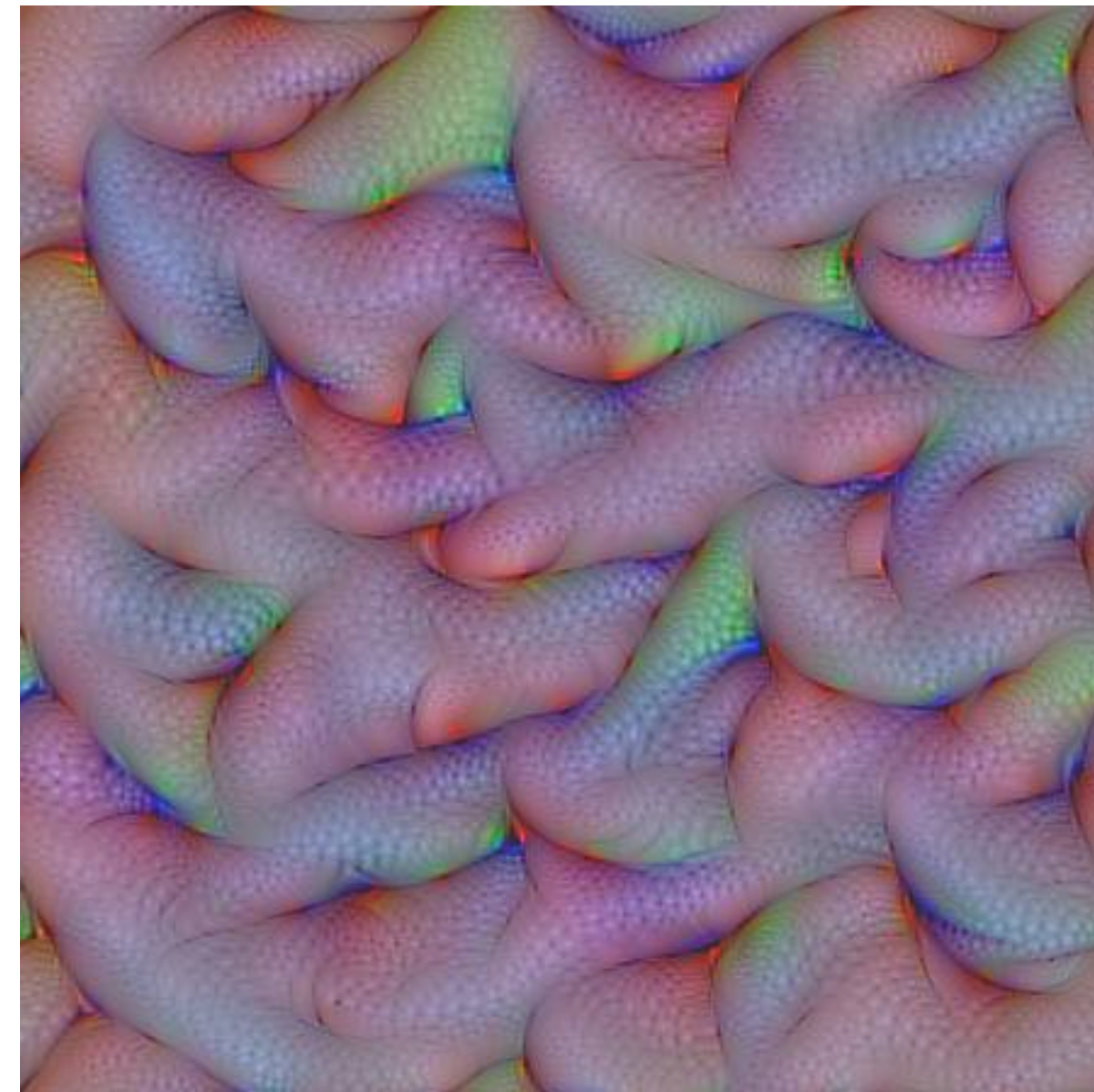
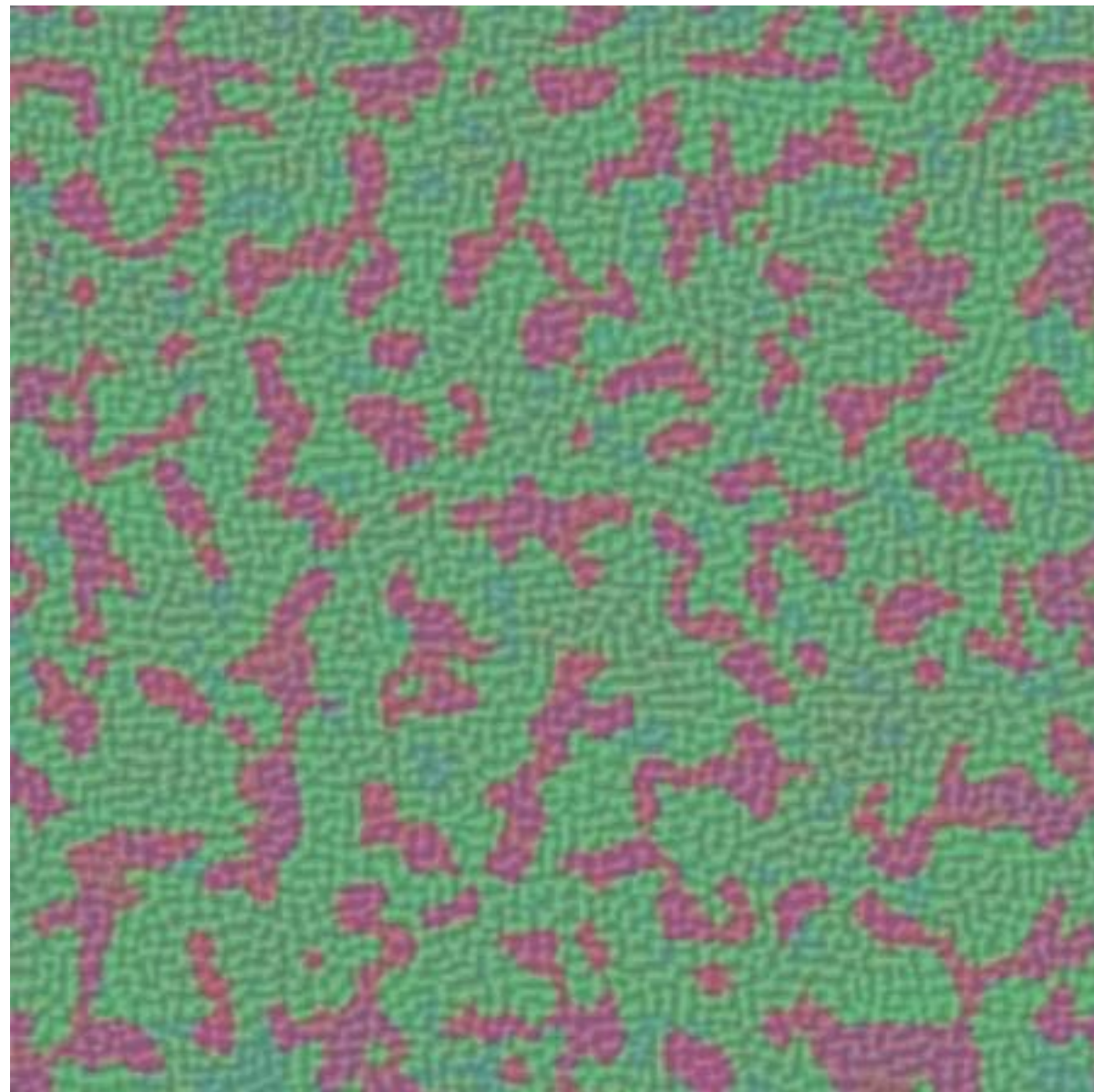
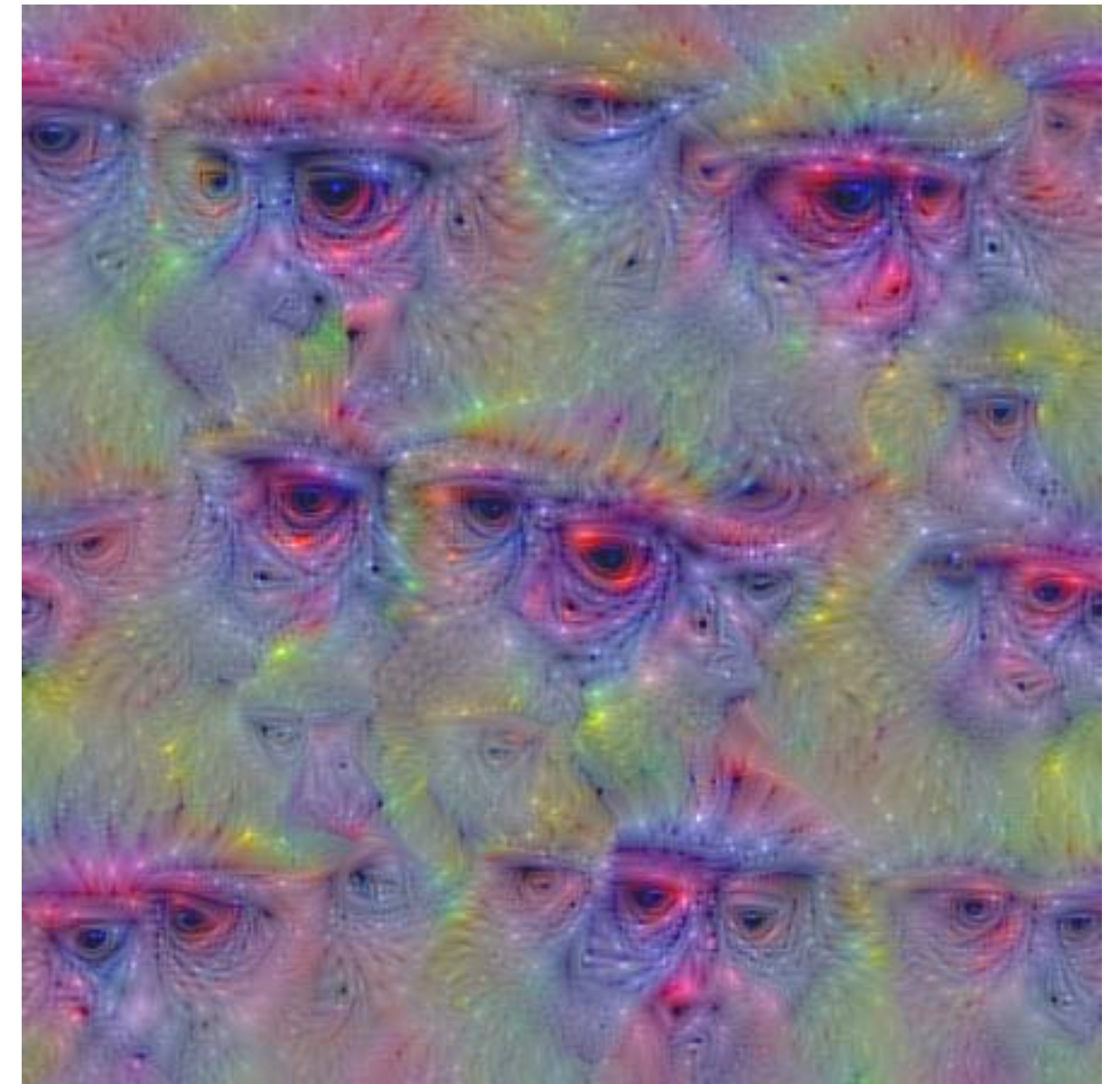


deep-dream-daniel

deep-dream-luca-masked



single neuron dreams



<https://distill.pub/2017/feature-visualization/>

<https://distill.pub/2017/feature-visualization/appendix/>

POSITIVE CHANNEL



Channel Objective



Diversity



Dataset examples

NEGATIVE CHANNEL



Negative Channel



Negative dataset examples

POSITIVE CHANNEL



Channel Objective



Diversity

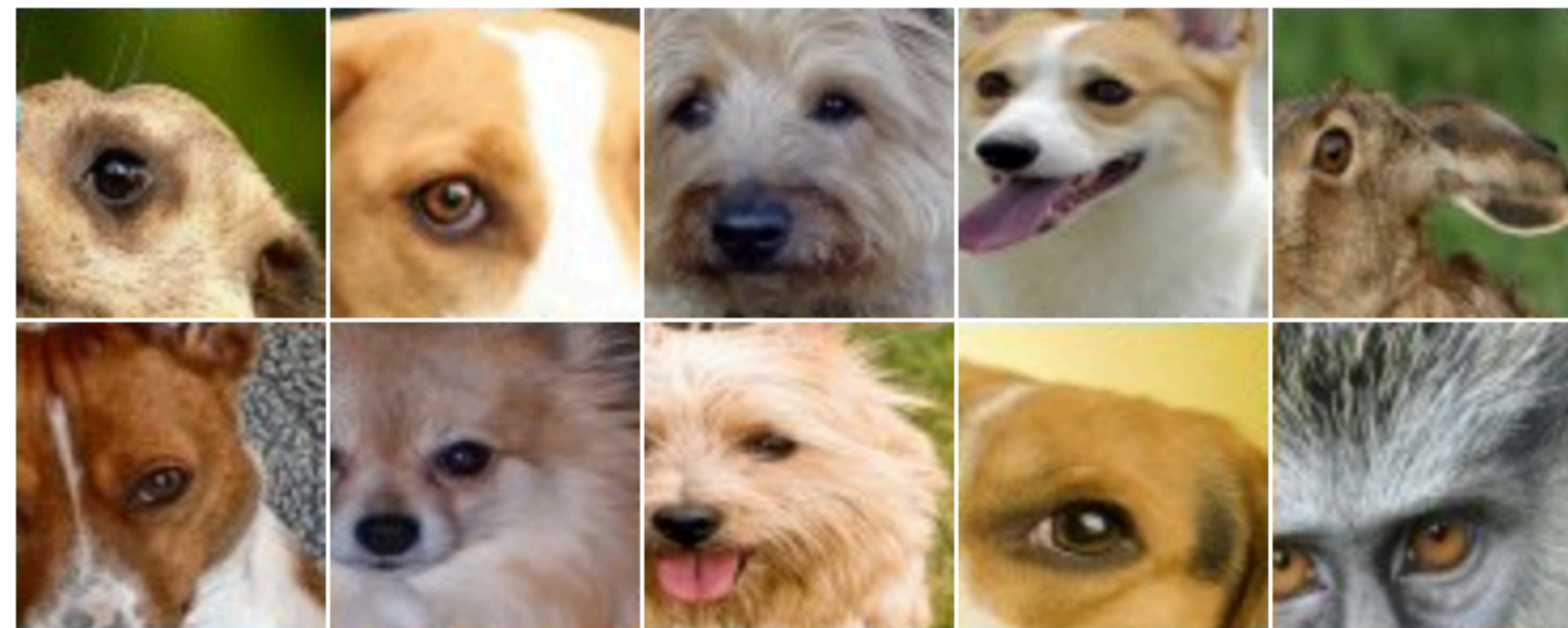


Dataset examples

NEGATIVE CHANNEL



Negative Channel



Negative dataset examples

POSITIVE CHANNEL



Channel Objective



Diversity



Dataset examples

NEGATIVE CHANNEL



Negative Channel



Negative dataset examples

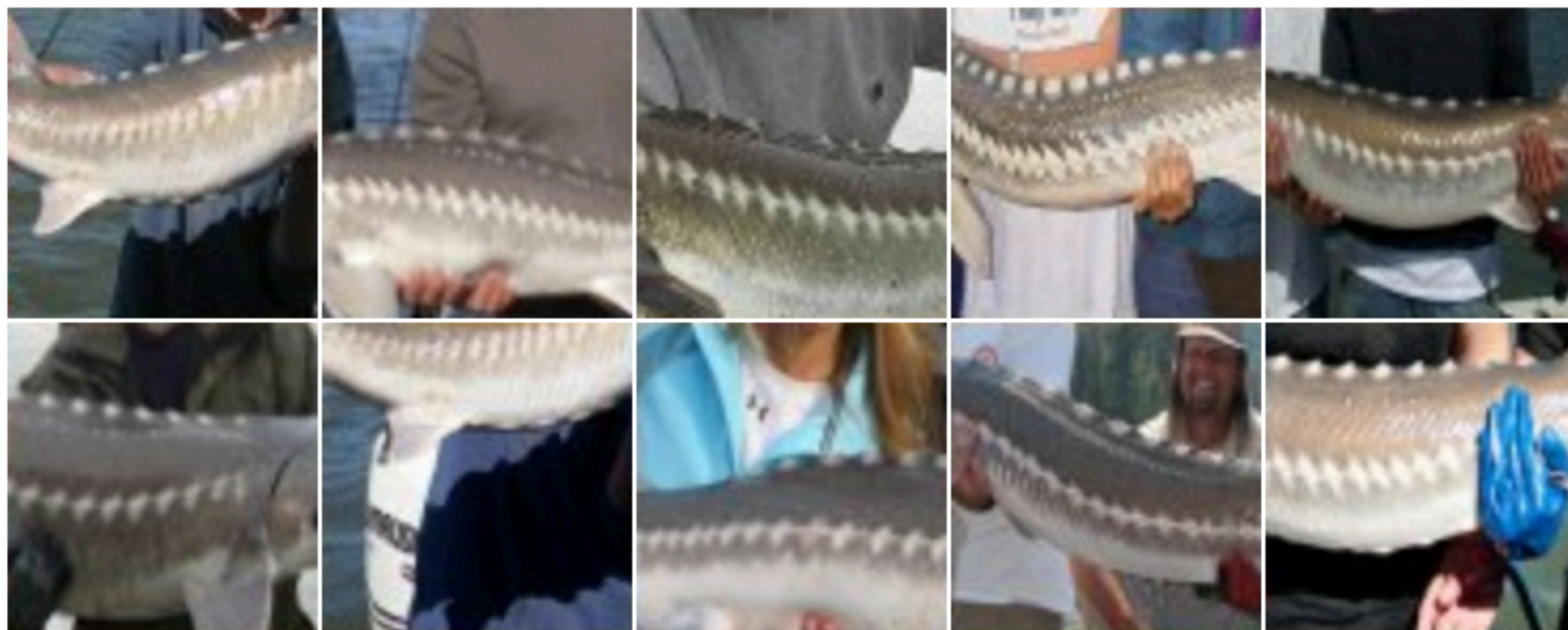
POSITIVE CHANNEL



Channel Objective



Diversity

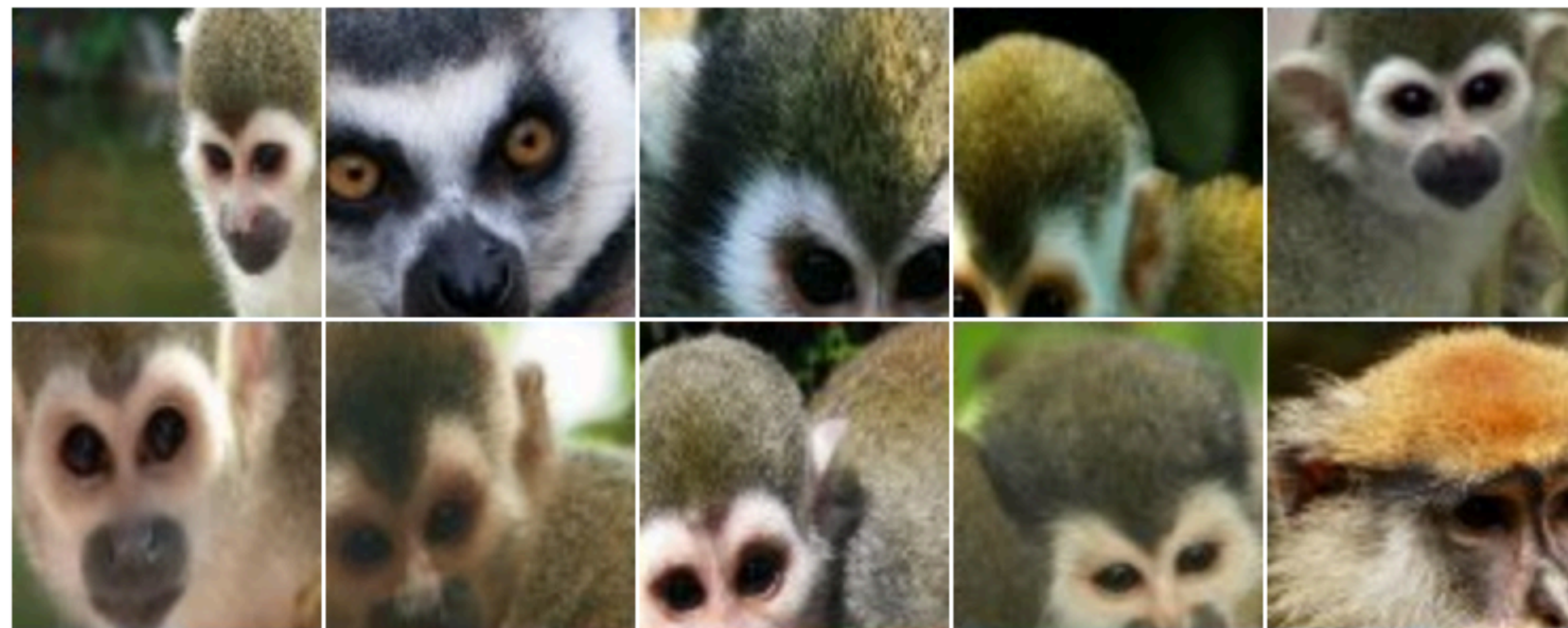


Dataset examples

NEGATIVE CHANNEL



Negative Channel



Negative dataset examples

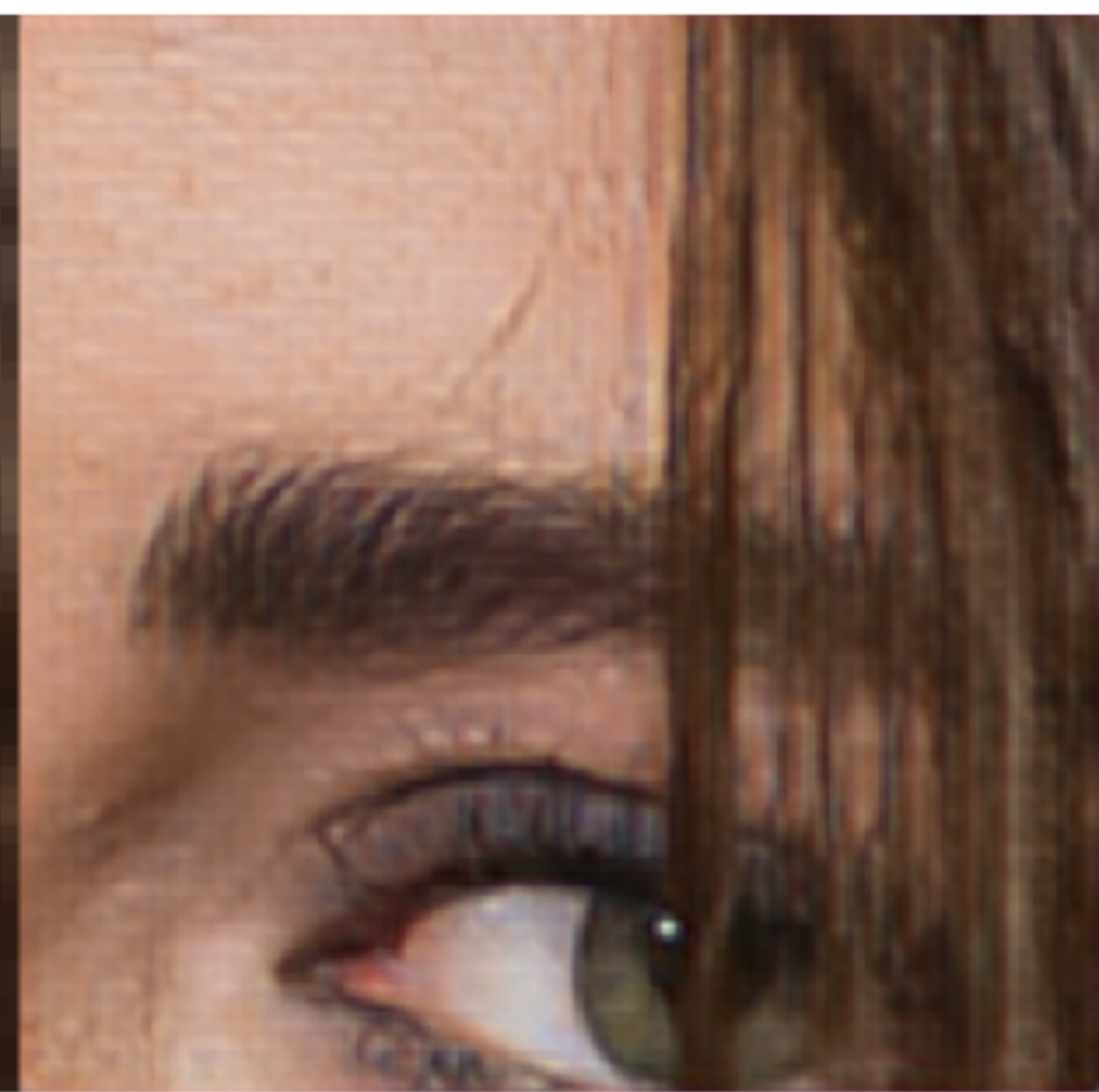
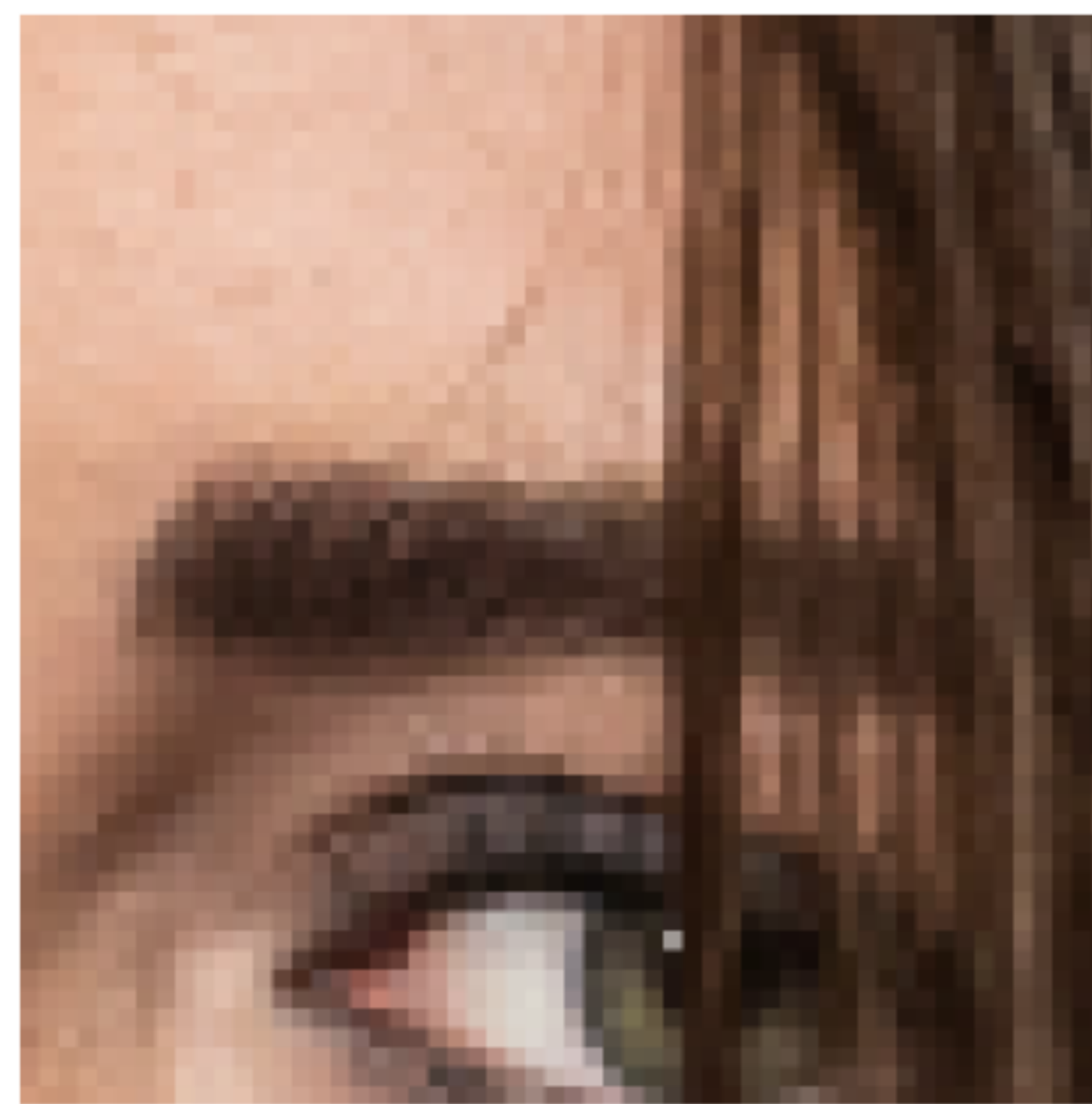
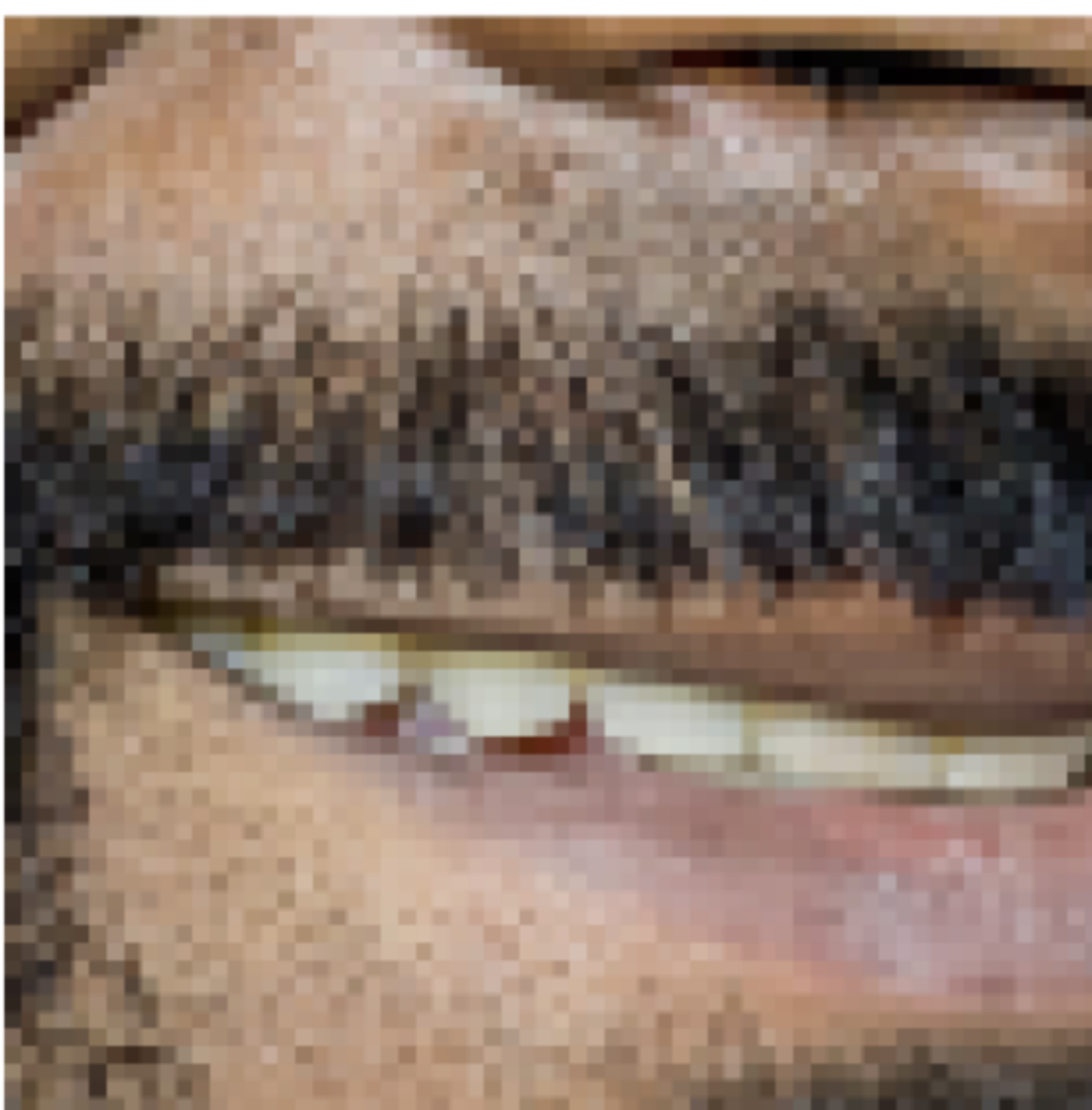
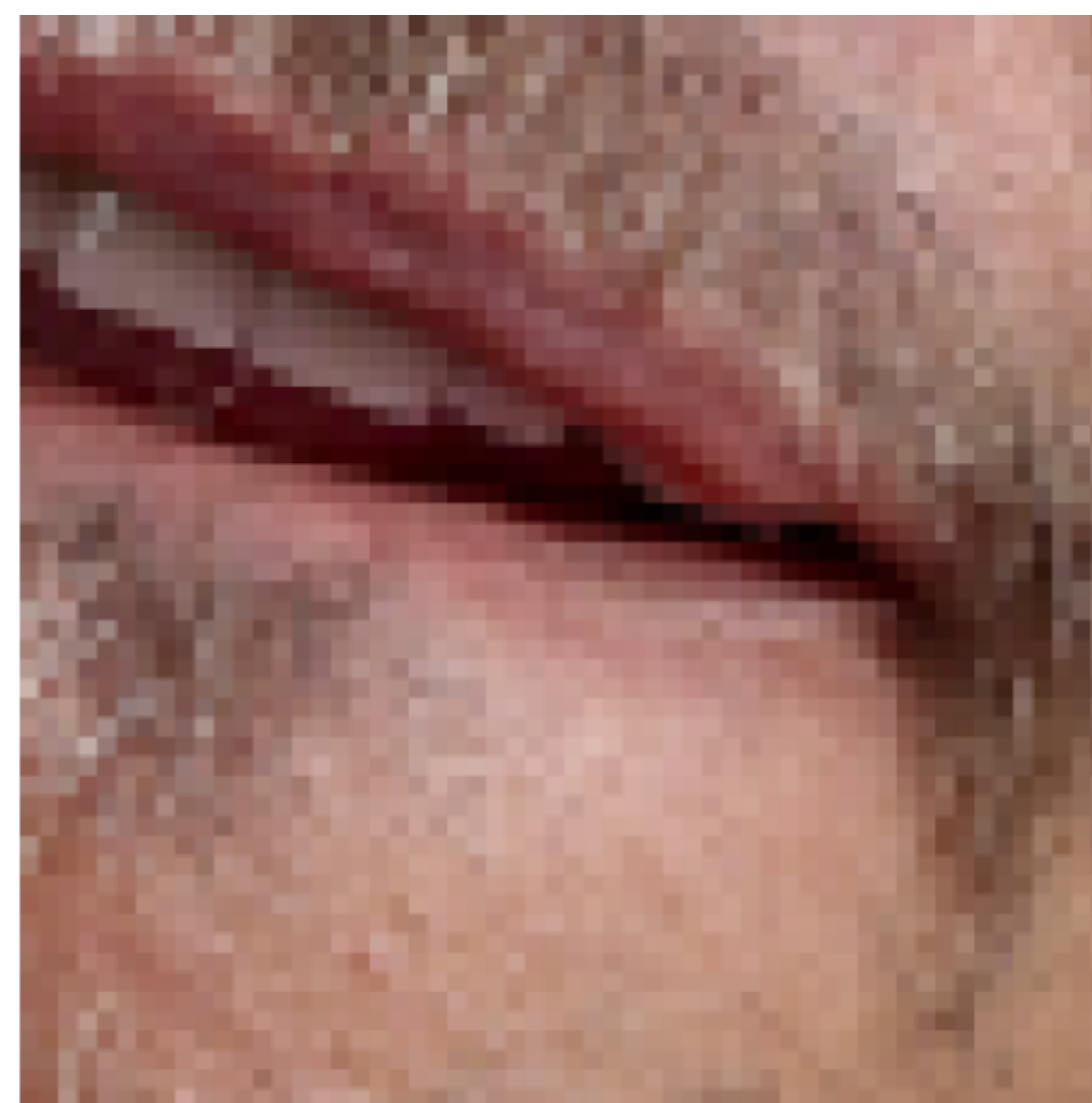
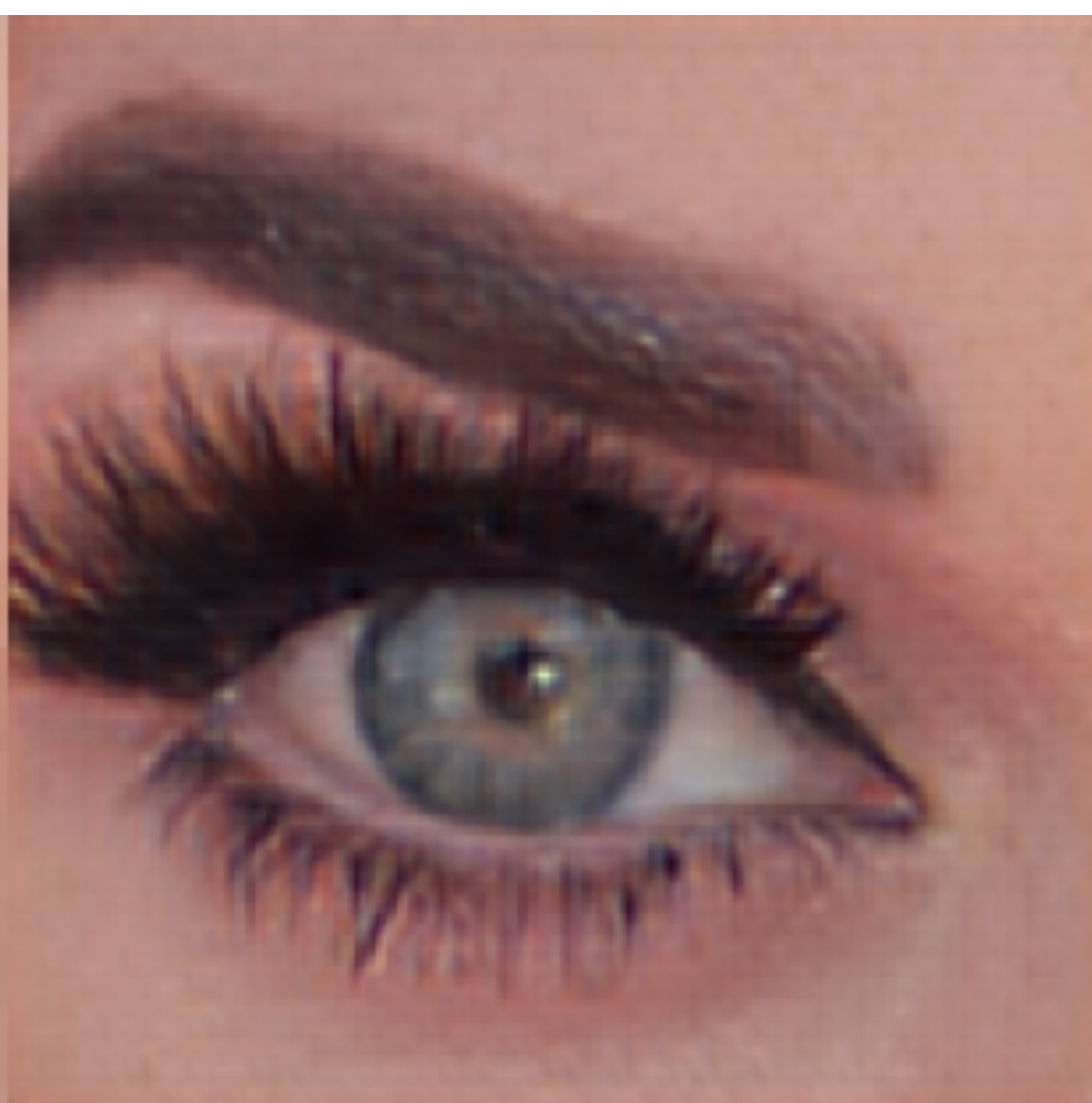
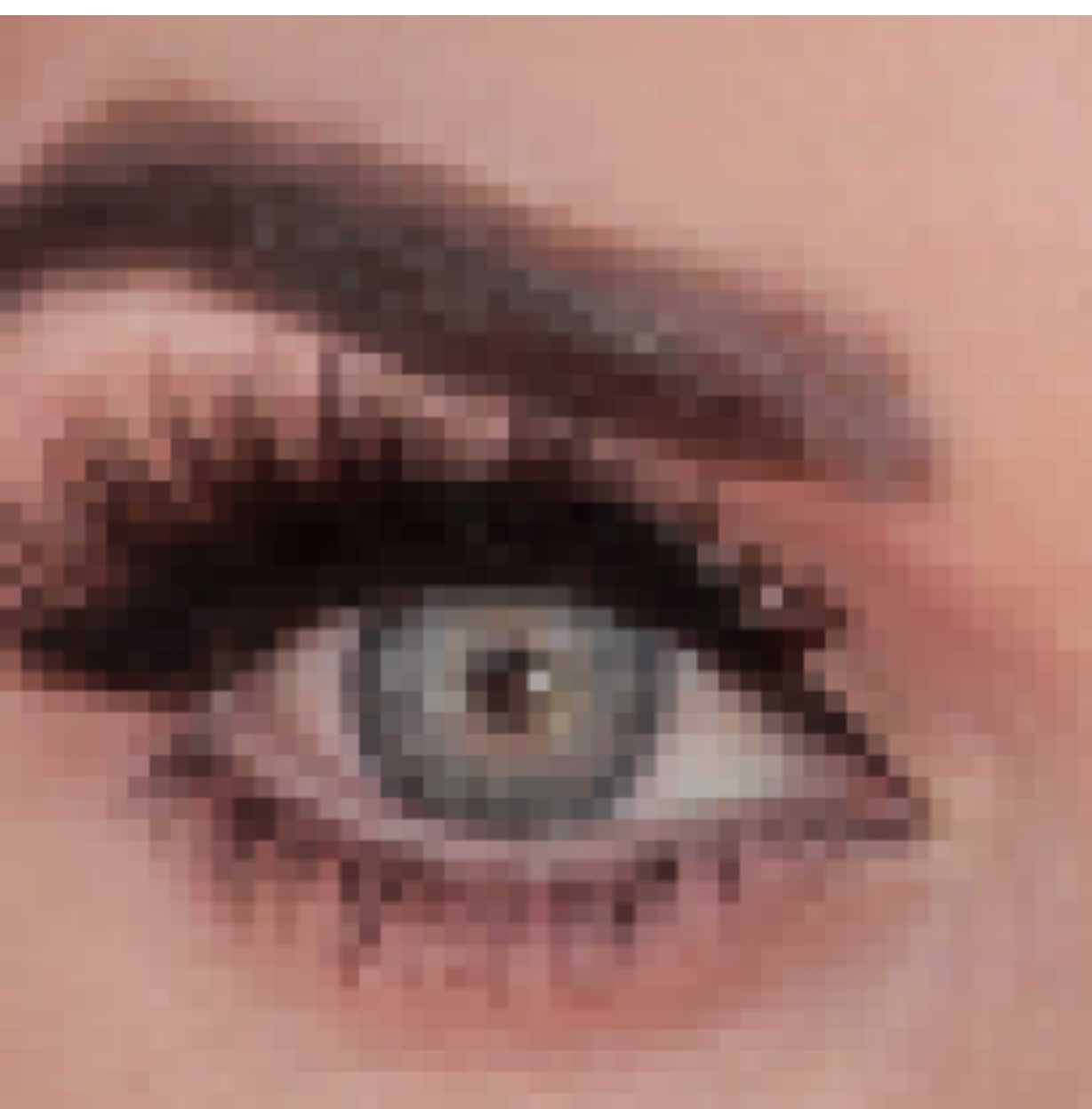
Style Transfer





Best of Ostagram

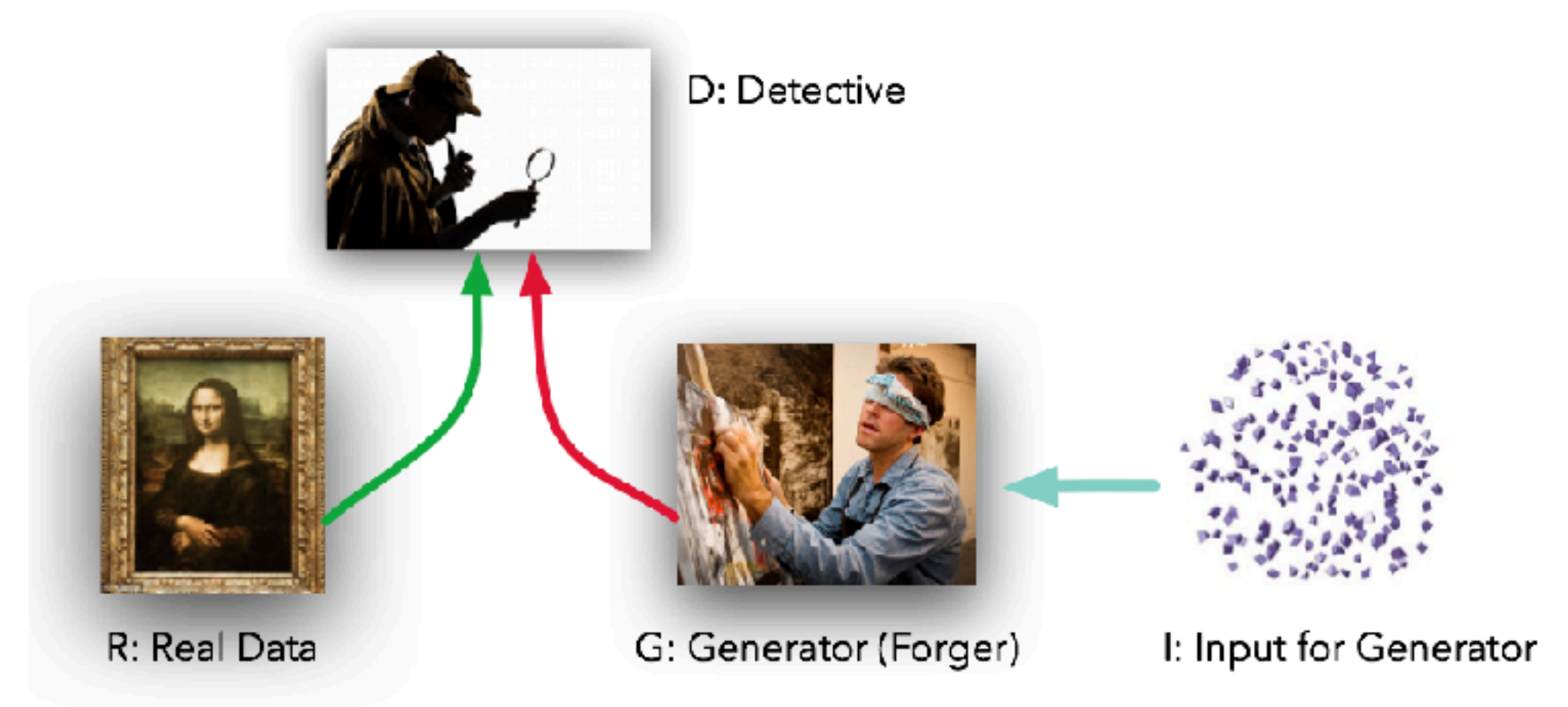
Superresolution



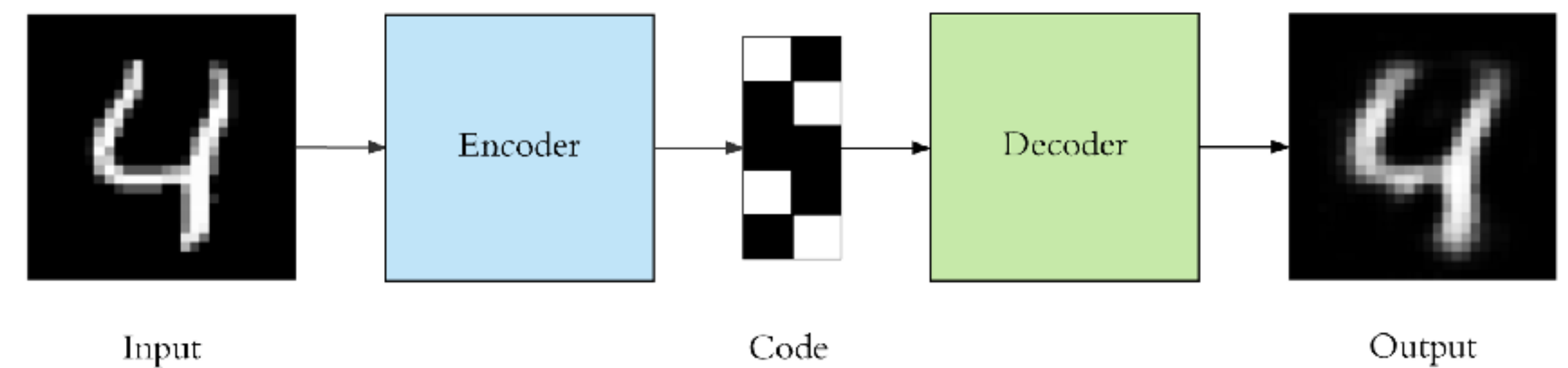
Generative neural networks

Generative neural networks

Generative Adversarial Networks

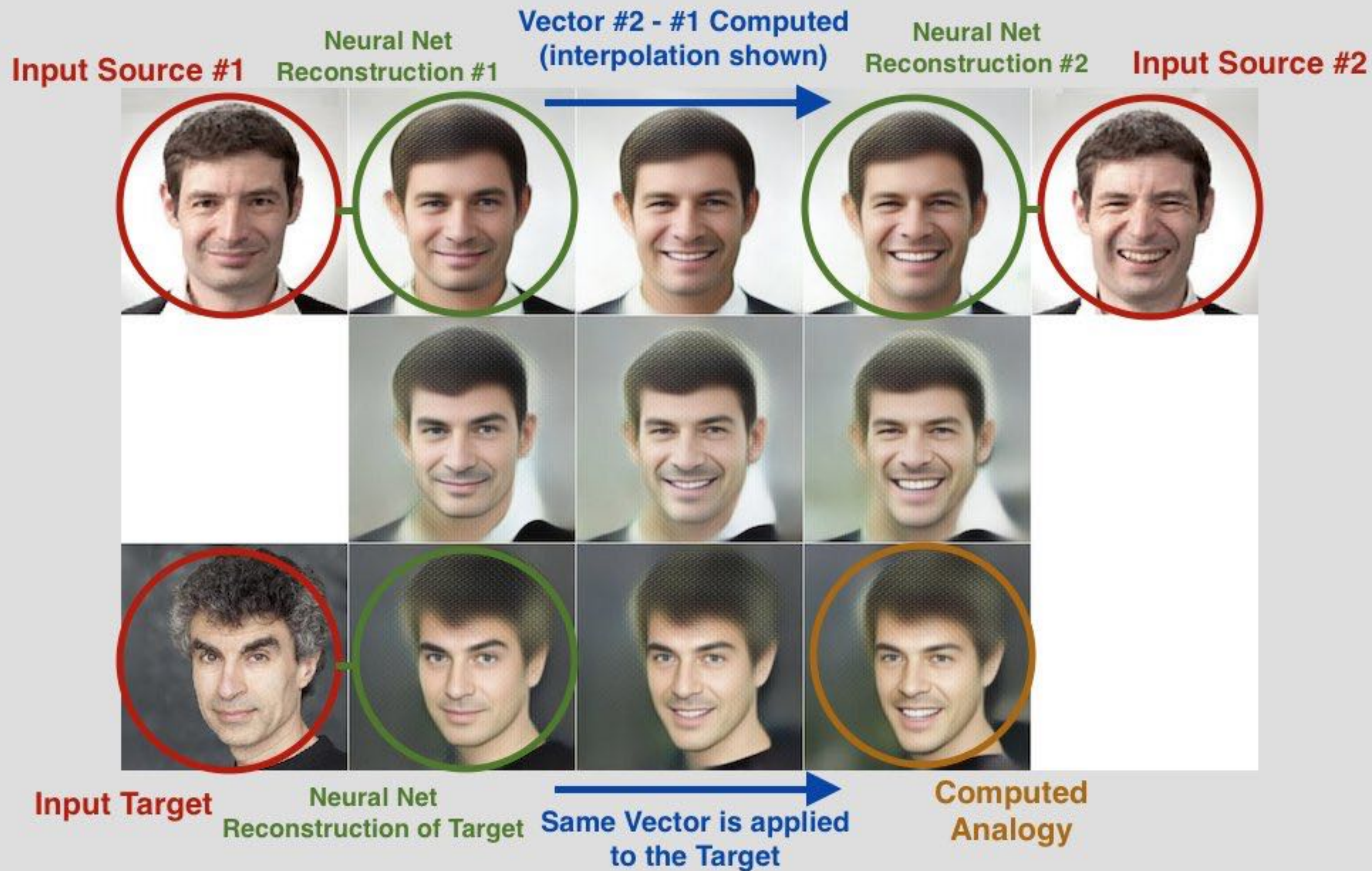


Variational Autoencoders



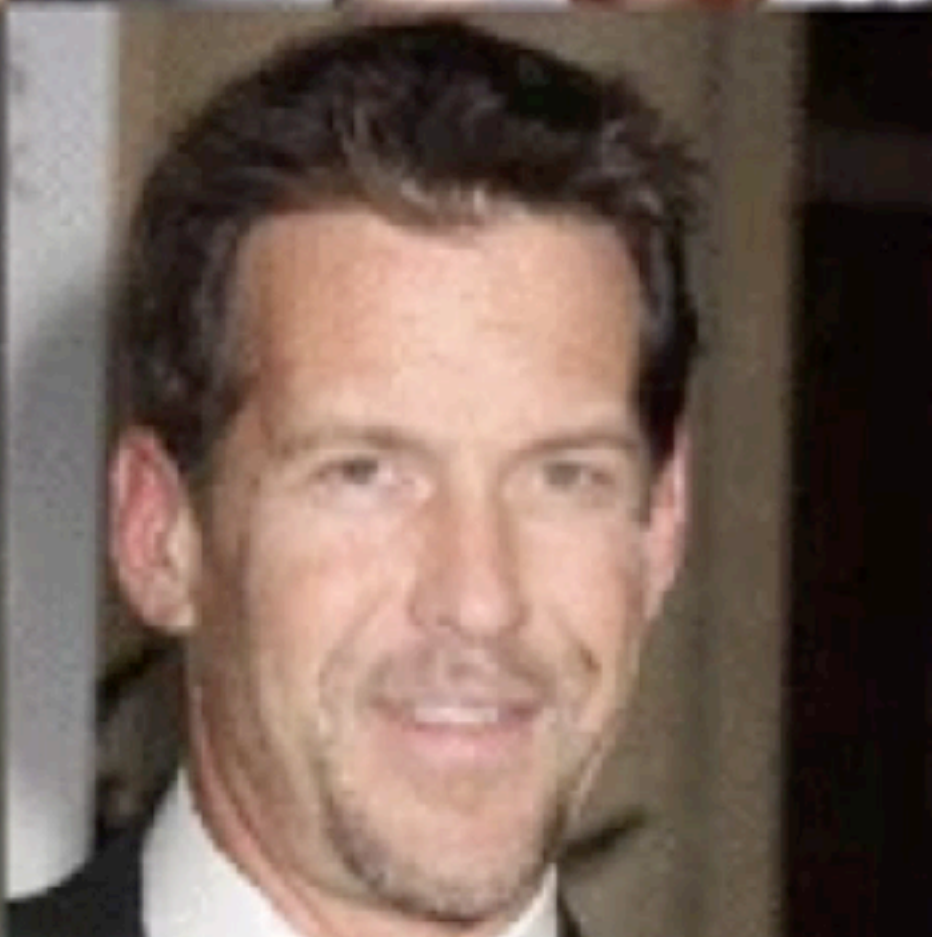
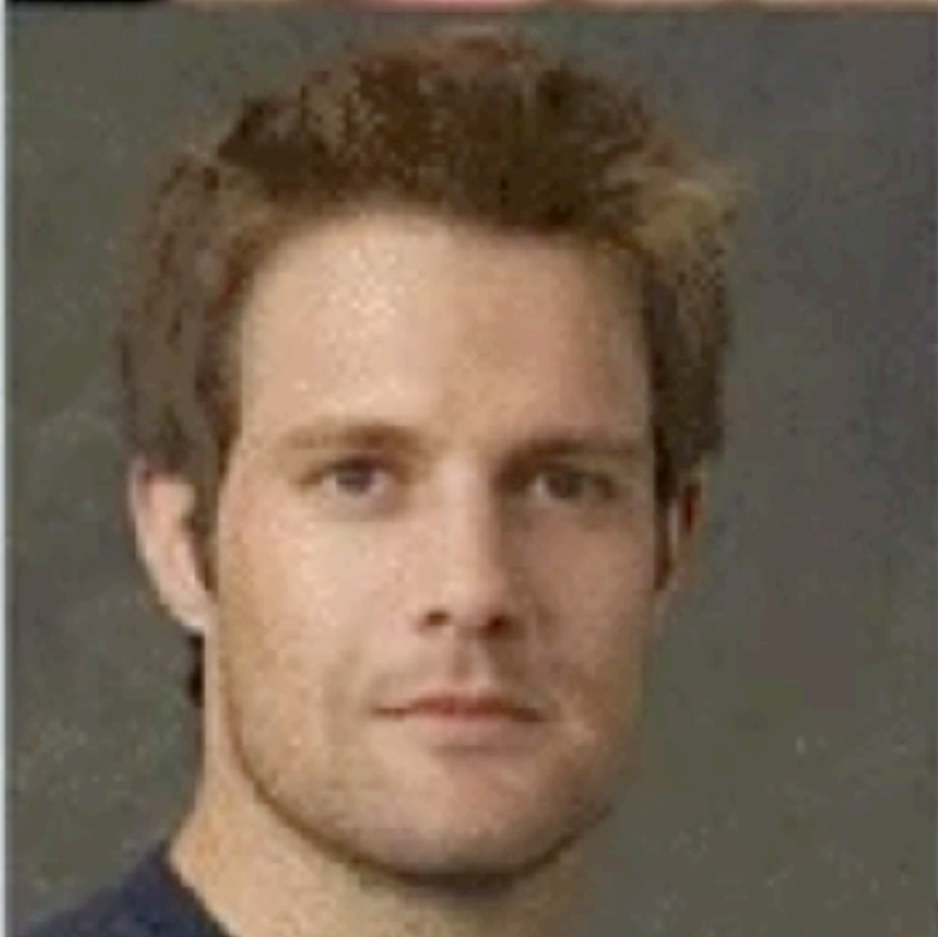
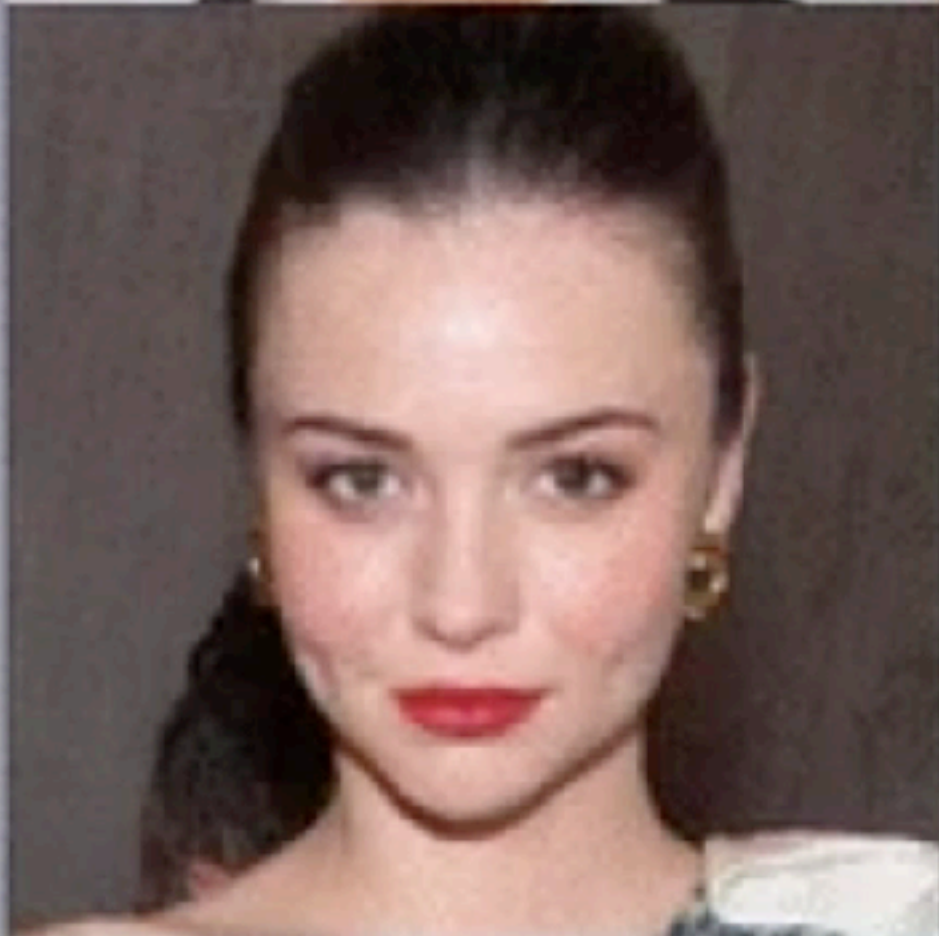
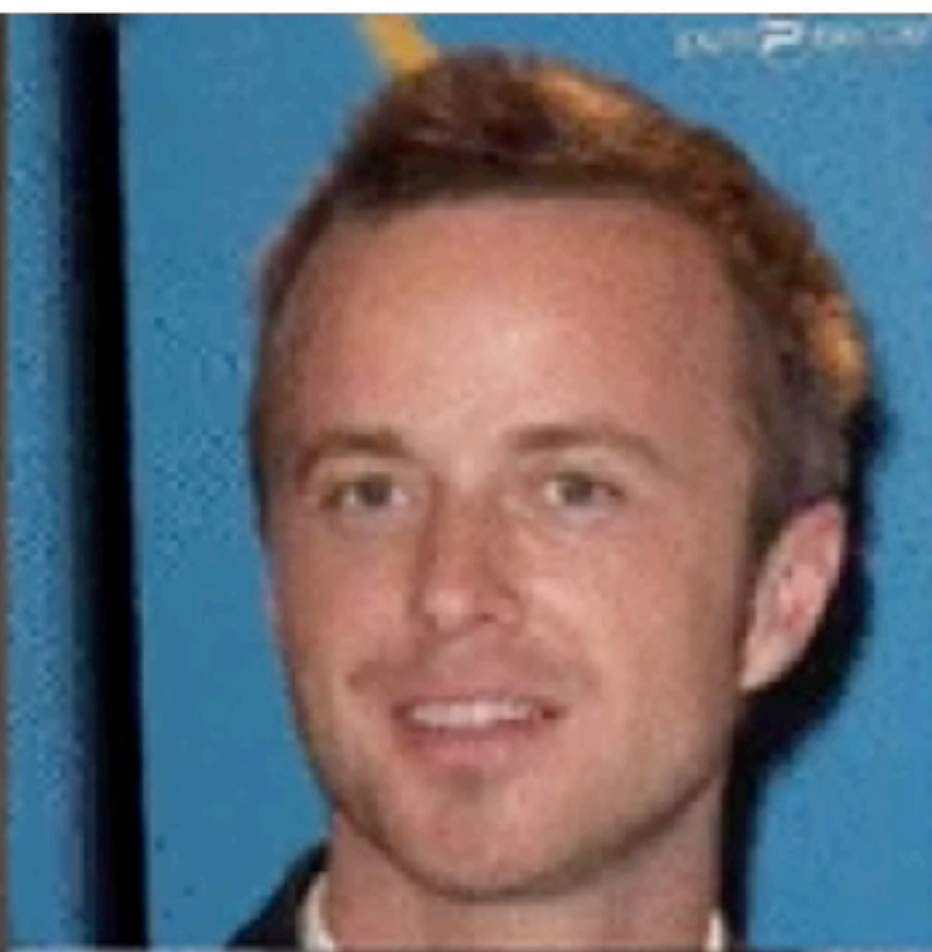
Latent embedding

Digits autoencoder demo



The relationship between Source #1 and Source #2 is applied to the target image.

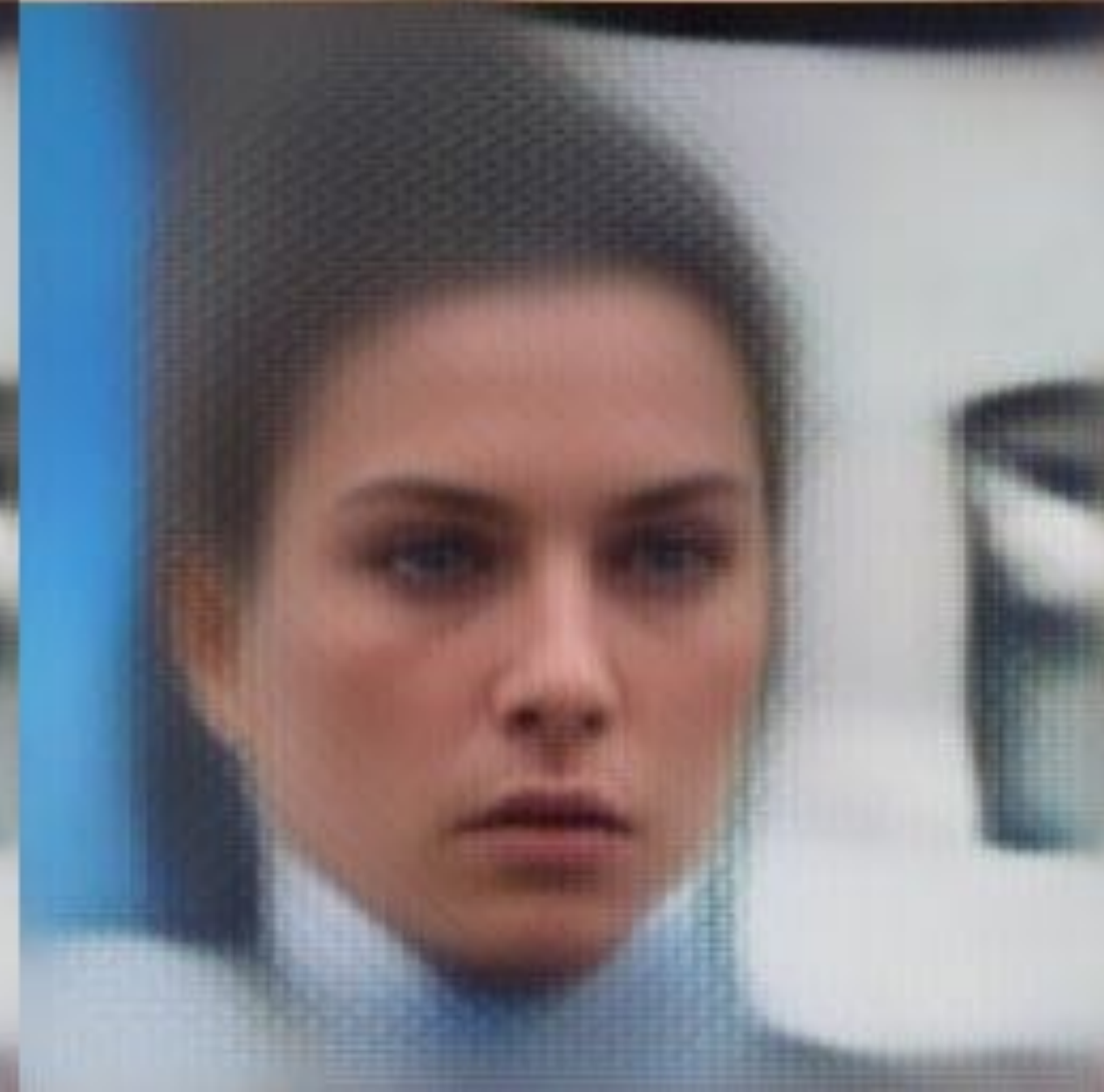
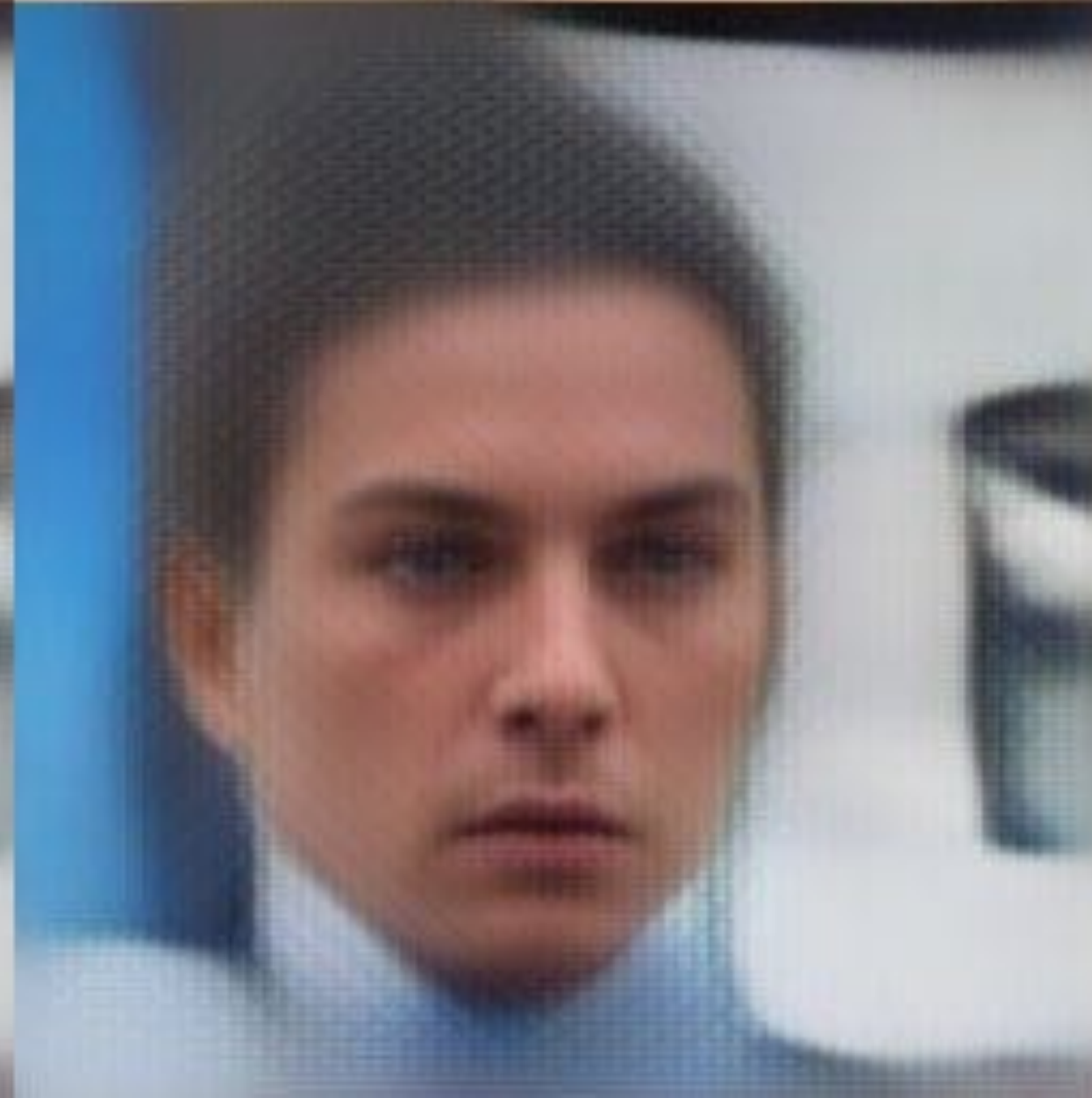
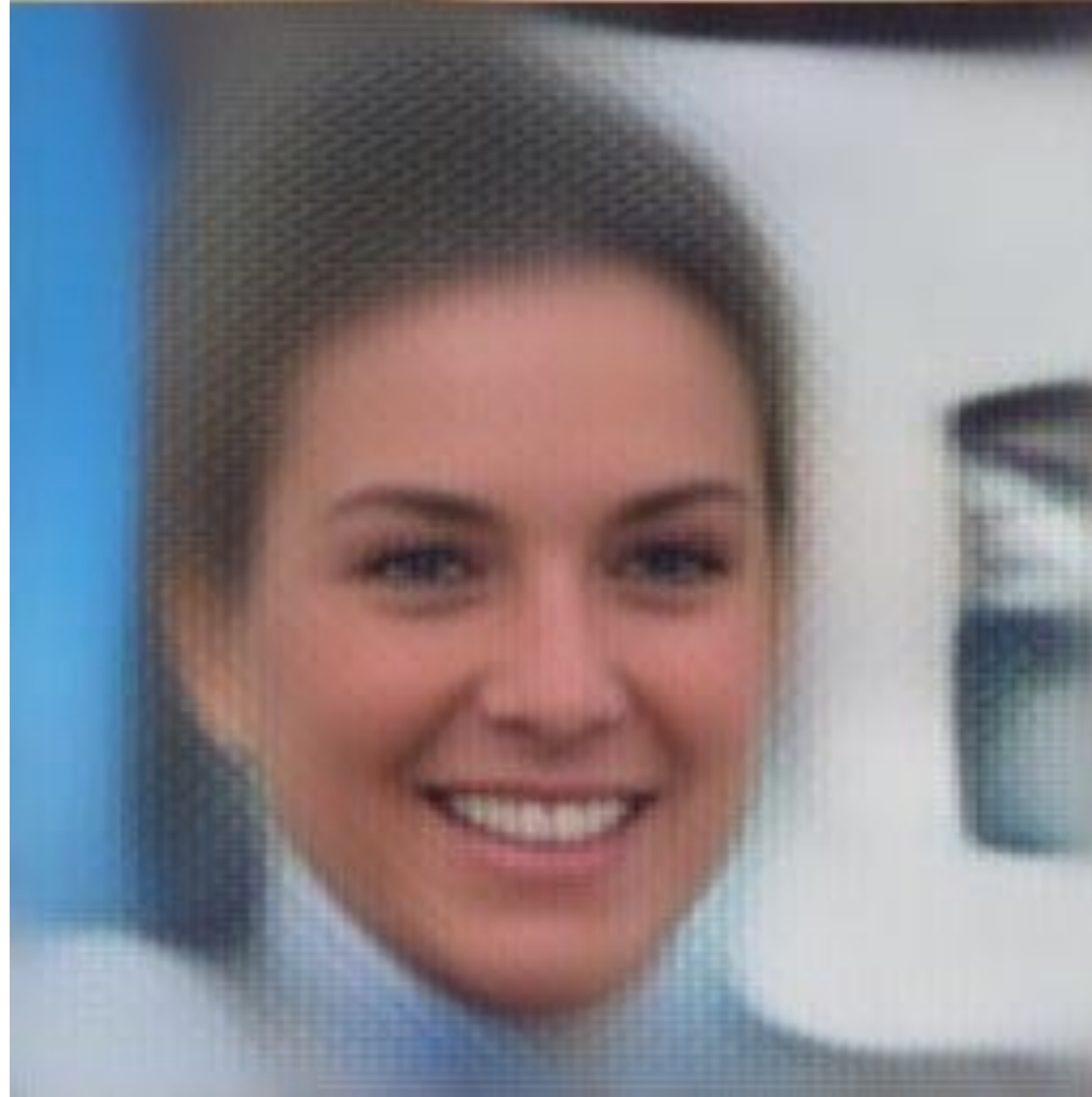
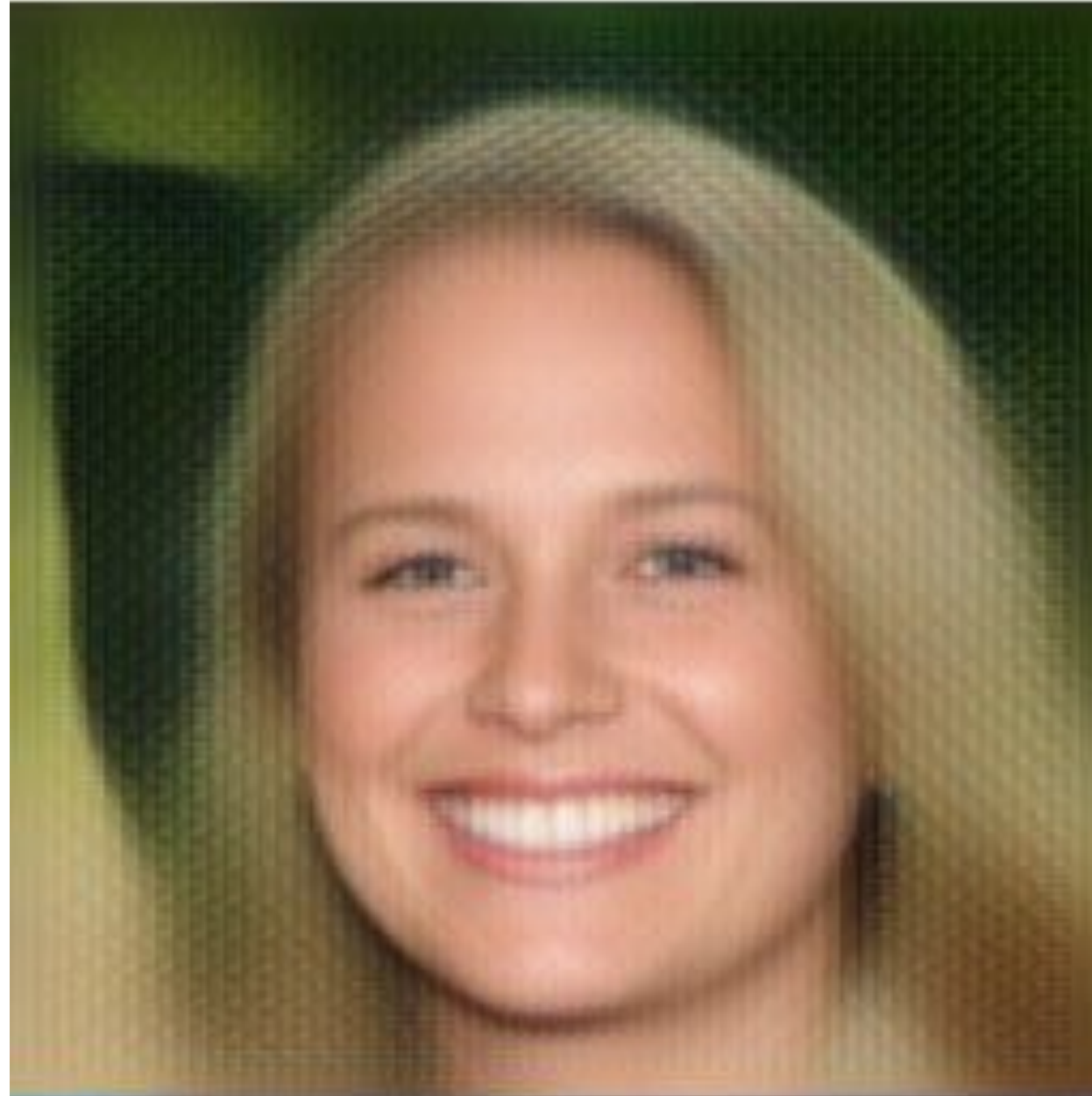


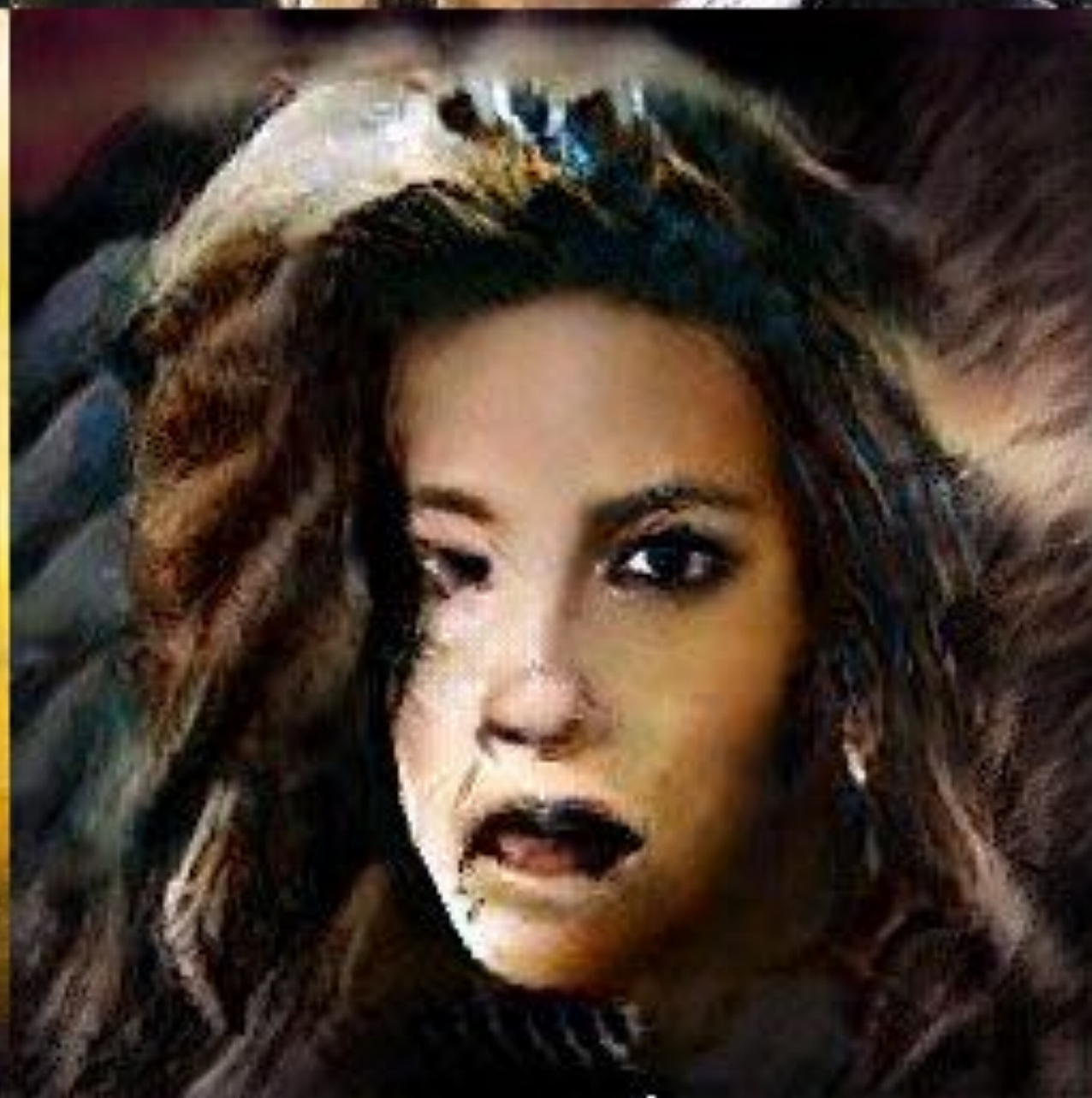


Reconstruction

Gender-biased
smilevector

Gender-balanced
smilevector









GAN state of the art 2017 november

Progressive Growing of GANs

Results video

One hour of imaginary celebrities



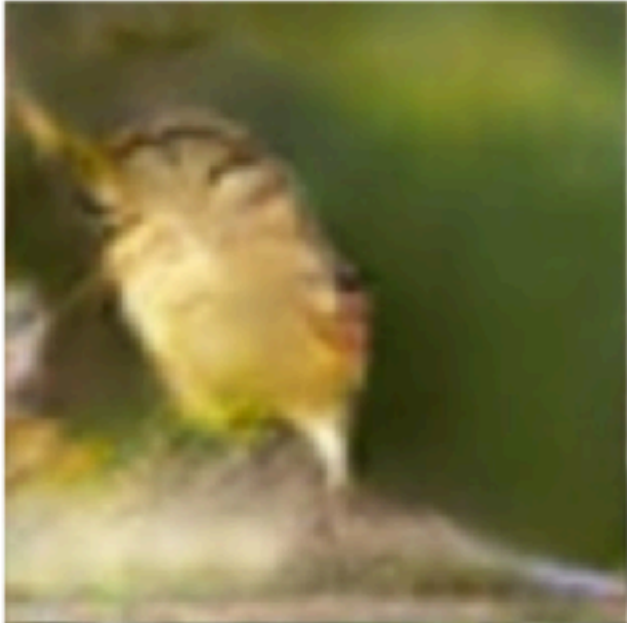
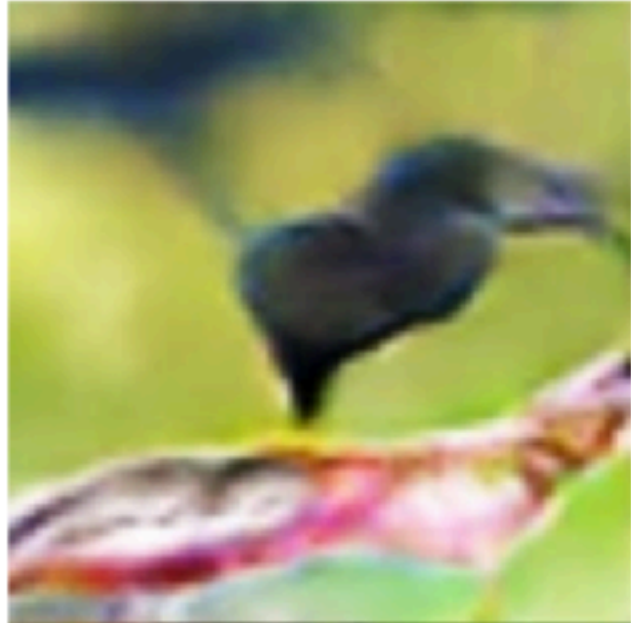
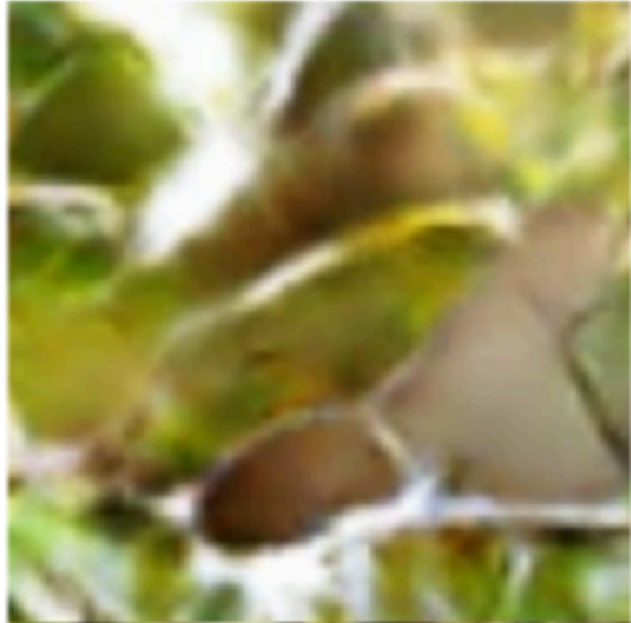
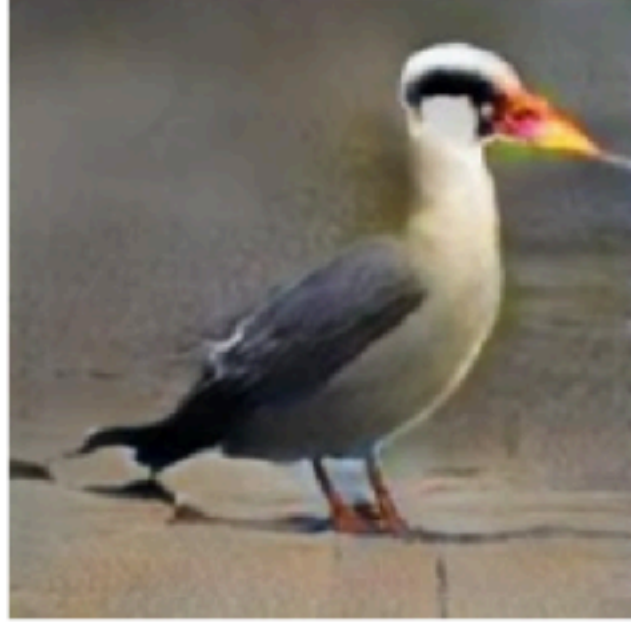
Corgi to German Shepherd

Left: Input, Right: Output



Cat to Cheetah

Left: Input, Right: Output

Text description	This bird is blue with white and has a very short beak	This bird has wings that are brown and has a yellow belly	A white bird with a black crown and yellow beak	This bird is white, black, and brown in color, with a brown beak	The bird has small beak, with reddish brown crown and gray belly	This is a small, black bird with a white breast and white on the wingbars.	This bird is white black and yellow in color, with a short black beak
Stage-I images							
Stage-II images							

...and this is all yours

- `pip install tensorflow`
- `git clone https://github.com/lengstrom/fast-style-transfer # style transfer`
- `git clone https://github.com/zsdonghao/SRGAN # superresolution`
- `git clone https://github.com/tensorflow/models ; cd research/im2txt # image to text`
- `git clone https://github.com/hanzhanggit/StackGAN.git # text to image`
- `pip install pytorch`
- `git clone https://github.com/tkarras/progressive\_growing\_of\_gans # image generation`

...and the internet is full of awesome tutorials

- <http://course.fast.ai/>
- <http://cs231n.stanford.edu/>
- <http://karpathy.github.io/neuralnets/>
- <https://medium.com/@devnag/generative-adversarial-networks-gans-in-50-lines-of-code-pytorch-e81b79659e3f>
- <http://blog.fastforwardlabs.com/2016/08/12/introducing-variational-autoencoders-in-prose-and.html>
- <http://karpathy.github.io/2015/05/21/rnn-effectiveness/>