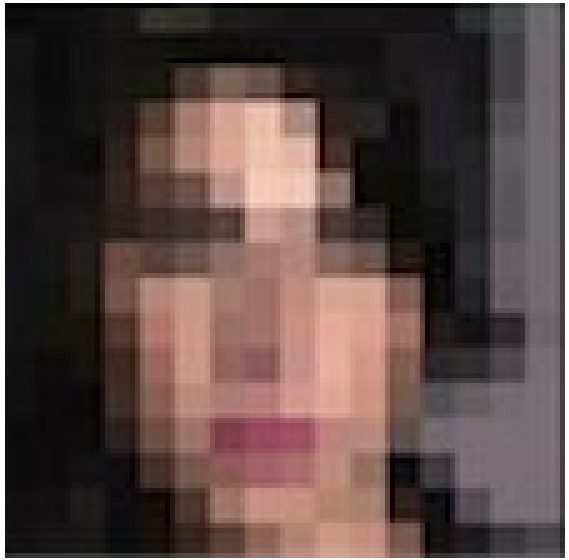
ENHANCE!!

@geoffreylitt

Entertainment ★★★★☆

Accuracy of portraying computers ★☆☆☆☆


CAN YOU
ENHANCE THAT



ENHANCE, PLEASE


Ps

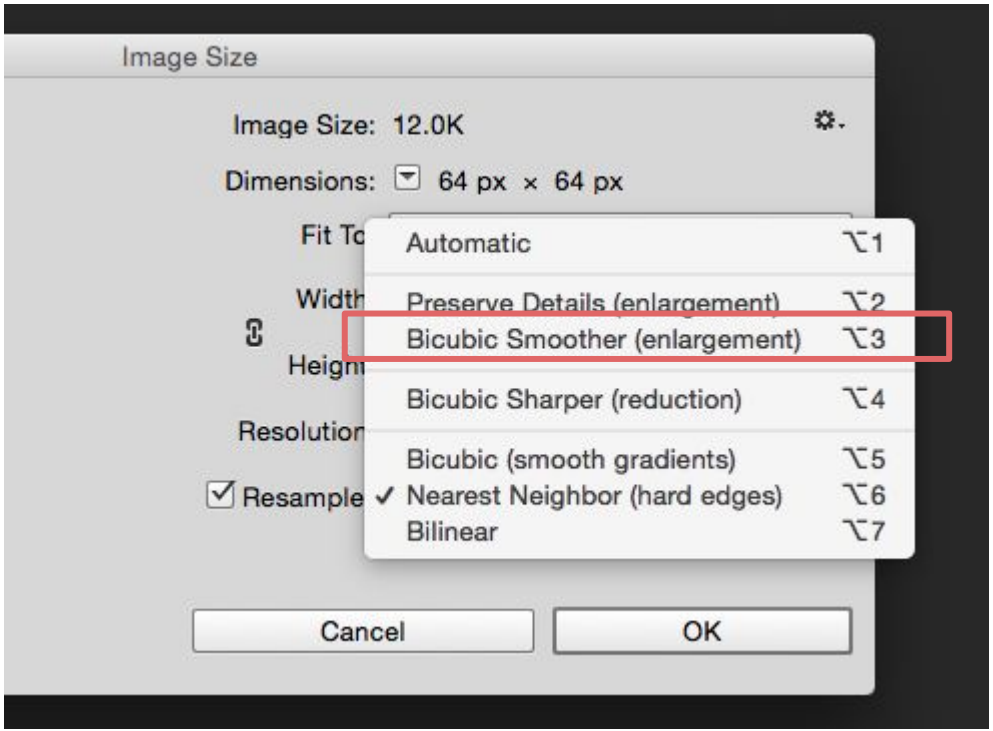
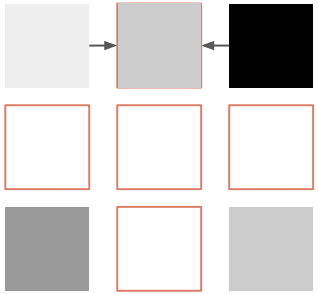
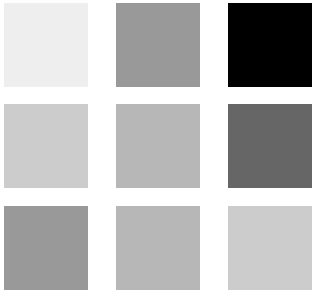


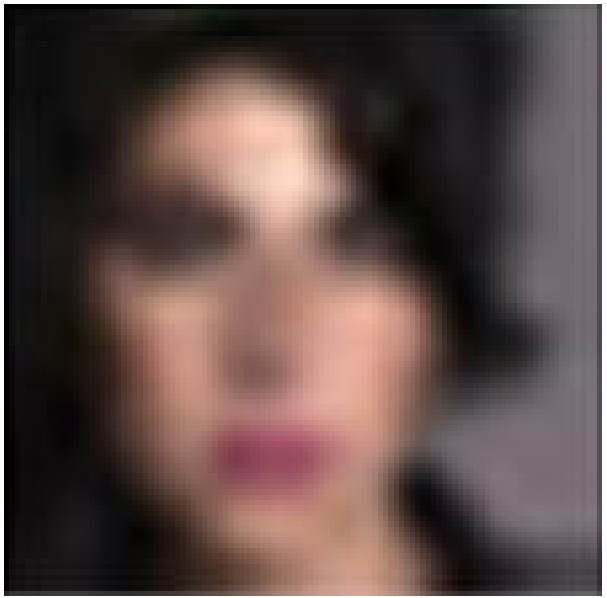
Image Size
Image Size: 12.0K
Dimensions: 64 px × 64 px
Fit To
Width
Height
Resolution
Resample
Automatic ⌥1
Preserve Details (enlargement) ⌥2
Bicubic Smoother (enlargement) ⌥3
Bicubic Sharper (reduction) ⌥4
Bicubic (smooth gradients) ⌥5
Nearest Neighbor (hard edges) ⌥6
Bilinear ⌥7
Cancel
OK

Bicubic interpolation

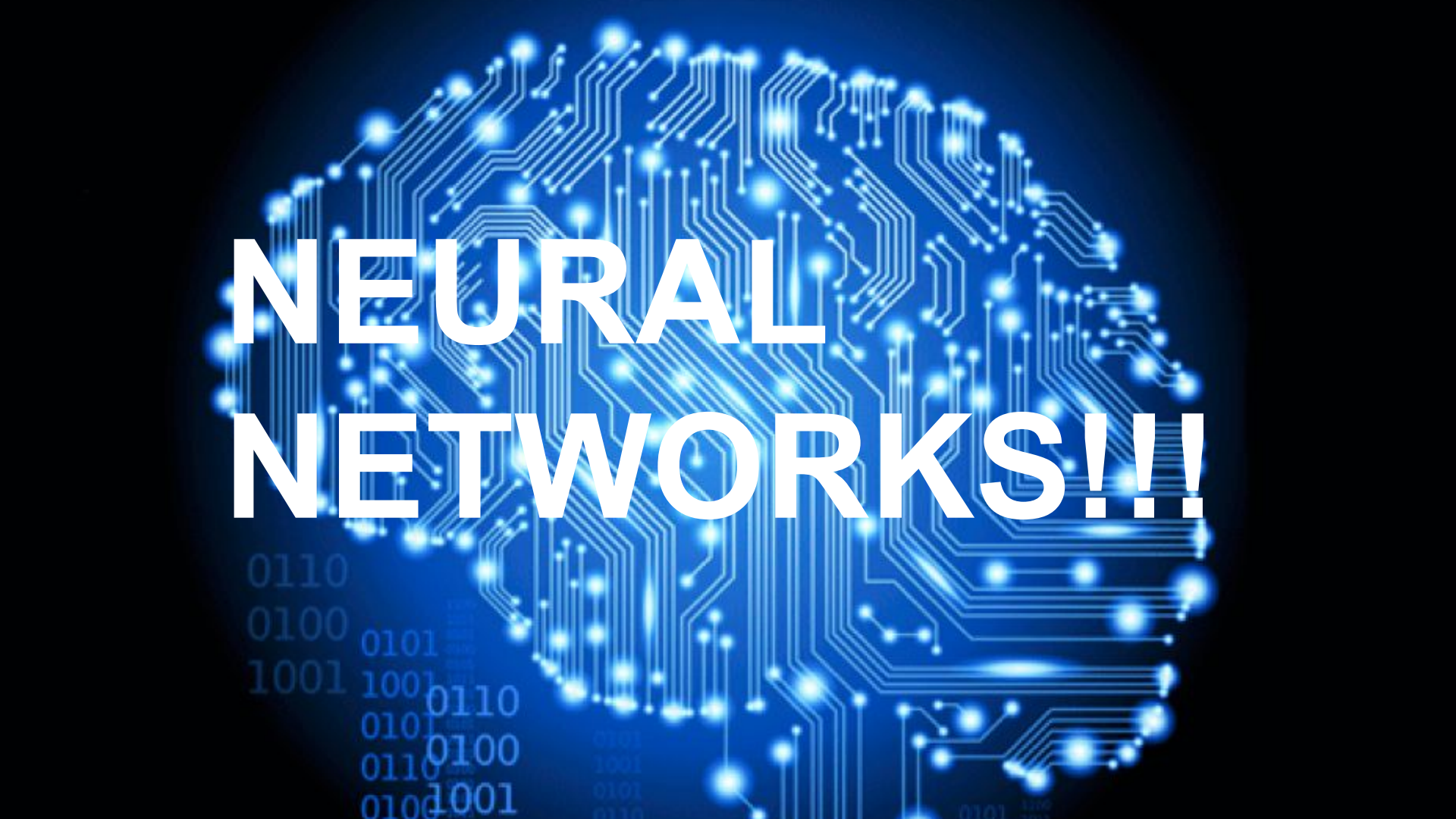




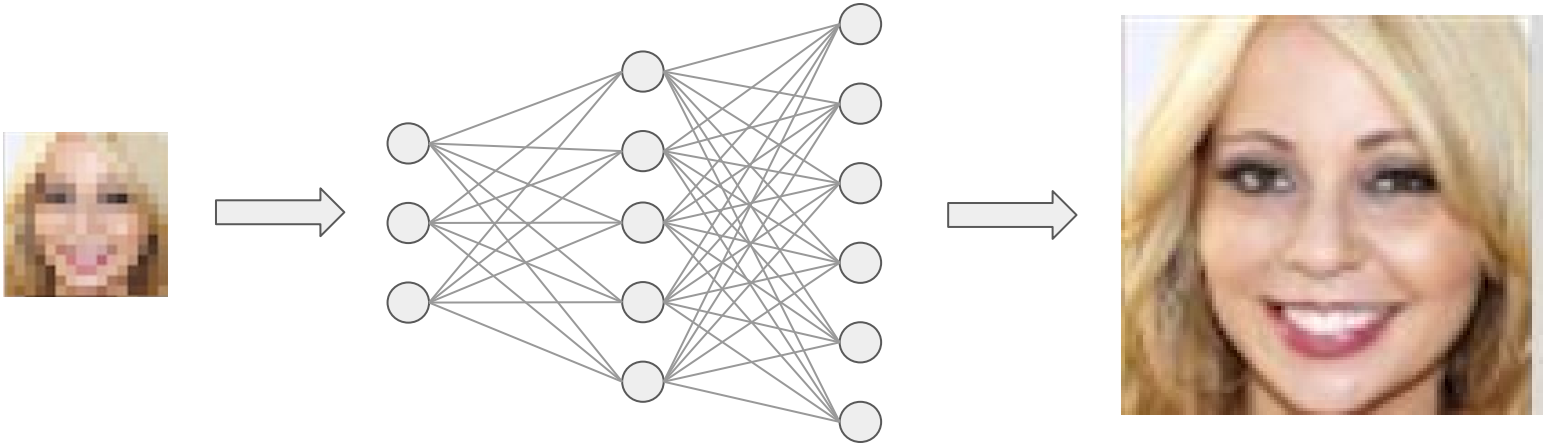
Bicubic interpolation




DO BETTER

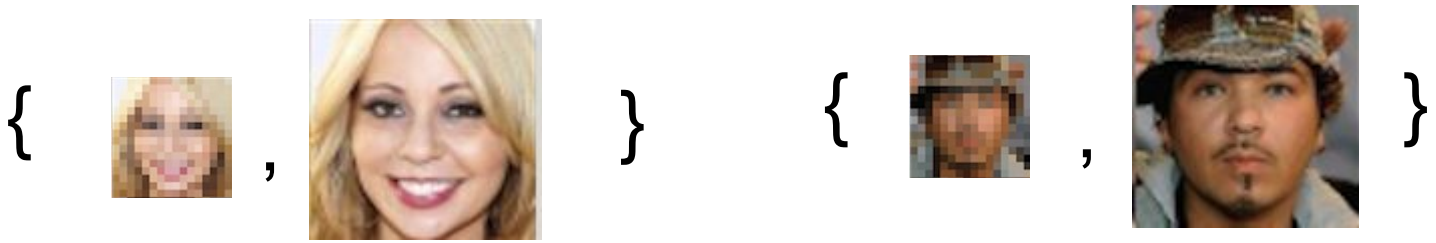

NEURAL
NETWORKS!!!

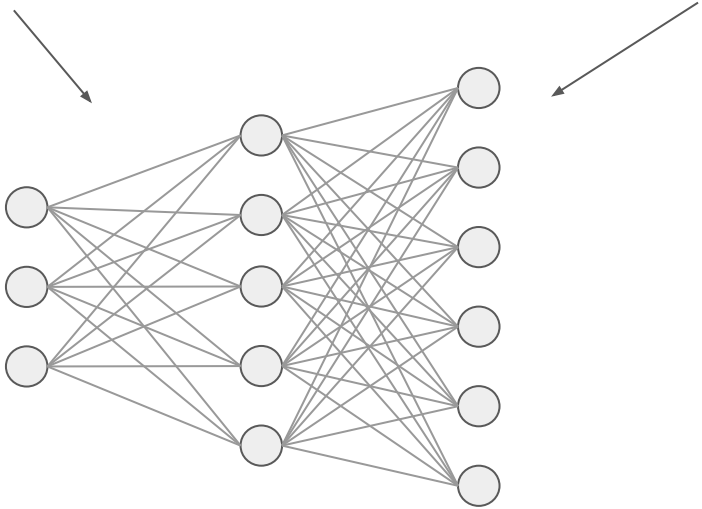
Neural network upscaling



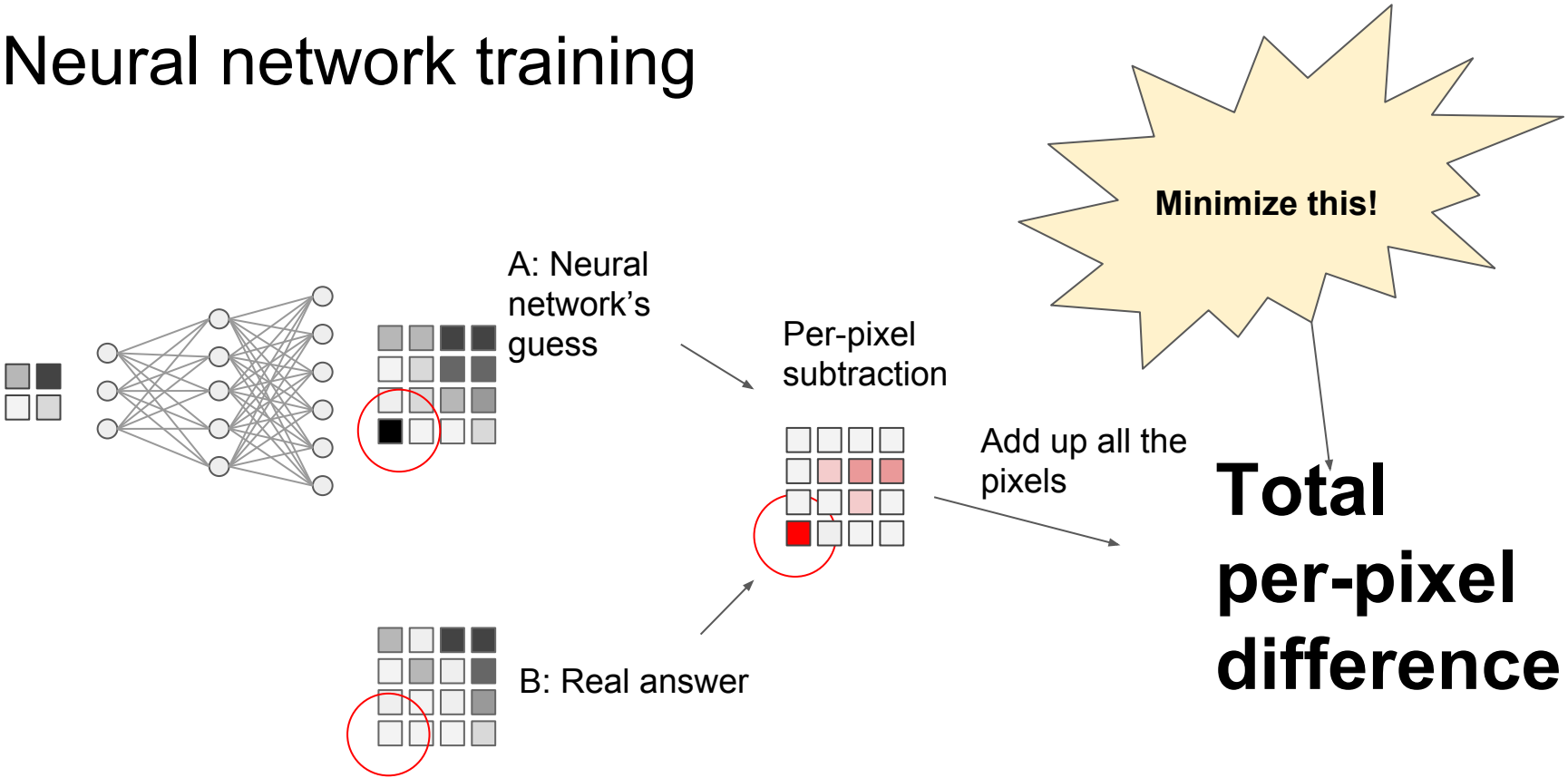
Neural network training

Training data





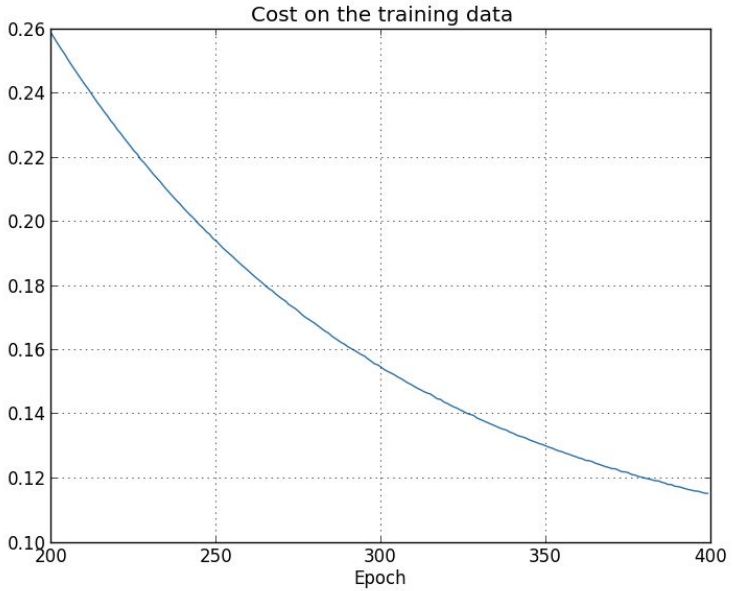
Neural network training



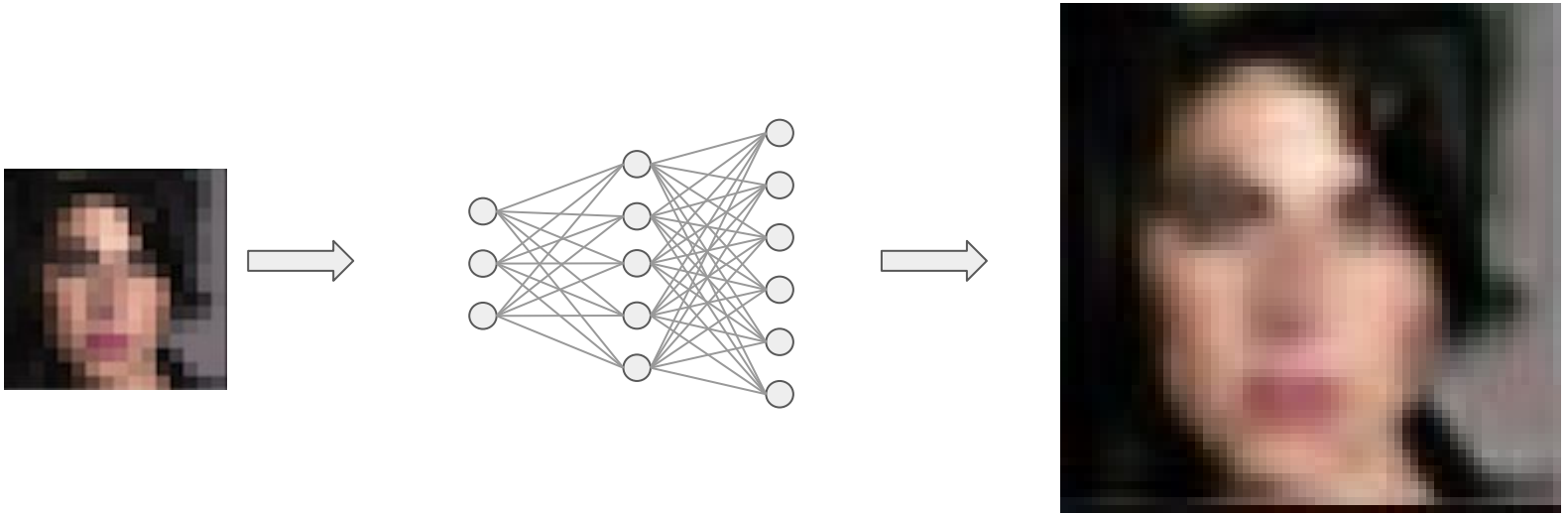
Neural network training

Loss function:

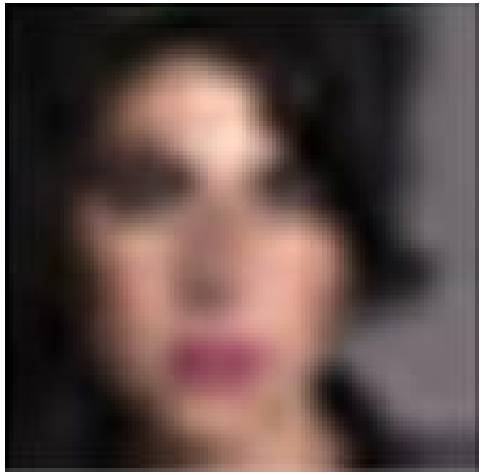
“Minimize the **total per-pixel difference** between the two images”



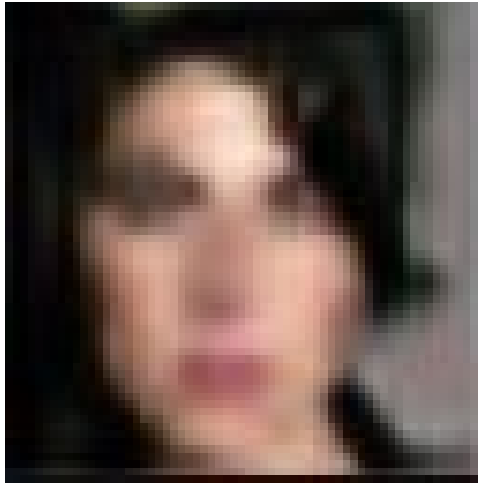
Neural network



Code: https://github.com/david-gpu/srez

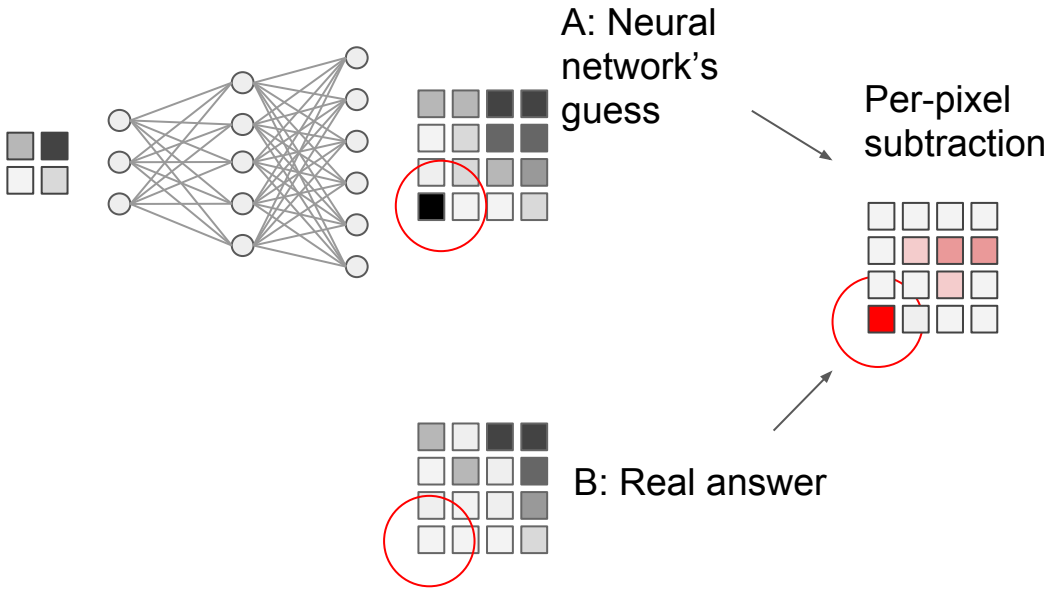


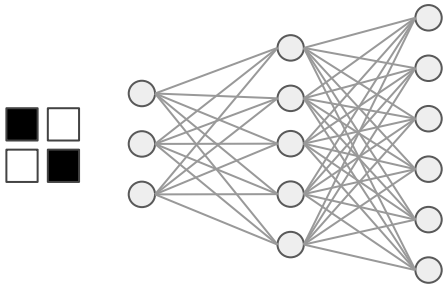
Bicubic interpolation



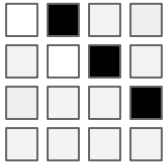
Neural network

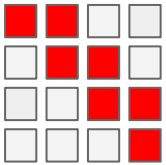
MORE.
ENHANCE.


A: Neural network's guess
Per-pixel subtraction
B: Real answer

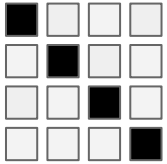


A: Neural network's guess

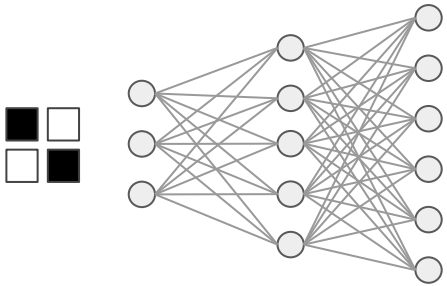




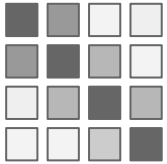
Really high loss

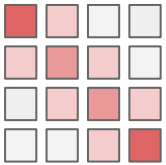


B: Real answer

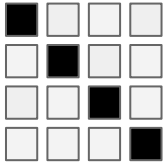


A: Neural network's guess





Lower loss

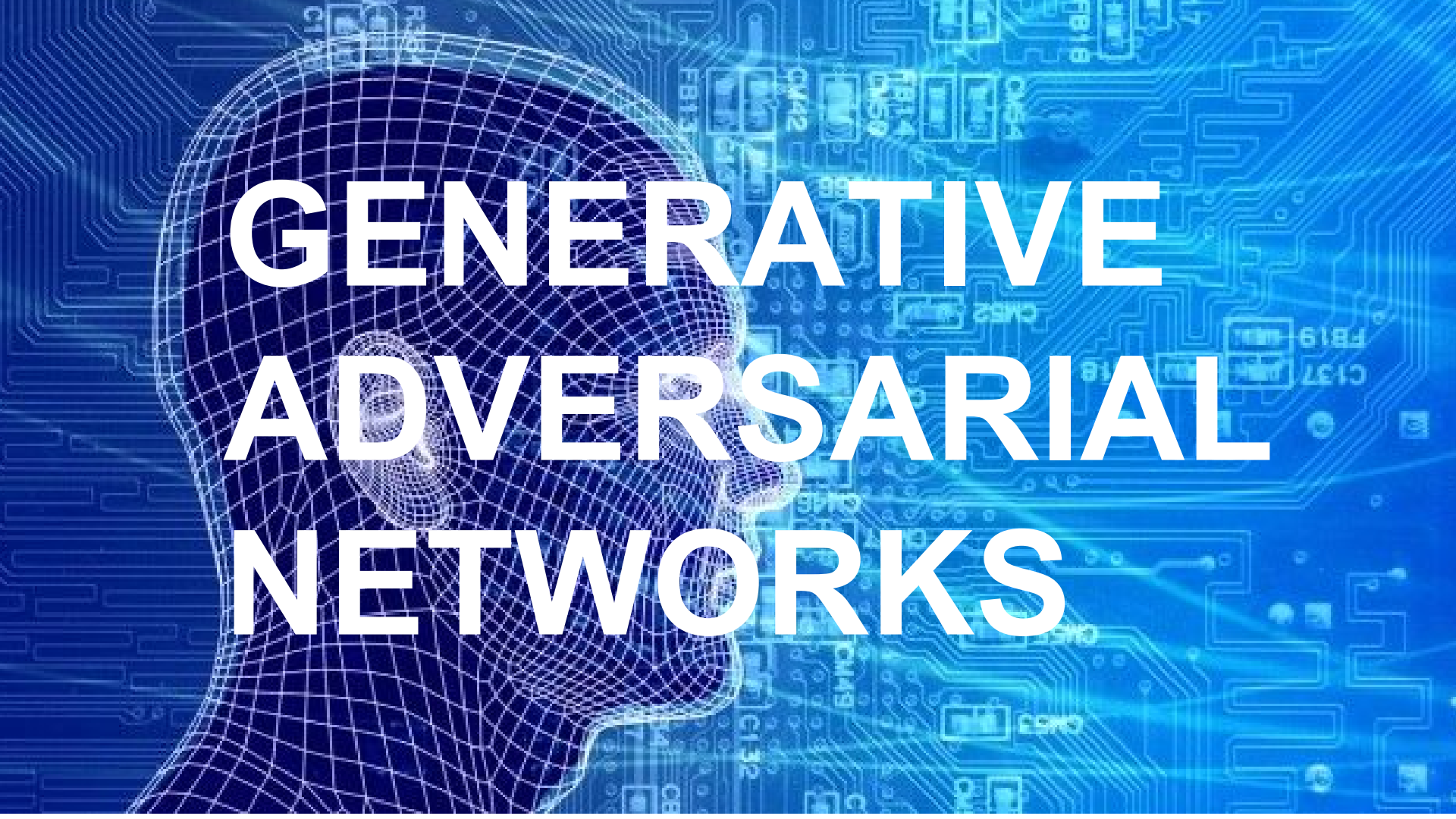


B: Real answer

A new loss function

"Minimize the total per-pixel difference between your guess and the real answer…
But also make your guess look sharp and realistic"

Loss =
Total Per-pixel difference + **???**


GENERATIVE
ADVERSARIAL
NETWORKS

Adversarial games

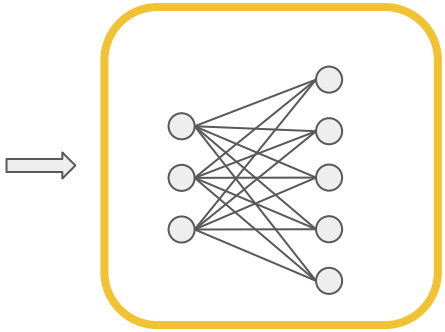
I'll develop better counterfeiting techniques!

I'll develop better counterfeit detection techniques!

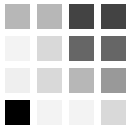
GAN structure

Training example

Generator



A: Neural network's guess



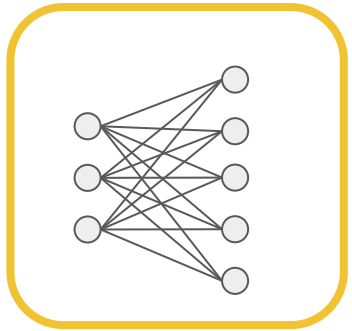
B: Real answer

GAN structure

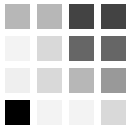
Goal:
Minimize discriminator accuracy

Training example

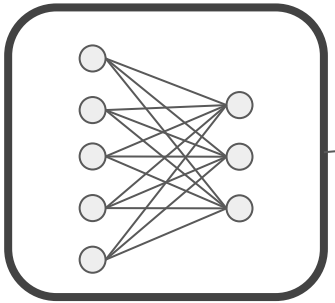
Generator



A: Neural network's guess



Discriminator



Probability of fake

B: Real answer

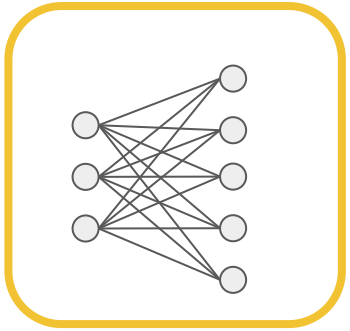
Goal: differentiate fake vs. real with 100% accuracy

GAN structure

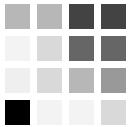
"Here's how you could make a better fake next time"

Training example

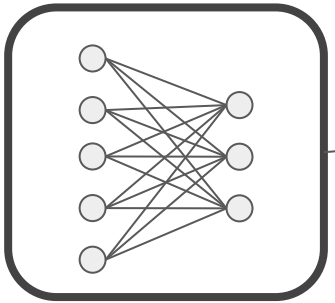
Generator



A: Neural network's guess



Discriminator

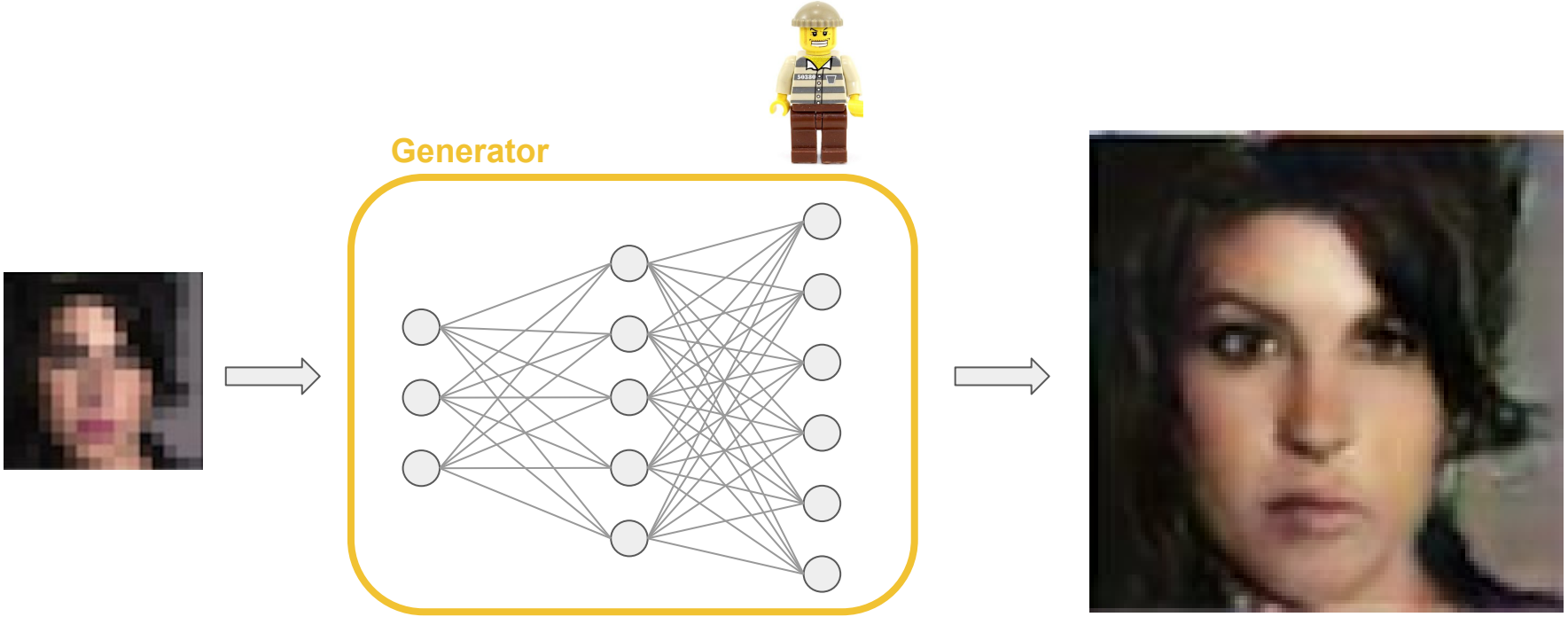


Probability of fake

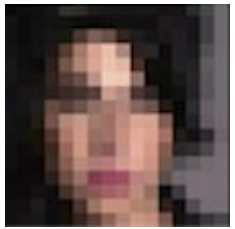
B: Real answer

low-res bicubic **GAN** Real answer

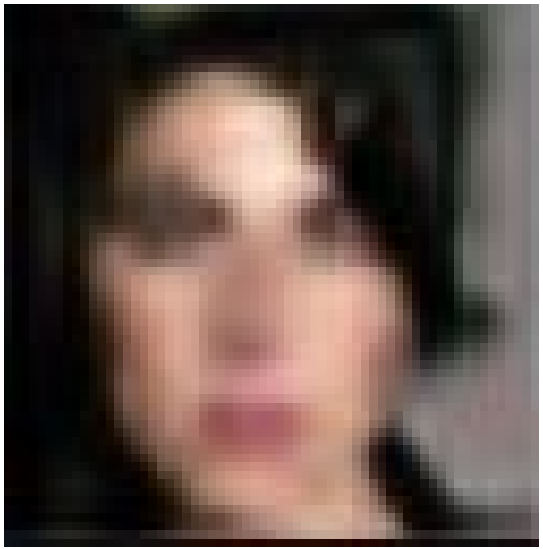
GAN-trained generator



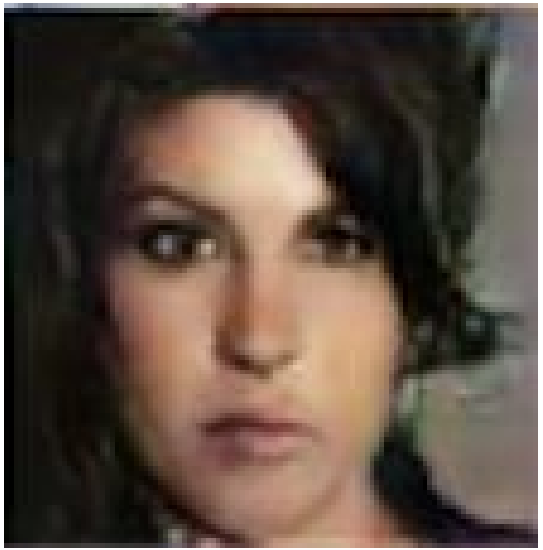
GAN results



original



Per-pixel diff
neural network



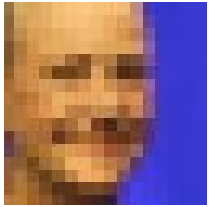
GAN

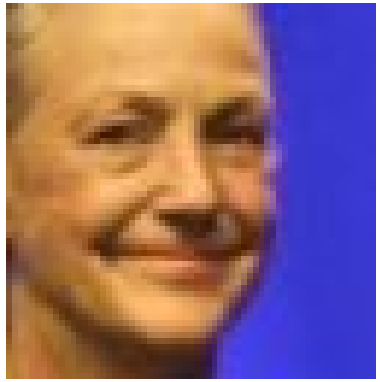

GOOD
JOB

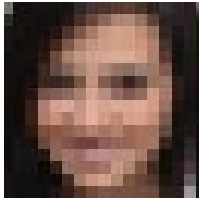
low-res

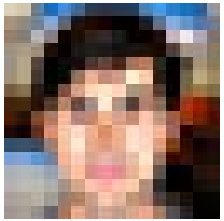
GAN

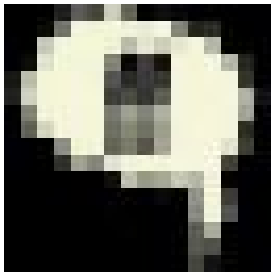
Real answer











Unpaired Image-to-Image Translation using Cycle-Consistent Adversarial Networks
Jun-Yan Zhu*, Taesung Park*, Phillip Isola, Alexei A. Efros

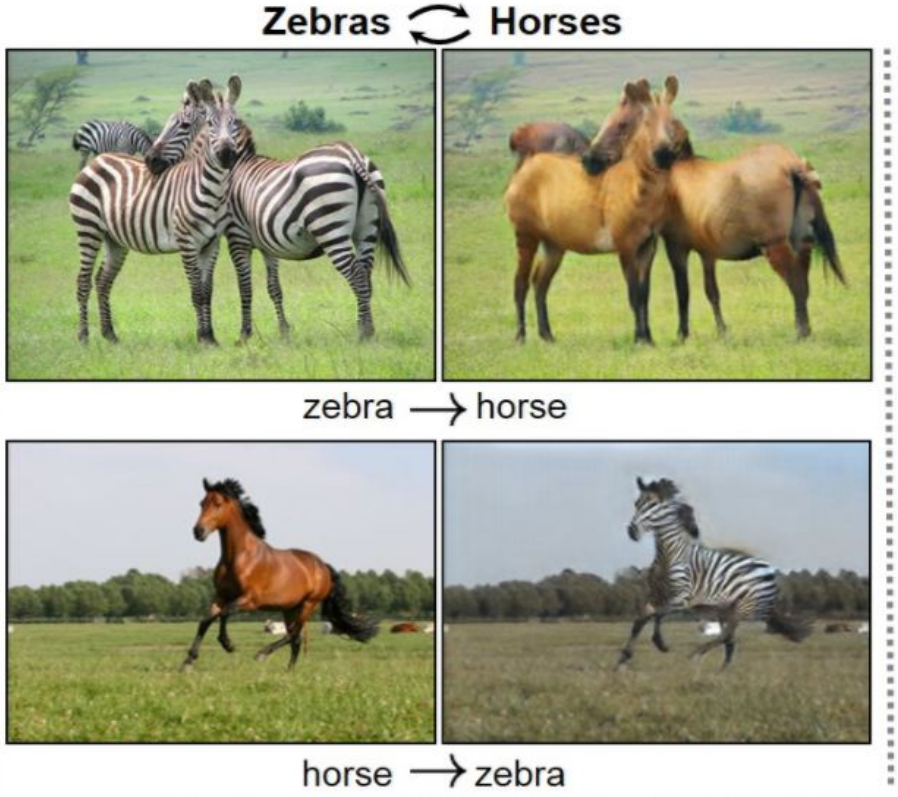


Image-to-Image Translation with Conditional Adversarial Networks
Phillip Isola, Jun-Yan Zhu, Tinghui Zhou, Alexei A. Efros

https://affinelayer.com/pixsrv/

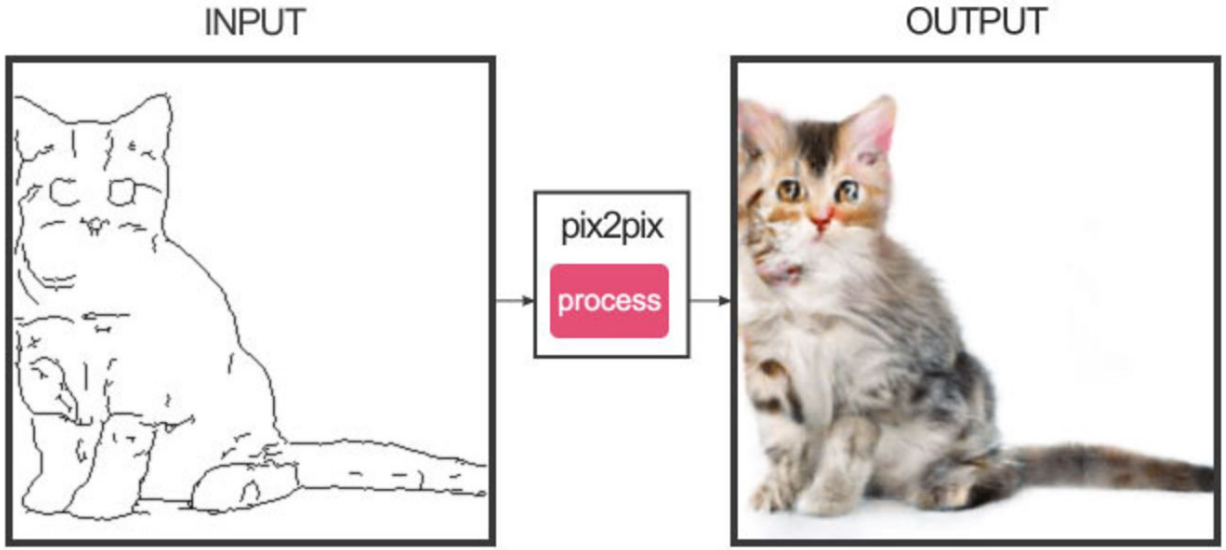
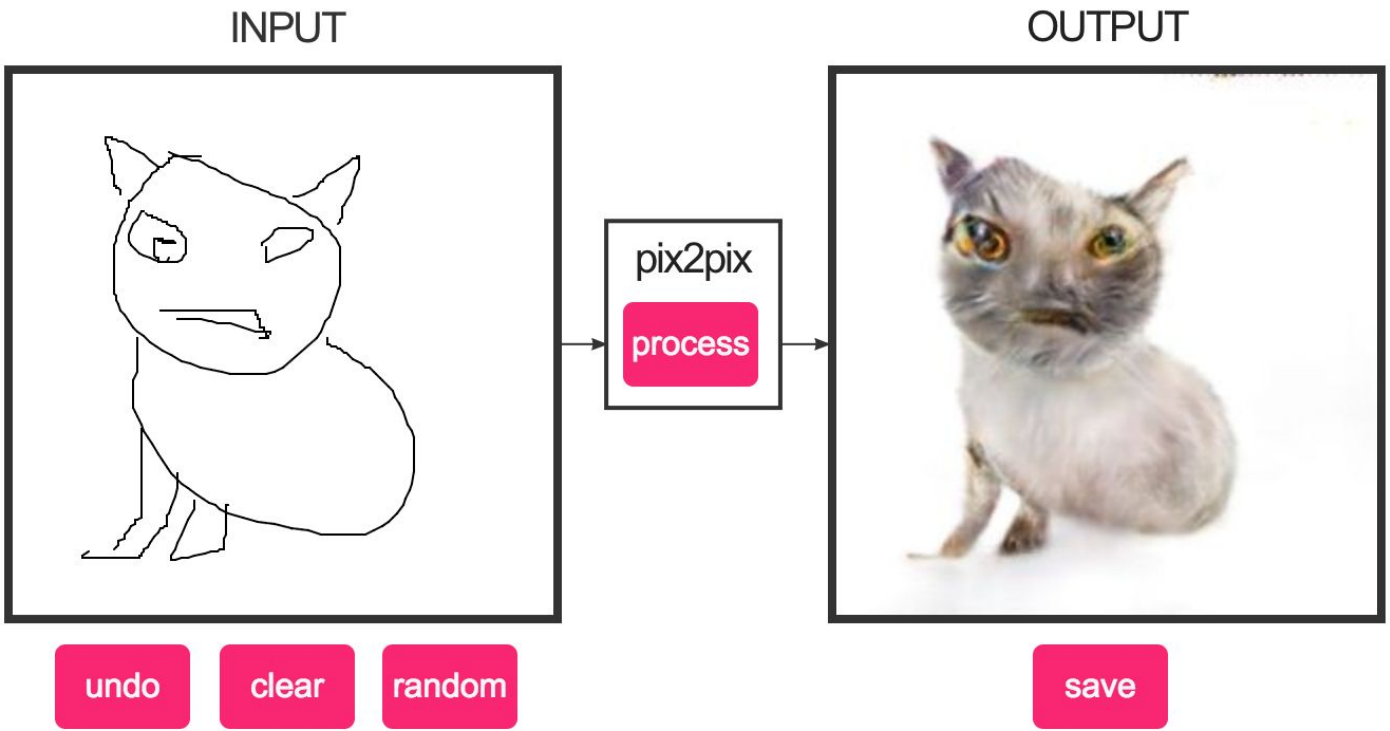


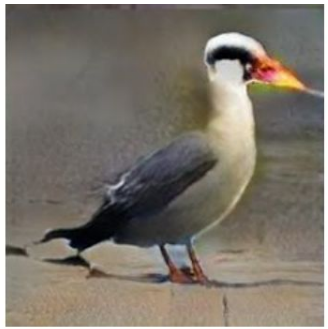
Image-to-Image Translation with Conditional Adversarial Networks
Phillip Isola, Jun-Yan Zhu, Tinghui Zhou, Alexei A. Efros

https://affinelayer.com/pixsrv/



StackGAN: Text to Photo-realistic Image Synthesis with Stacked Generative Adversarial Networks

Han Zhang, Tao Xu, Hongsheng Li, Shaoting Zhang,
Xiaolei Huang, Xiaogang Wang, Dimitris Metaxas

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
Stage-II images			

Thanks!

@geoffreylitt