



中国移动开发者大会
Mobile Developer Conference China 2016

寻找下一款 Prisma App

深度学习在图像处理中的应用探讨

周昌

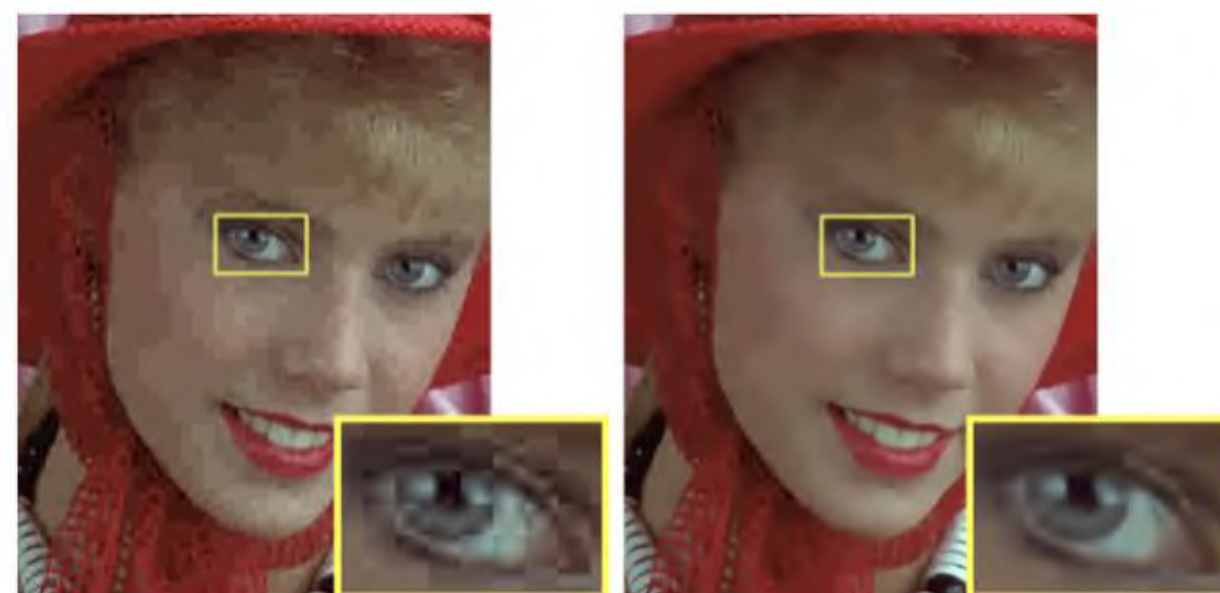


图像增强：从图像到图像

图像增强

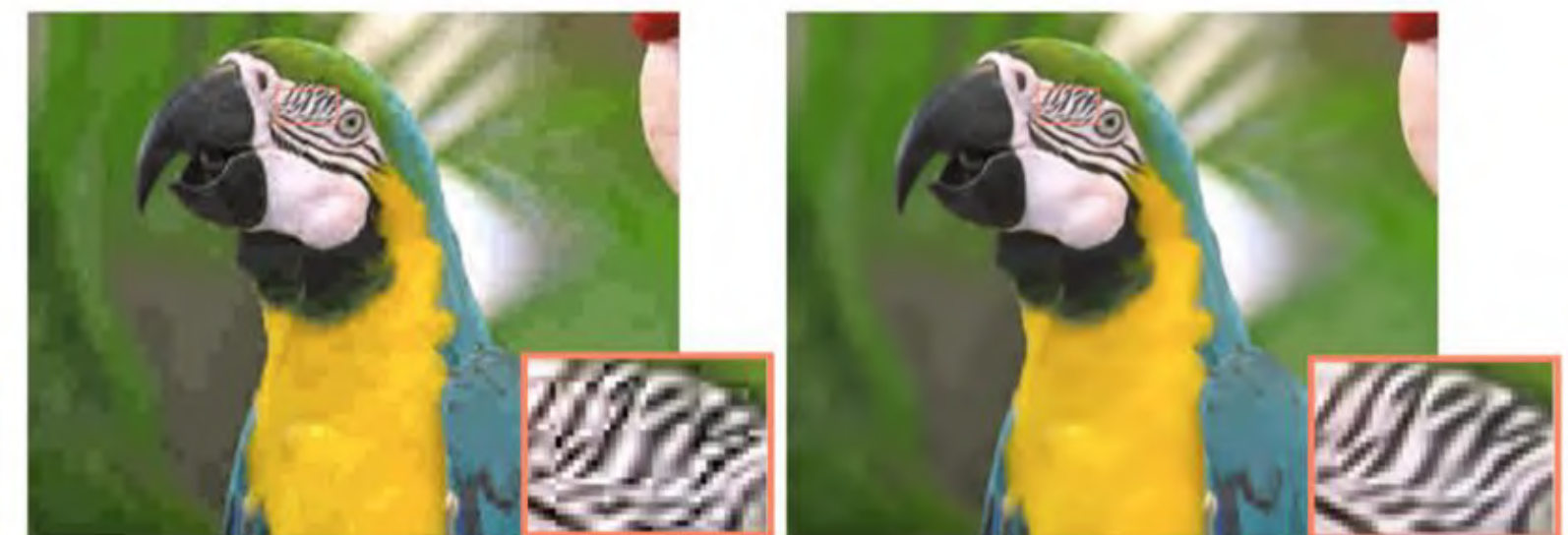


(a) Input rainy image



JPEG-compressed image

Restored image by AR-CNN



JPEG-compressed image

Restored image by AR-CNN

分辨率增强：超分辨率

- 将低分辨率的图像转换为高分辨率的图像
 - ✓ “标清”转换为“高清”
 - ✓ 通常是 2x，也可以是 4x

Chao Dong, Chen Change Loy, **Kaiming He**, Xiaoou Tang, "Image Super-Resolution Using Deep Convolutional Networks"

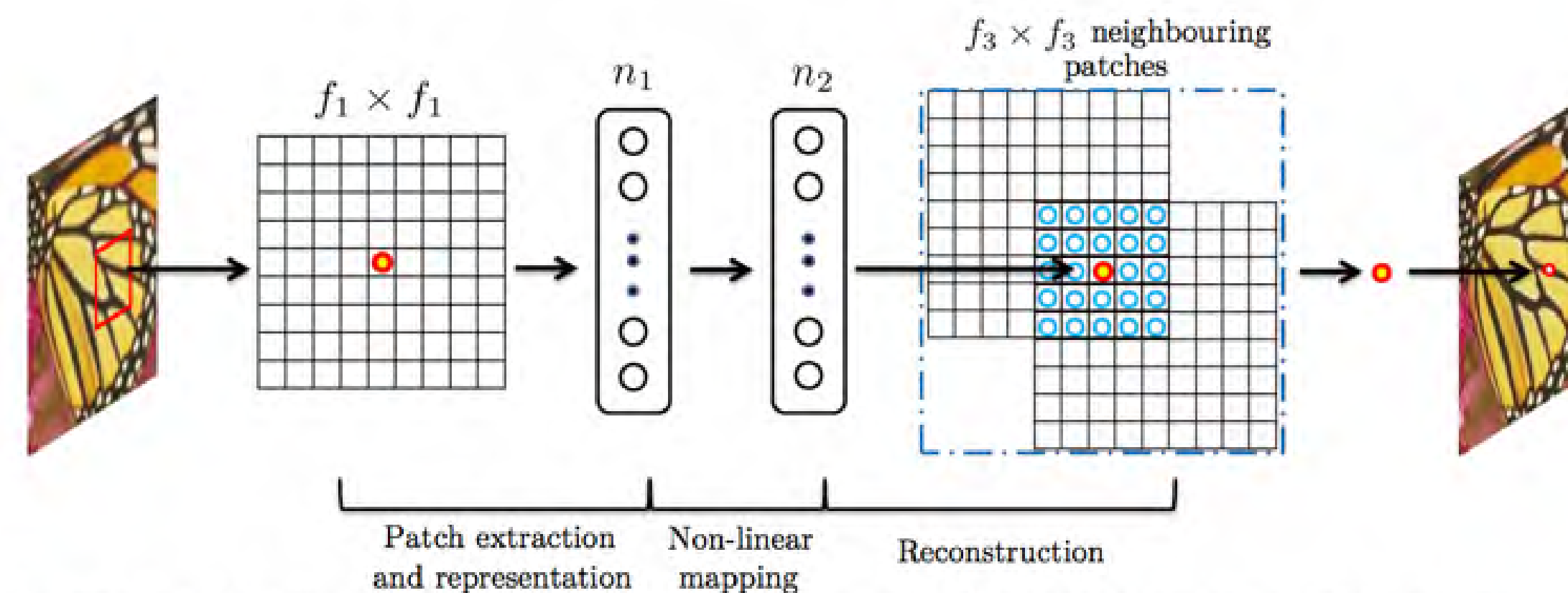
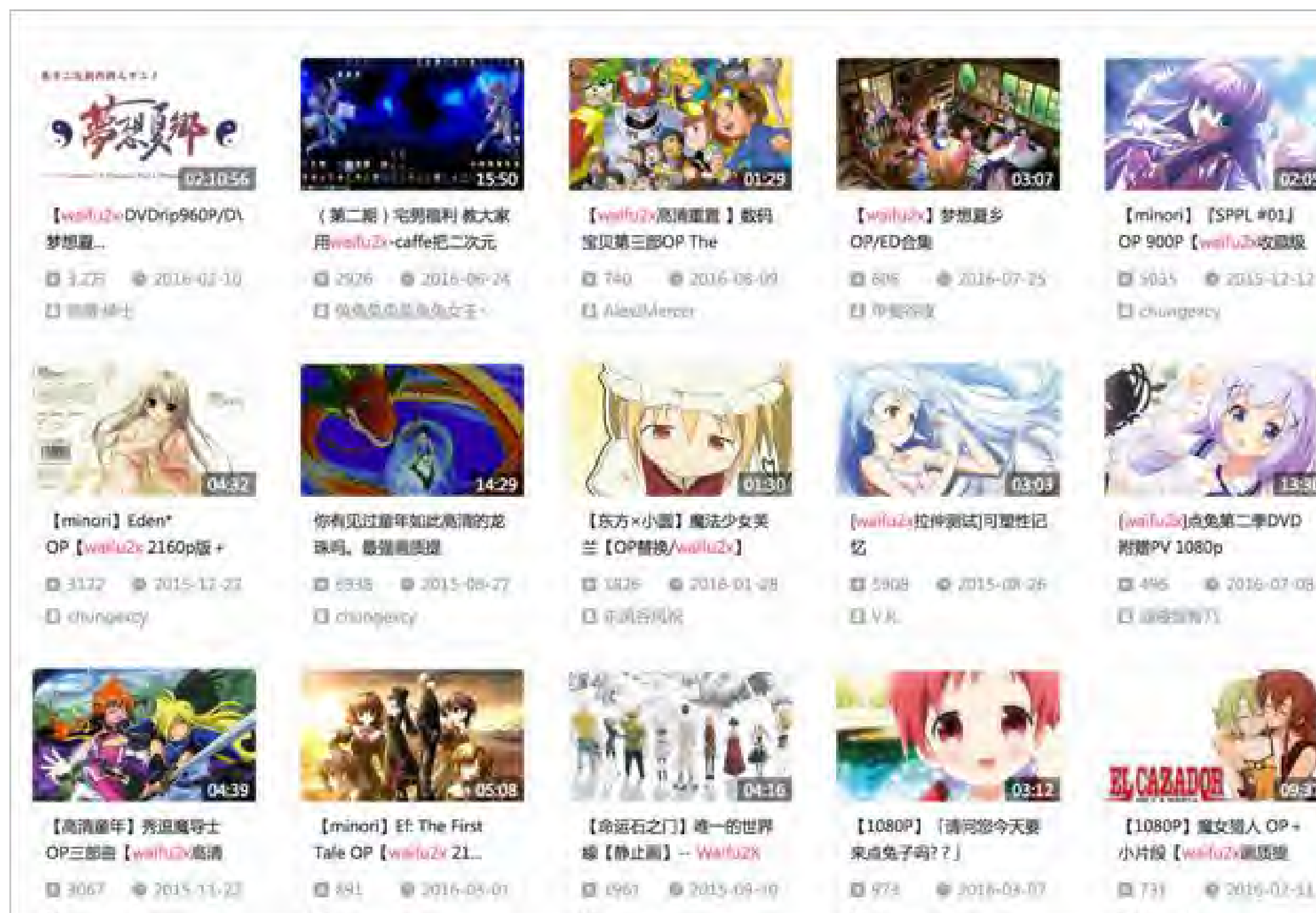


Fig. 3. An illustration of sparse-coding-based methods in the view of a convolutional neural network.

<http://arxiv.org/pdf/1501.00092v3.pdf>

Image Super-Resolution for Anime-Style Art



清晰度增强：去噪声、去马赛克

Compression Artifacts Reduction by a Deep Convolutional Network

Chao Dong, Yubin Deng, Chen Change Loy, Xiaoou Tang

Department of Informaiton Engineering, The Chinese University of Hong Kong

{dc012, dy015, ccloy, xtang}@ie.cuhk.edu.com

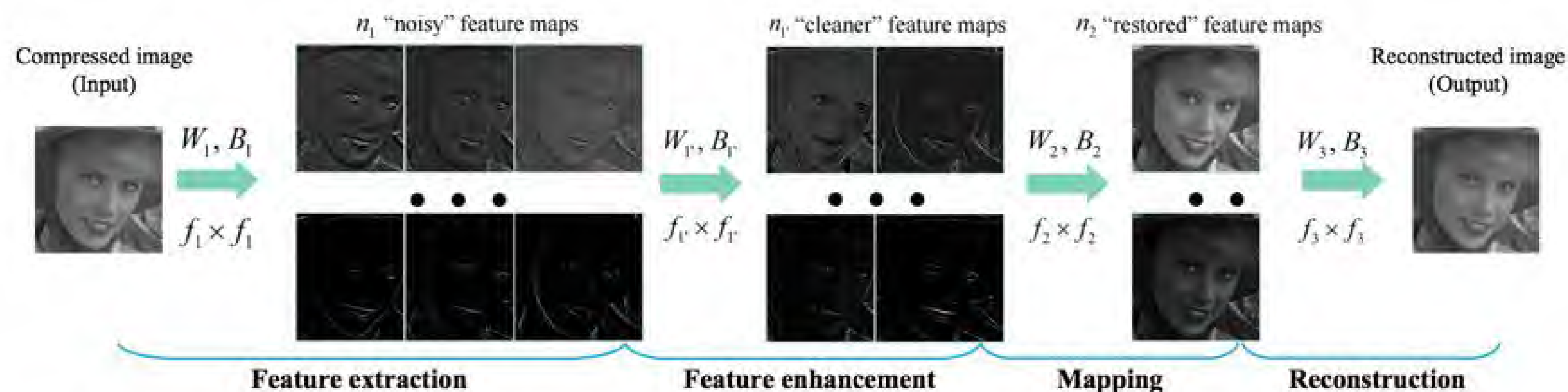
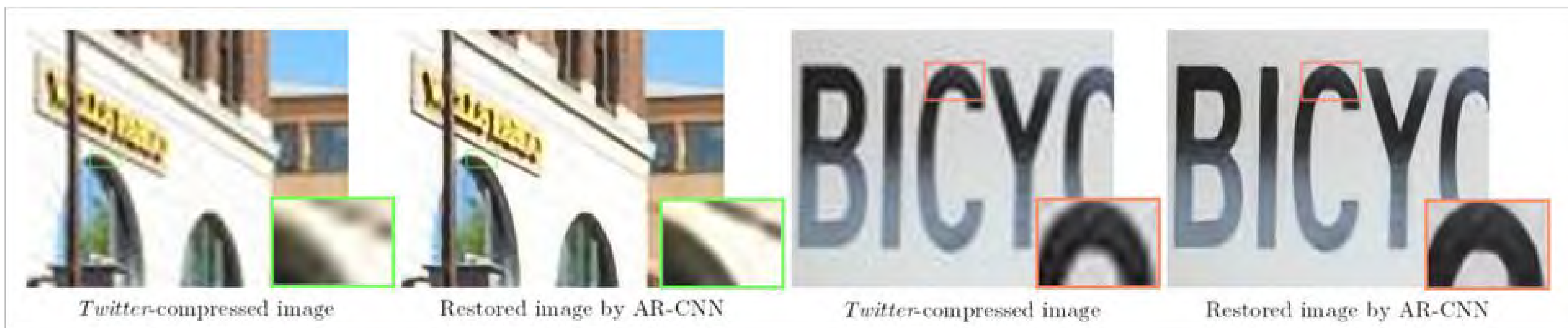


Figure 2. The framework of the Artifacts Reduction Convolutional Neural Network (AR-CNN). The network consists of four convolutional layers, each of which is responsible for a specific operation. Then it optimizes the four operations (*i.e.*, feature extraction, feature enhancement, mapping and reconstruction) jointly in an end-to-end framework. Example feature maps shown in each step could well illustrate the functionality of each operation. They are normalized for better visualization.



{dc012, dy015, ccloy, xiang}@ie.cuhk.edu.com

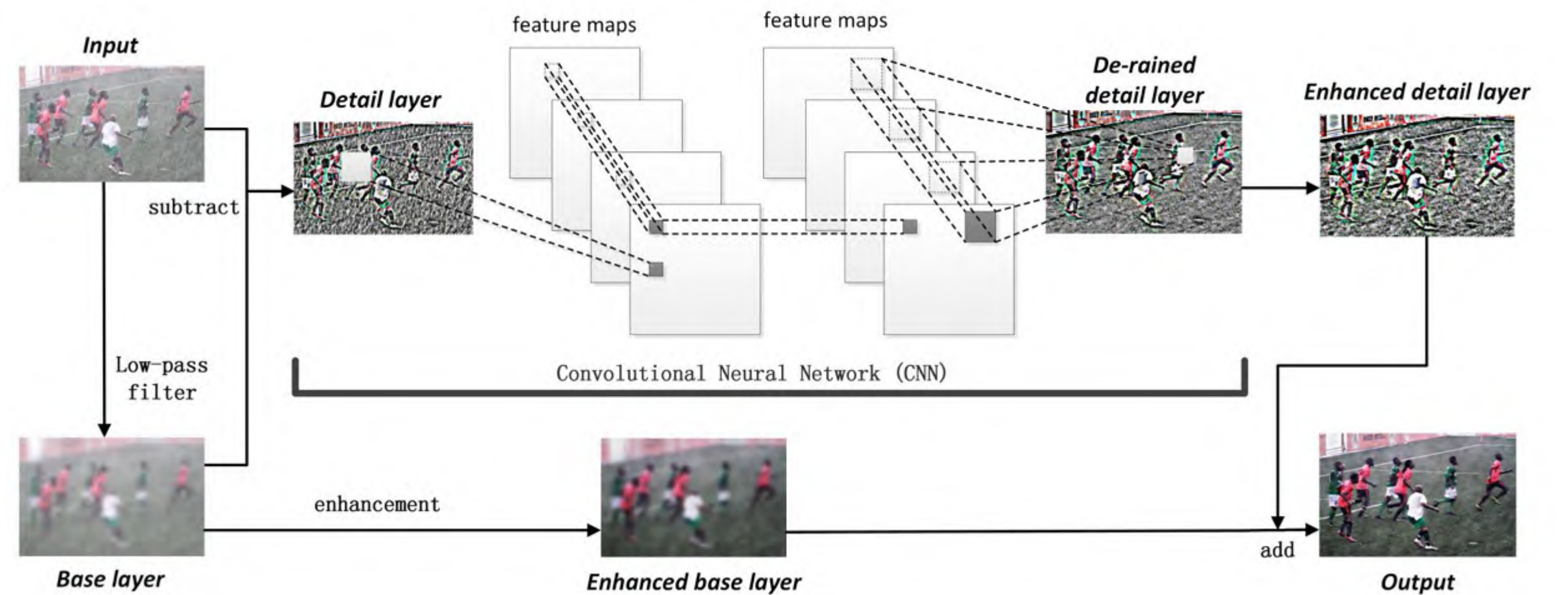


<http://mmlab.ie.cuhk.edu.hk/projects/ARCNN.html>

画面改善：去雾，去雨

Clearing the Skies: A deep network architecture for single-image rain removal

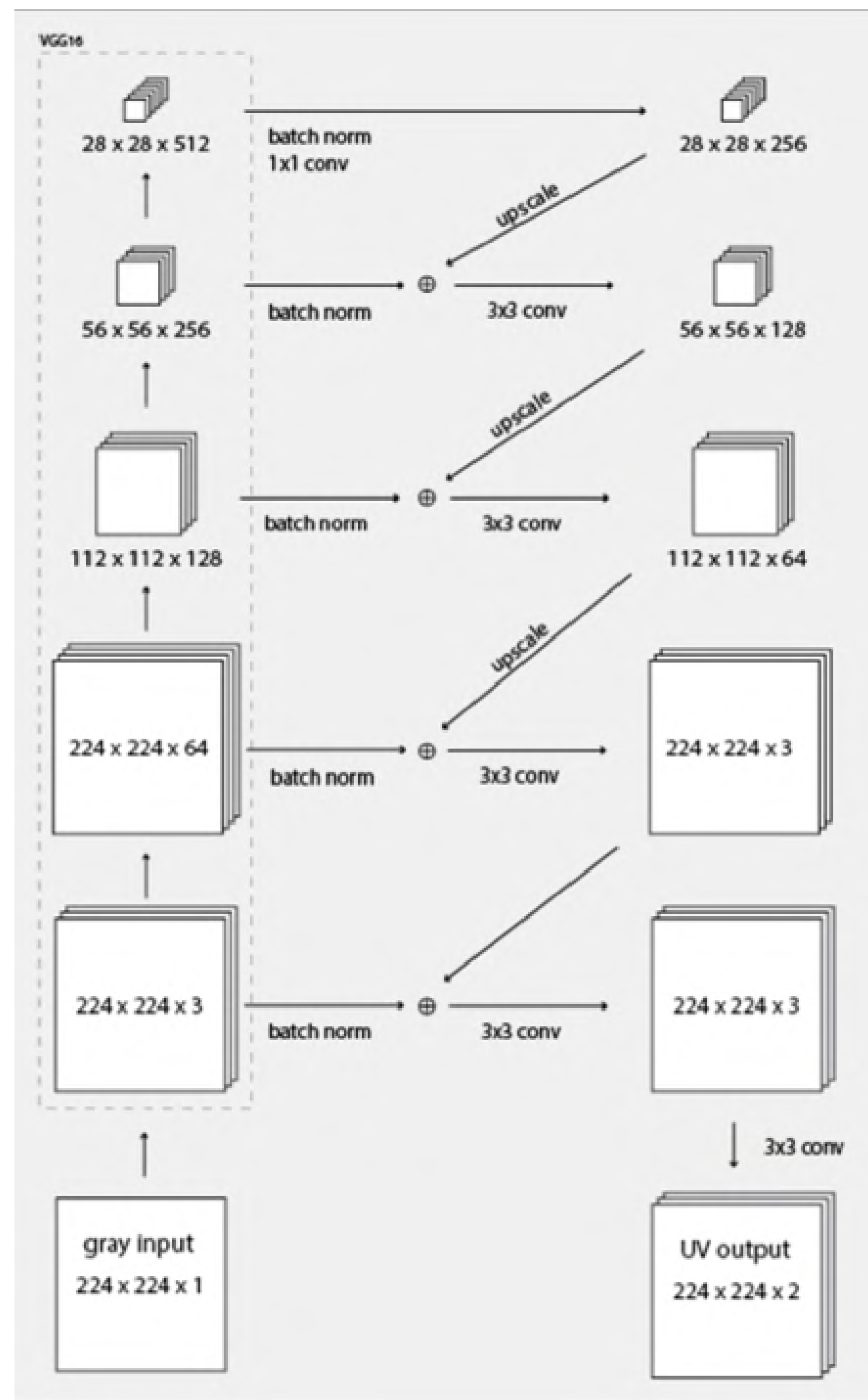
Xueyang Fu, Jiabin Huang, Xinghao Ding*, Yinghao Liao and John Paisley



<http://arxiv.org/pdf/1609.02087.pdf>

色彩的增强：灰度图彩色化





<http://tinyclouds.org/colorize/>

更多的图像增强类应用

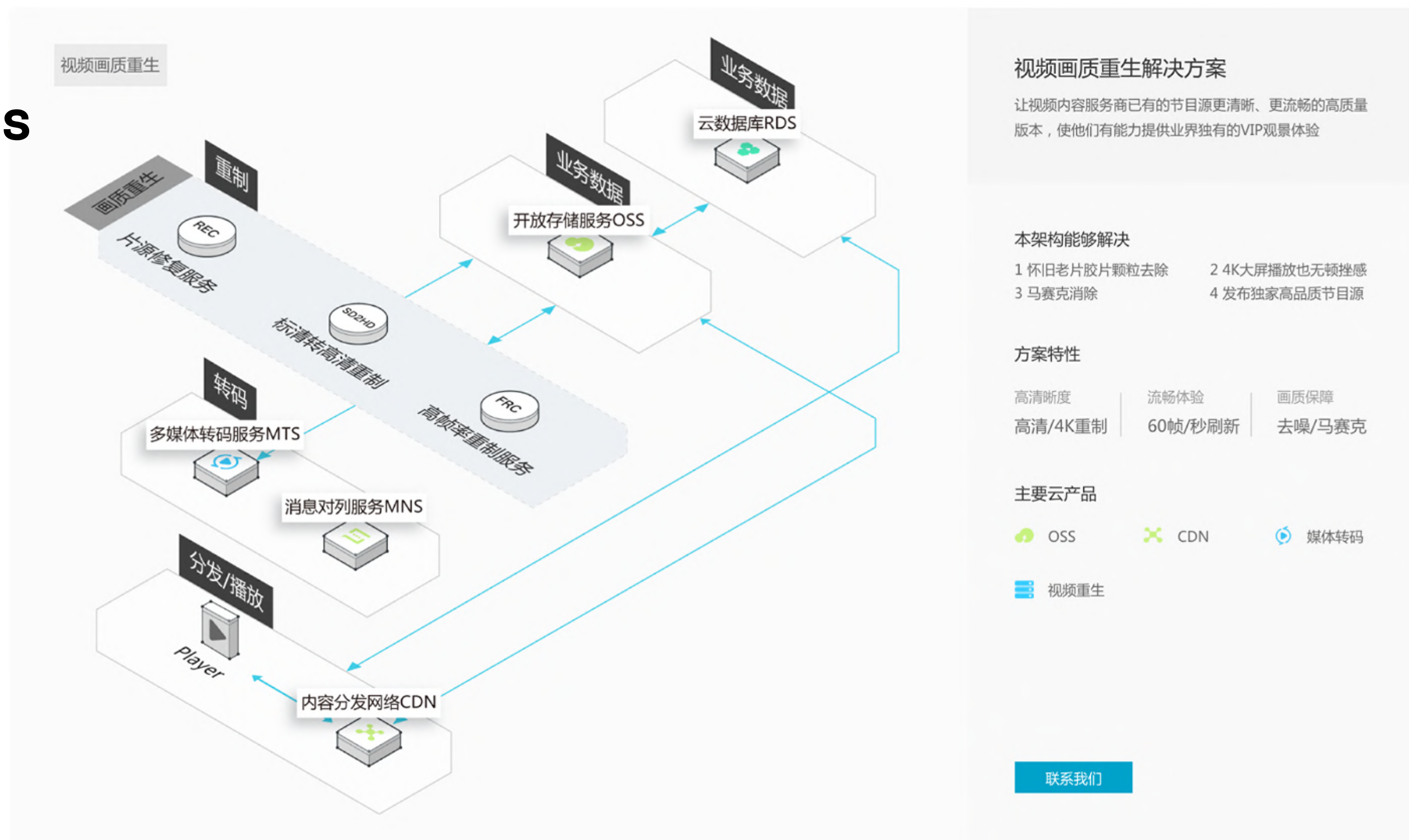
➤ 视频增强应用

- ✓ 频率变换，从 25fps 到 50fps
- ✓ 2D/3D 转换
- ✓ 手机视频去抖动
- ✓ 视频直播应用
- ✓ ...

➤ 云端服务

- ✓ 阿里云线上服务

解决方案推荐



<https://www.aliyun.com/solution/media/videorevive?spm=5176.7991373.431988.1.4eAw6c>

图像变换：从图像到另外一张图像

图像变换：从图像到另外一张图像（风格化）



Image A



Image A'



Deepdream

google / deepdream

Watch 813

★ Unstar 9,219

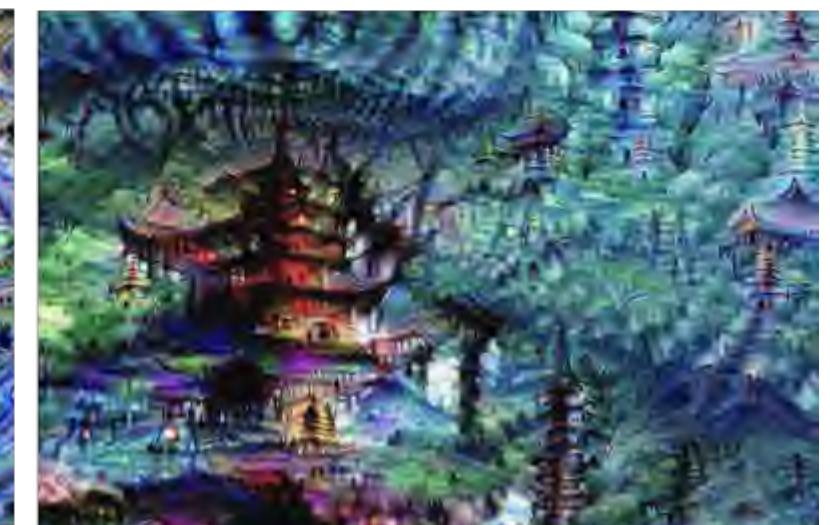
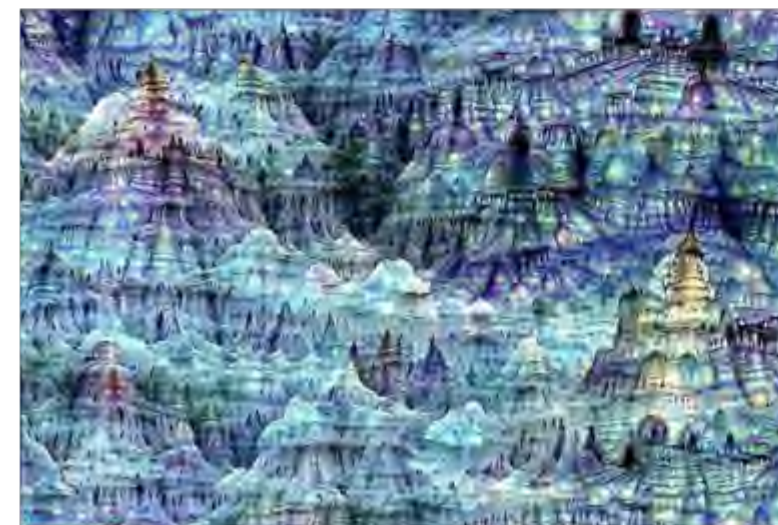
Fork 2,293

Code

Pull requests 7

Pulse

Graphs



风格化：全局的纹理学习

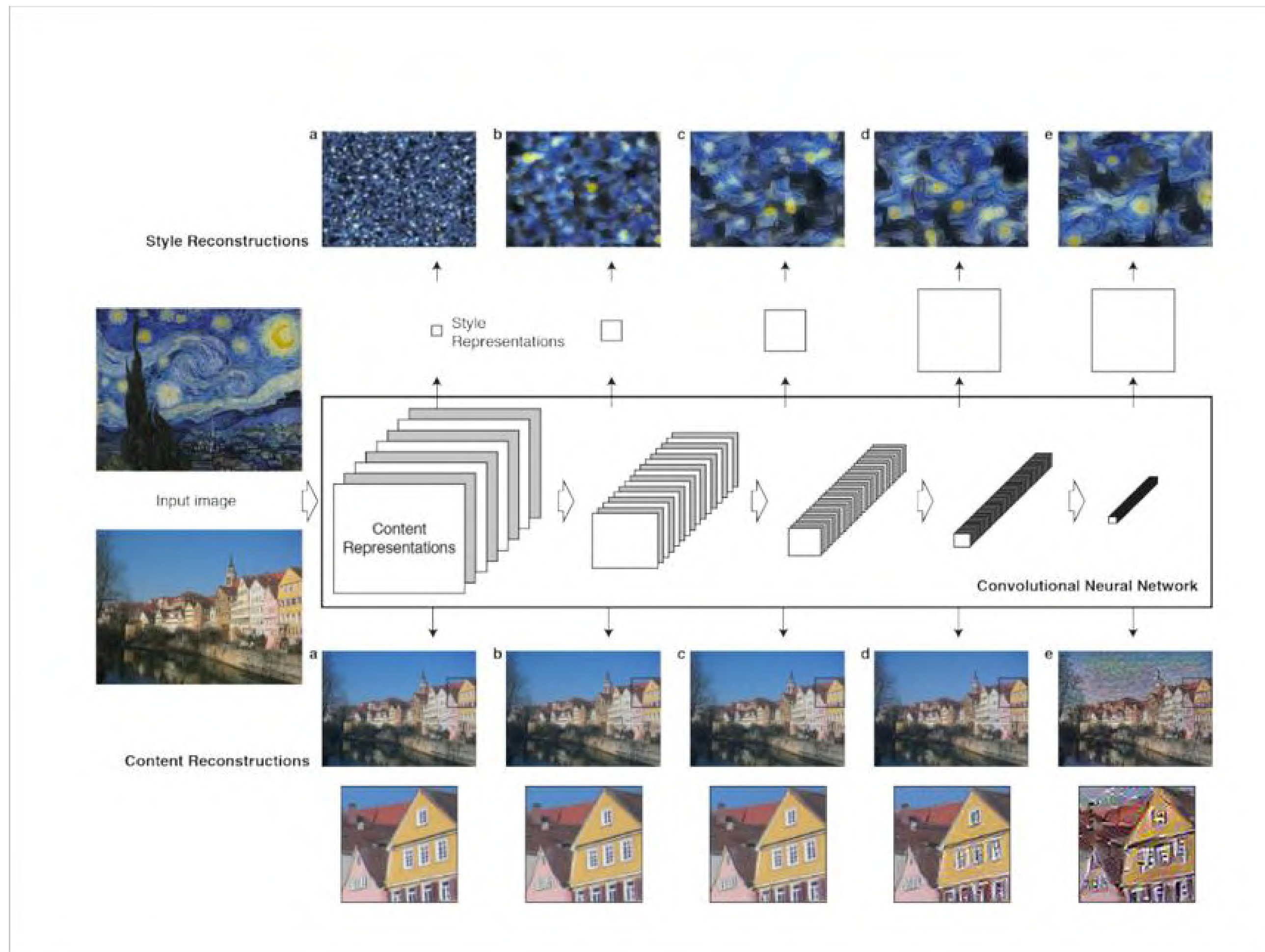
A Neural Algorithm of Artistic Style

A Neural Algorithm of Artistic Style

Leon A. Gatys, Alexander S. Ecker, Matthias Bethge

(Submitted on 26 Aug 2015 (v1), last revised 2 Sep 2015 (this version, v2))

<http://arxiv.org/abs/1508.06576>



算法关键：Gram 矩阵的应用，消除了分辨率，融合了全局风格

jcjohnson / neural-style

Watch 542

★ Unstar 10,532

🍴 Fork 1,461

Code

Issues 184

Pull requests 17

Wiki

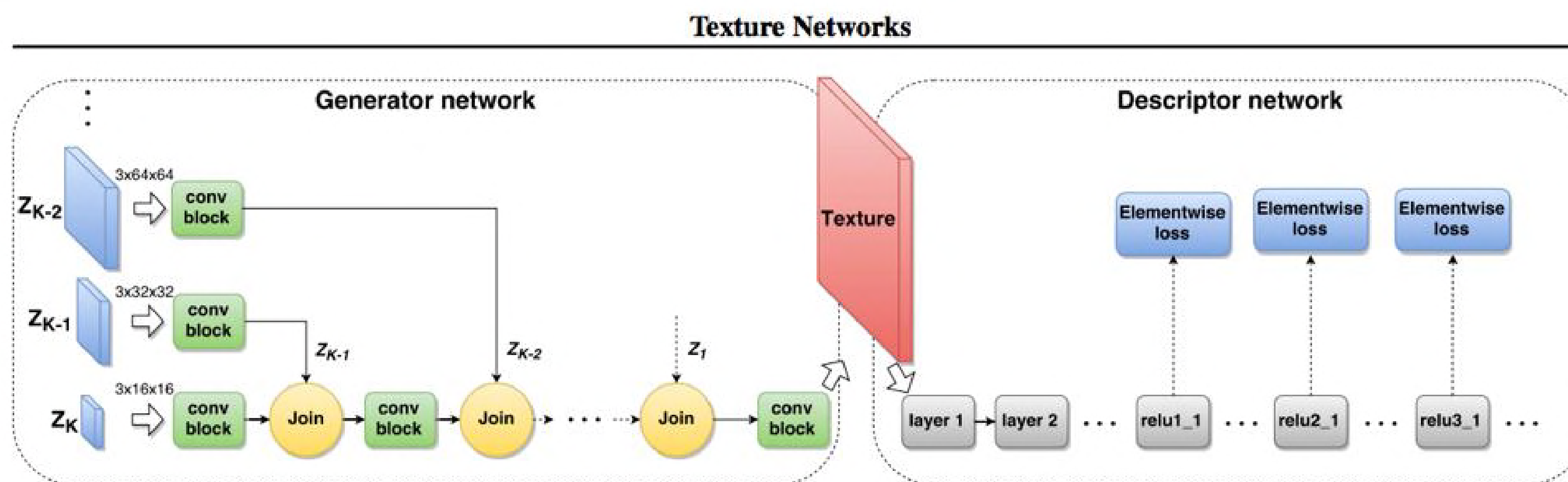
Pulse

Graphs

Torch implementation of neural style algorithm



Texture Networks: Feed-forward Synthesis of Textures and Stylized Images



https://github.com/DmitryUlyanov/texture_nets



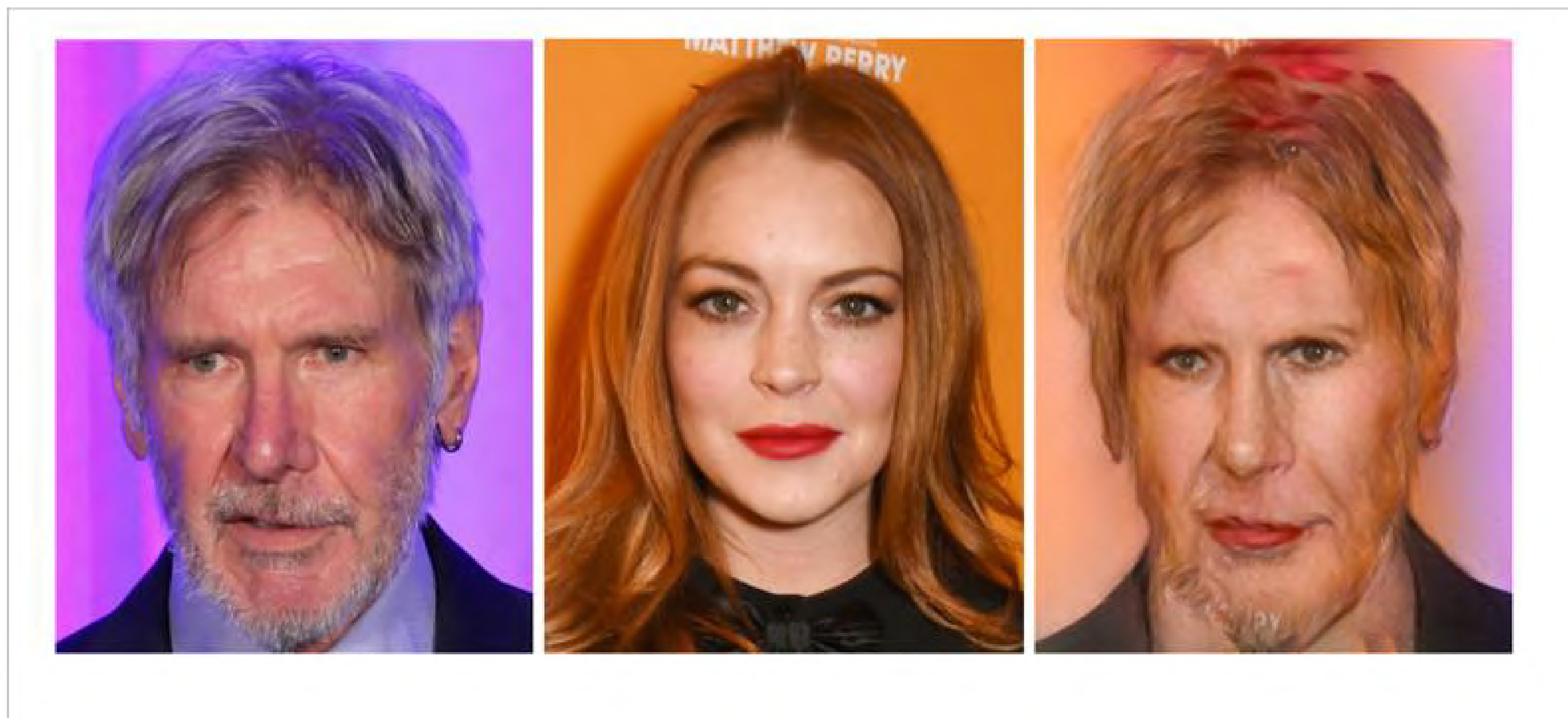
局部风格化：利用位置信息



<https://github.com/chuanli11/CNNMRF>

- 算法原理

- 根据两幅图片的相似区域，在Feature map直接融合出需要的目标



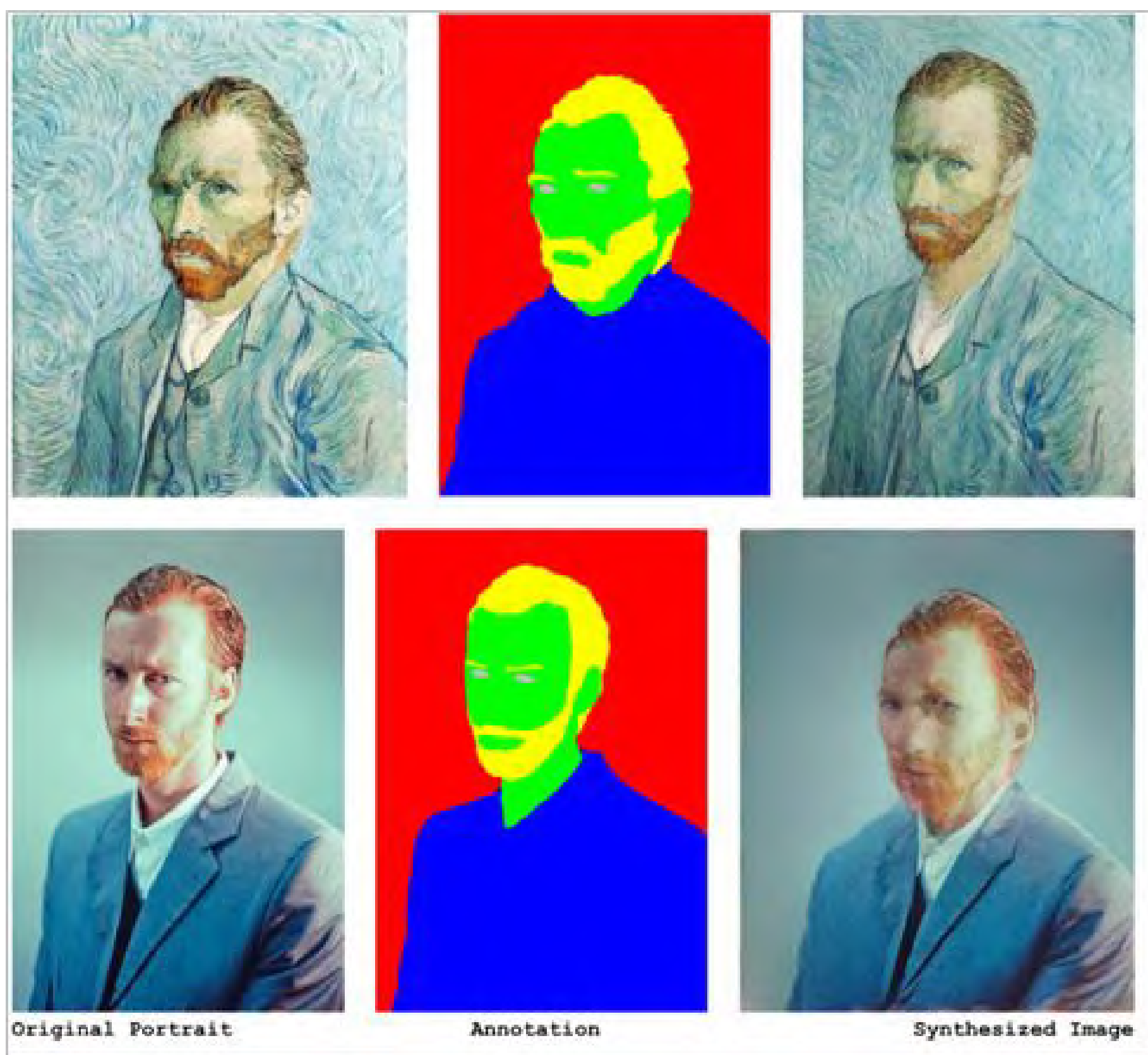
<http://arxiv.org/pdf/1601.04589v1.pdf>

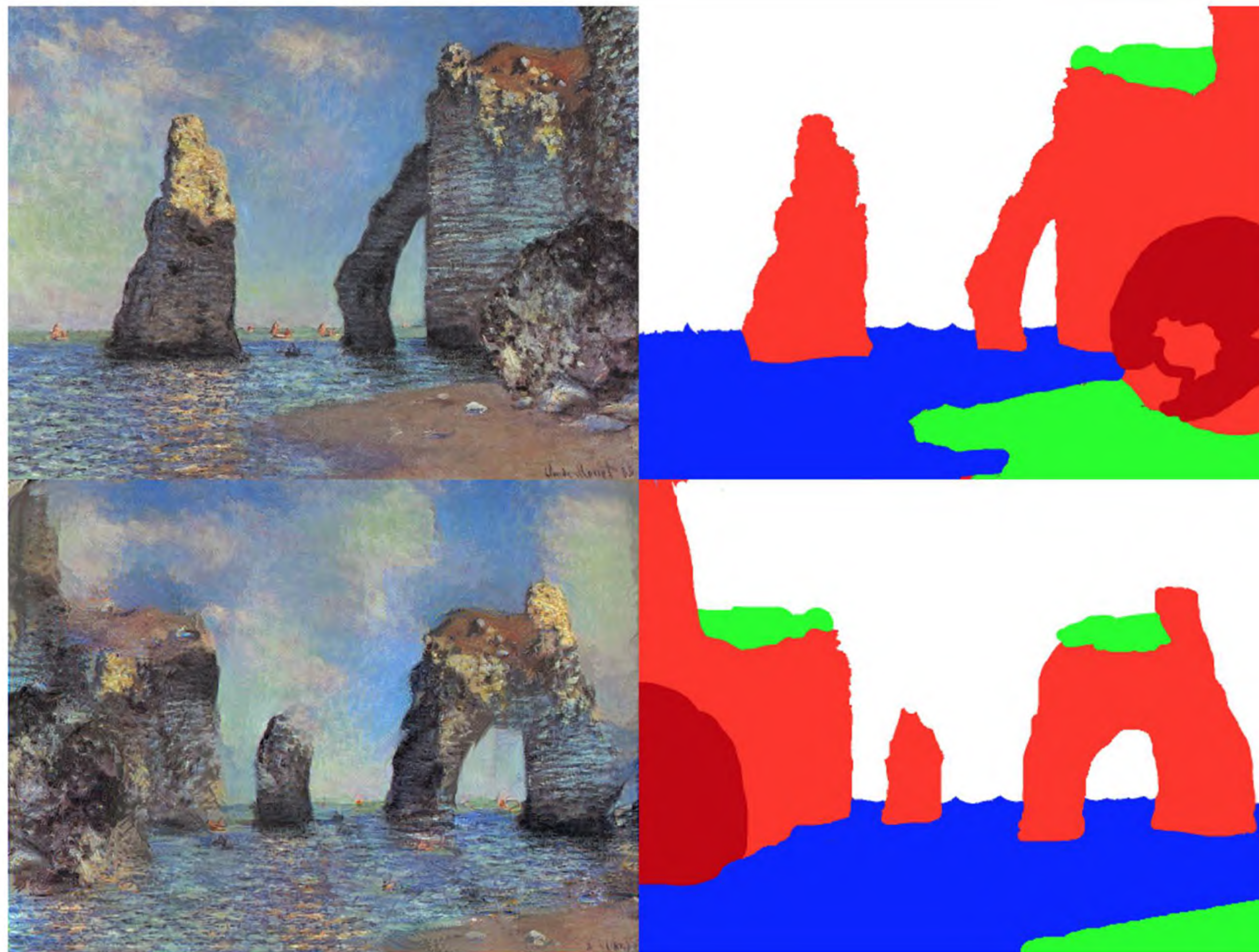
交互式涂鸦

alexjc / neural-doodle

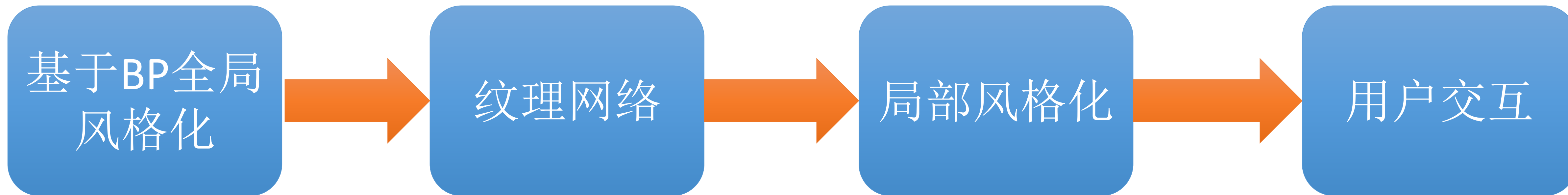
Watch 215 Unstar 6,390 Fork 428

Code Issues 21 Pull requests 0 Pulse Graphs



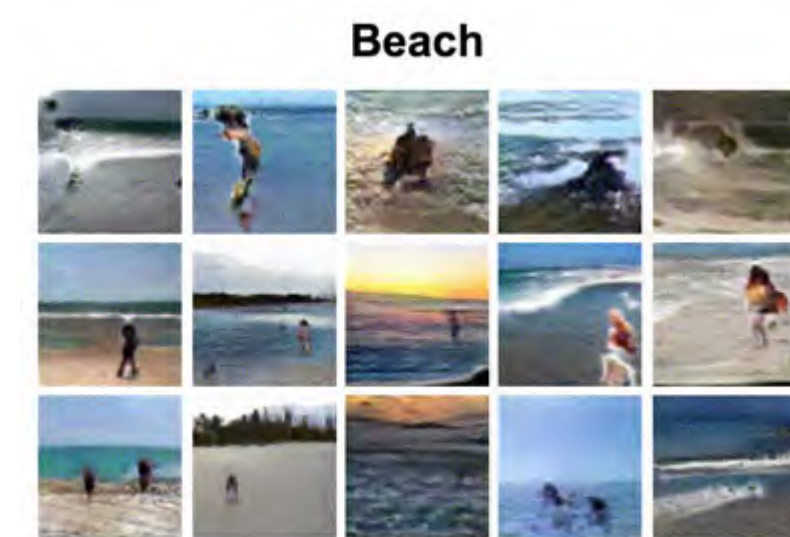
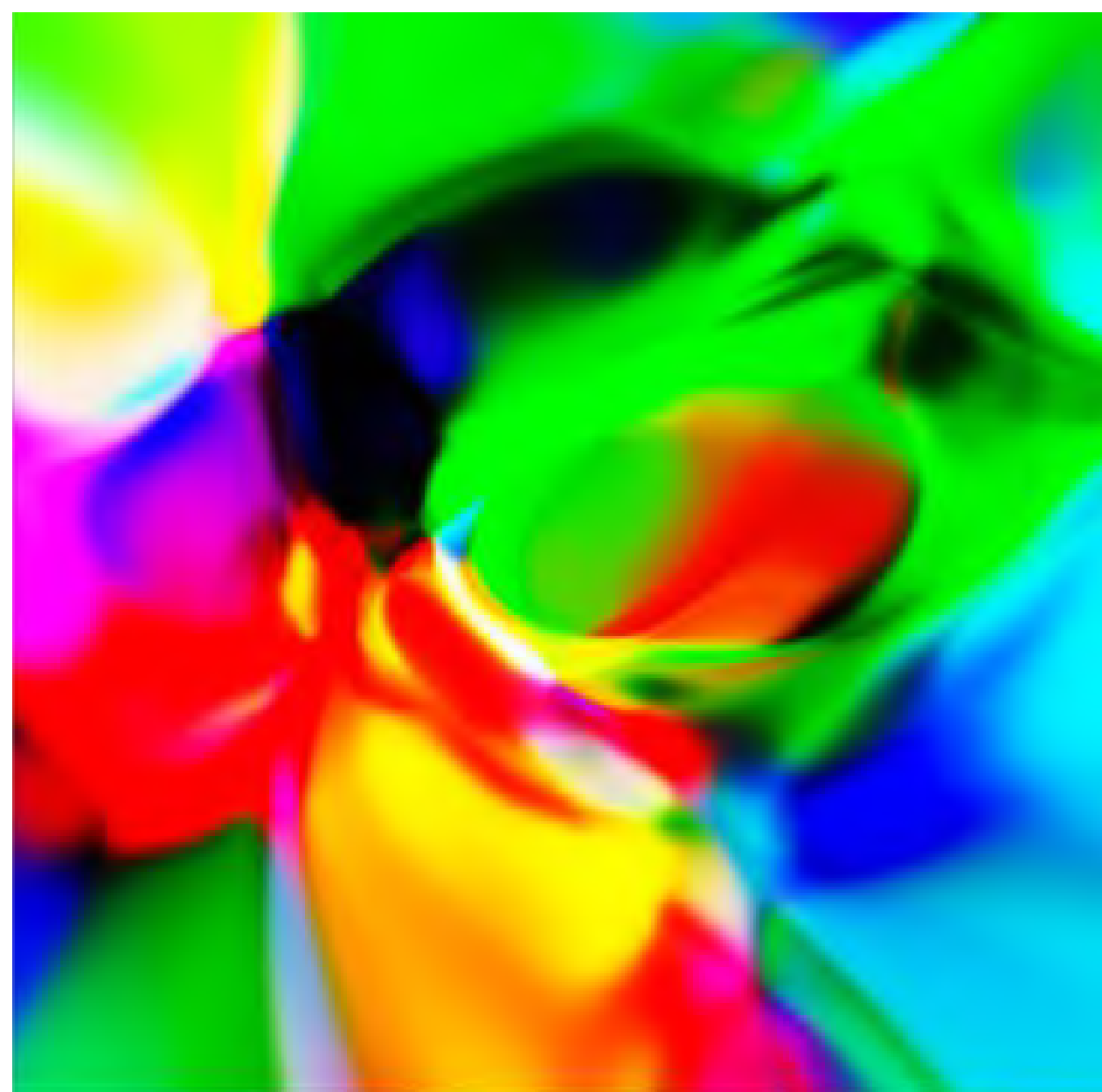


技术演变

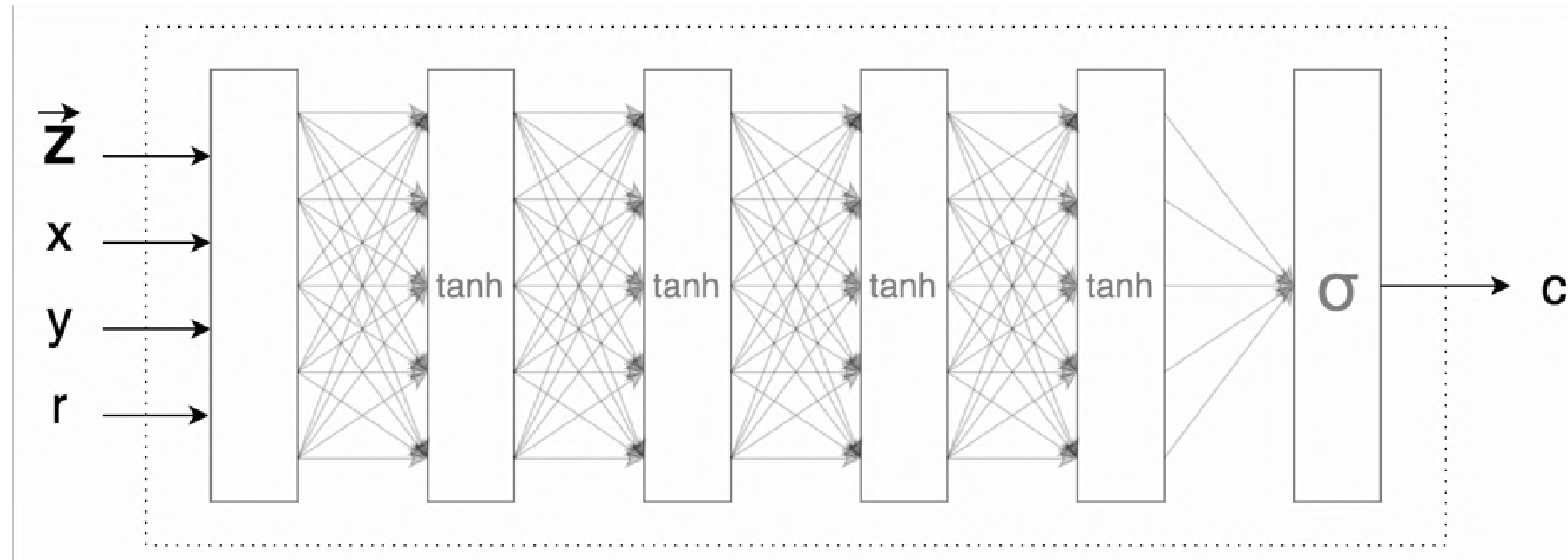


图像生成：直接生成新的图像

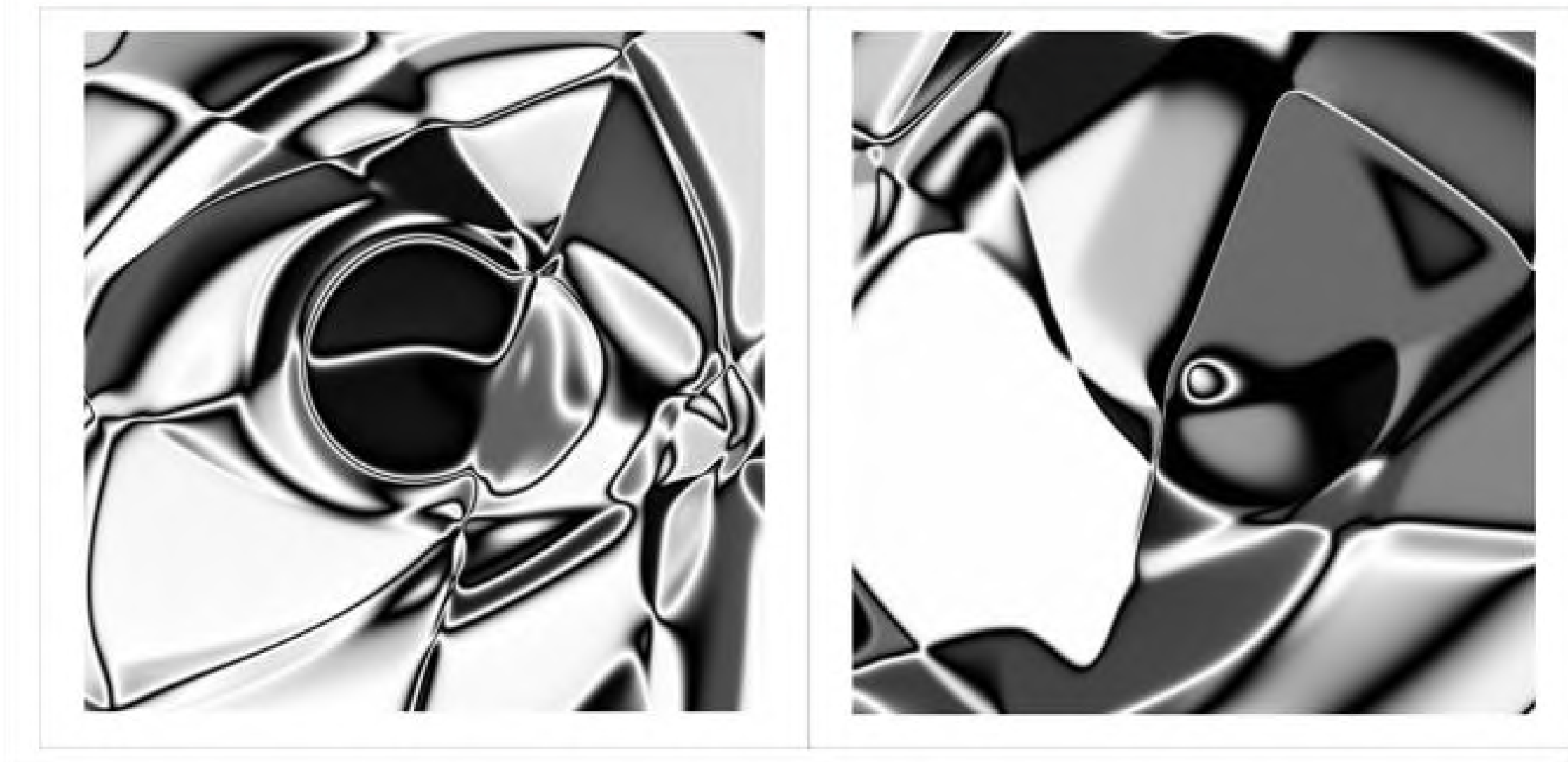
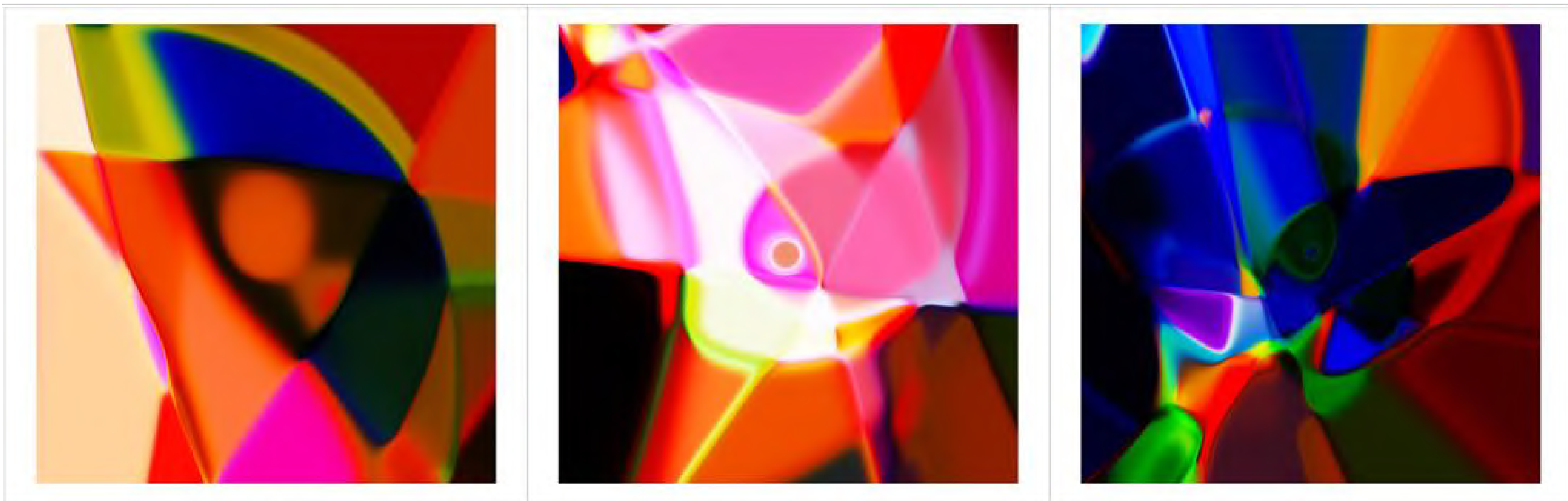
图像生成



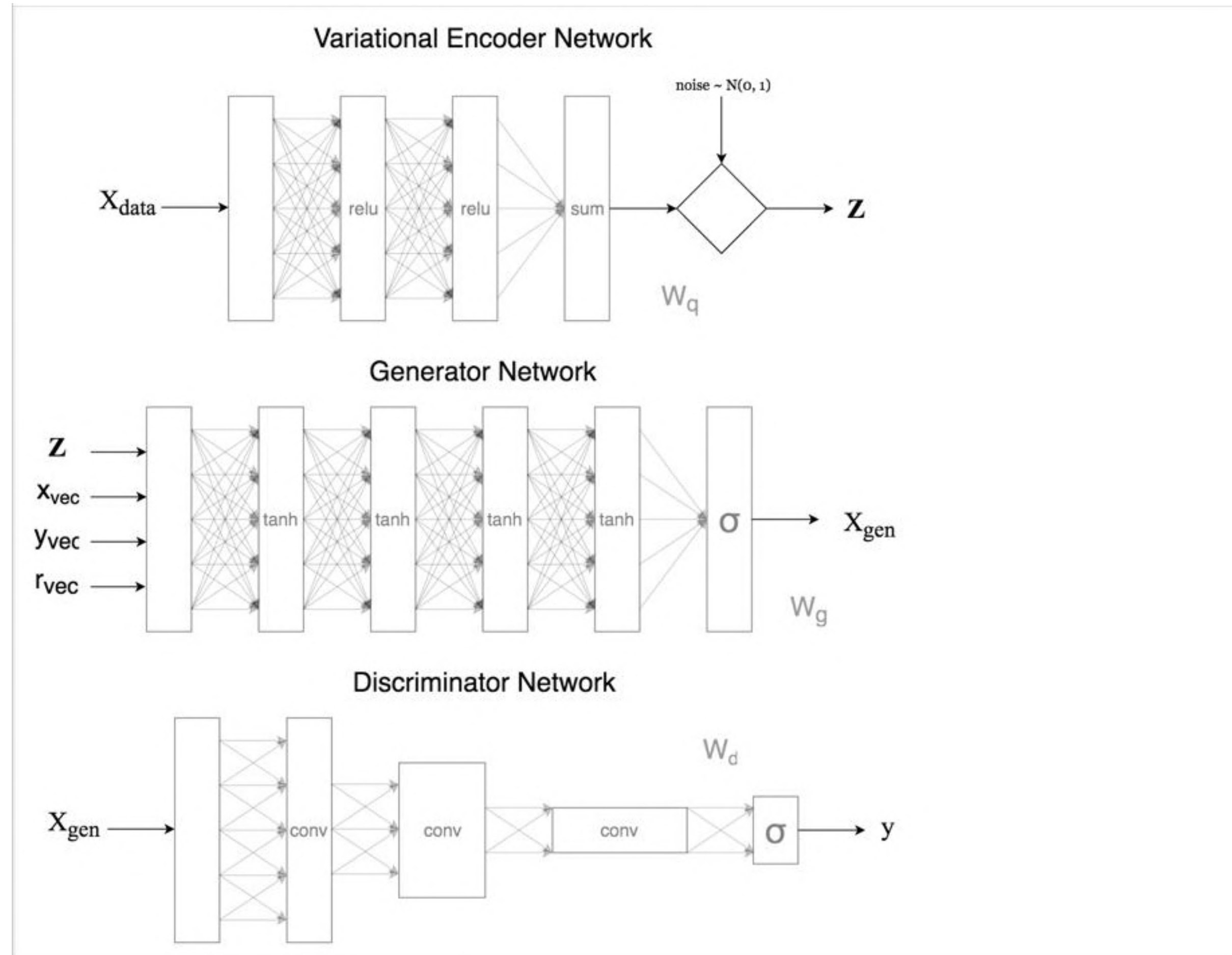
CPPN (Compositional Pattern Producing Network)



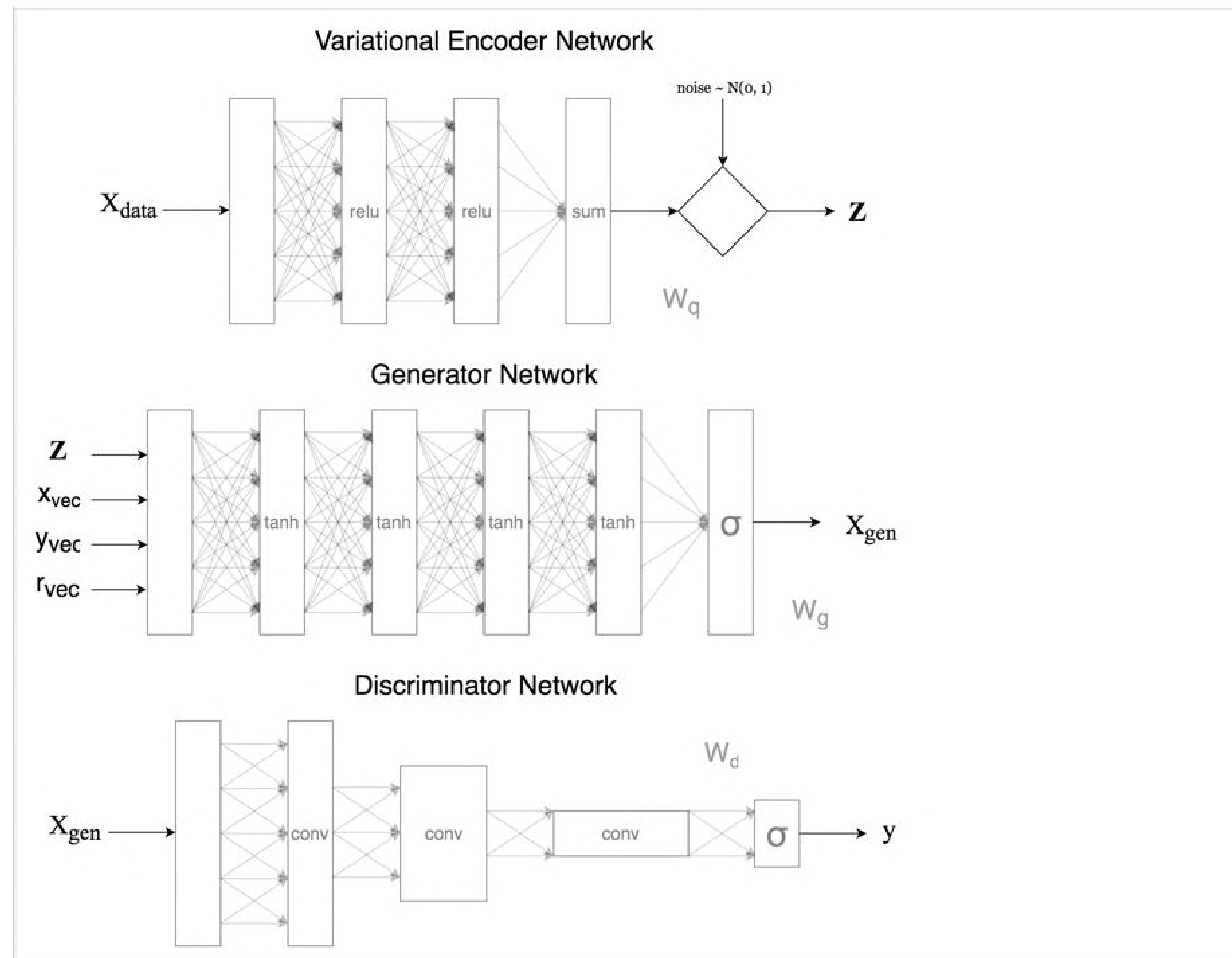
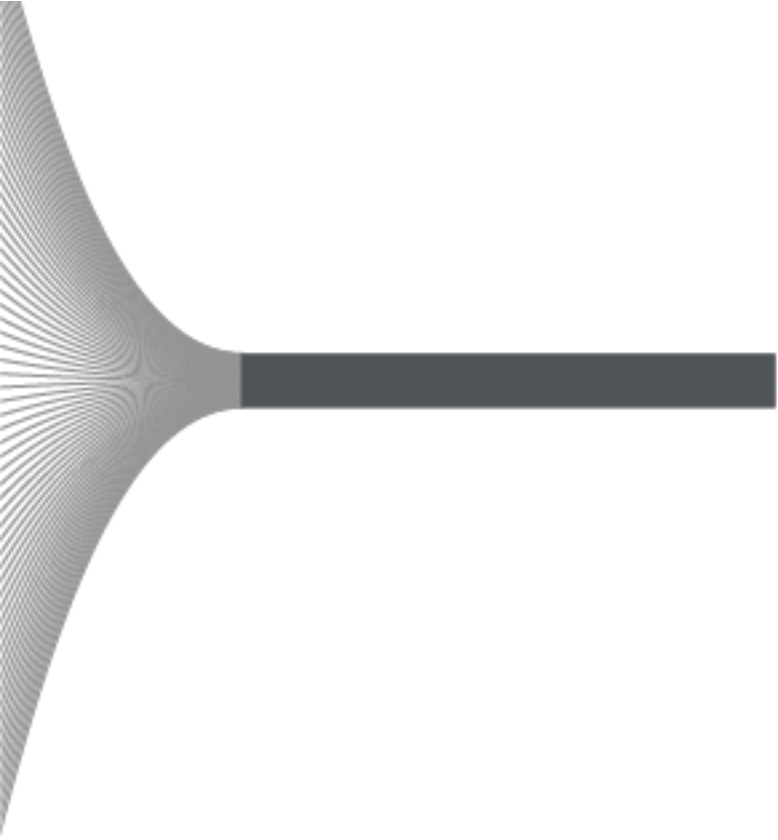
<http://zhouchang.info/blog/2016-04-08/simple-cppn.html>



VAE + CPPN



<http://blog.otoro.net/2016/04/01/generating-large-images-from-latent-vectors/>



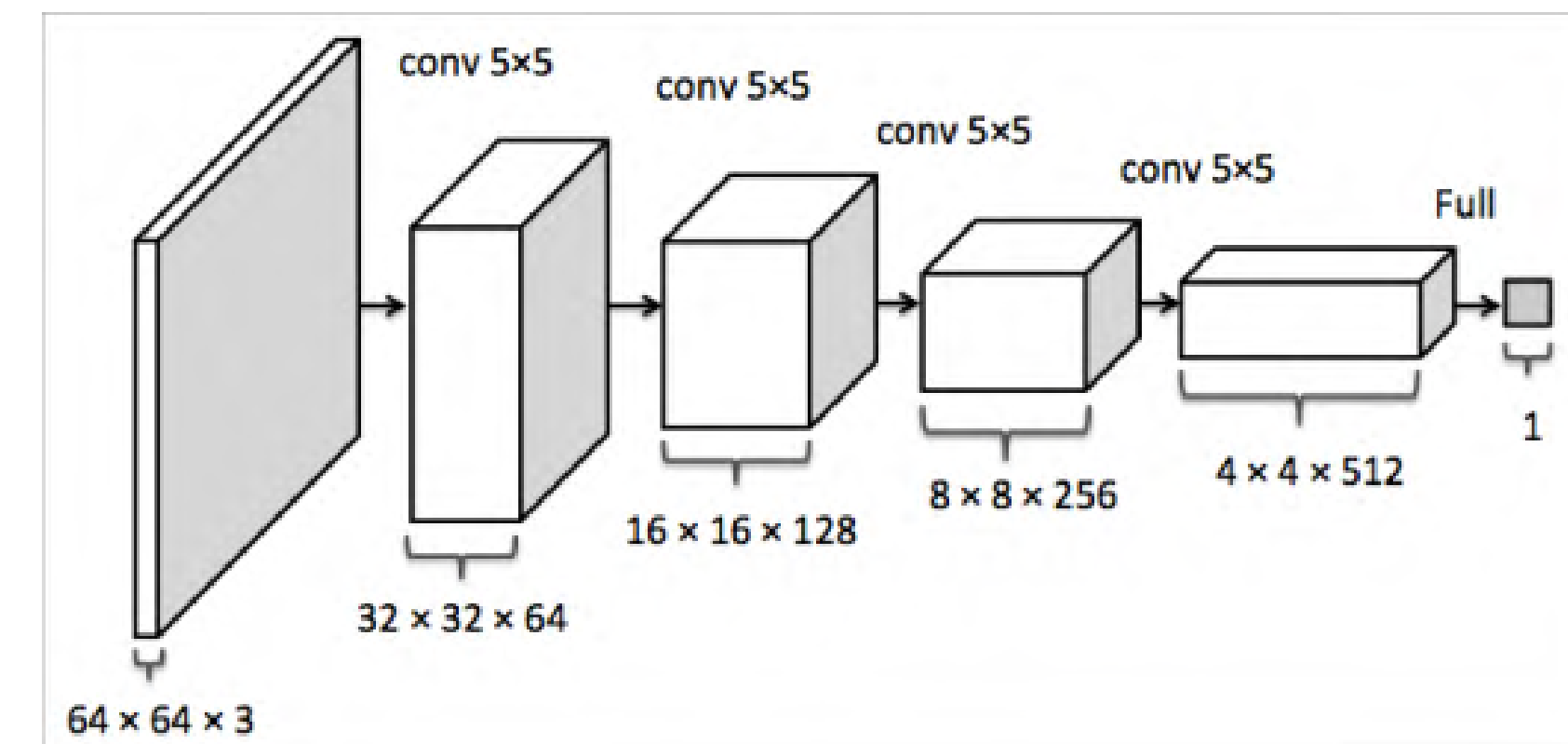
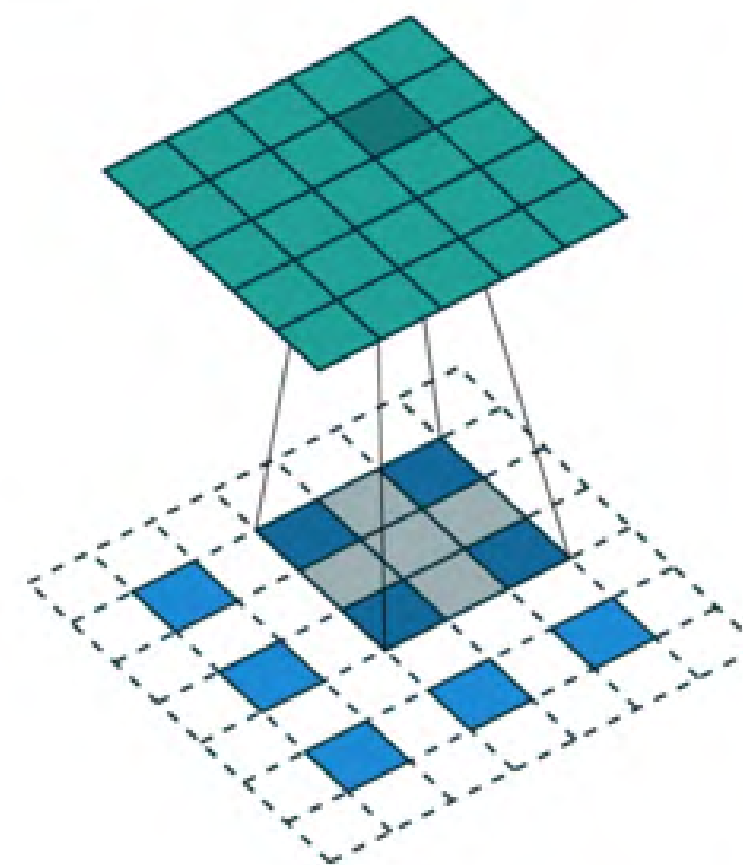
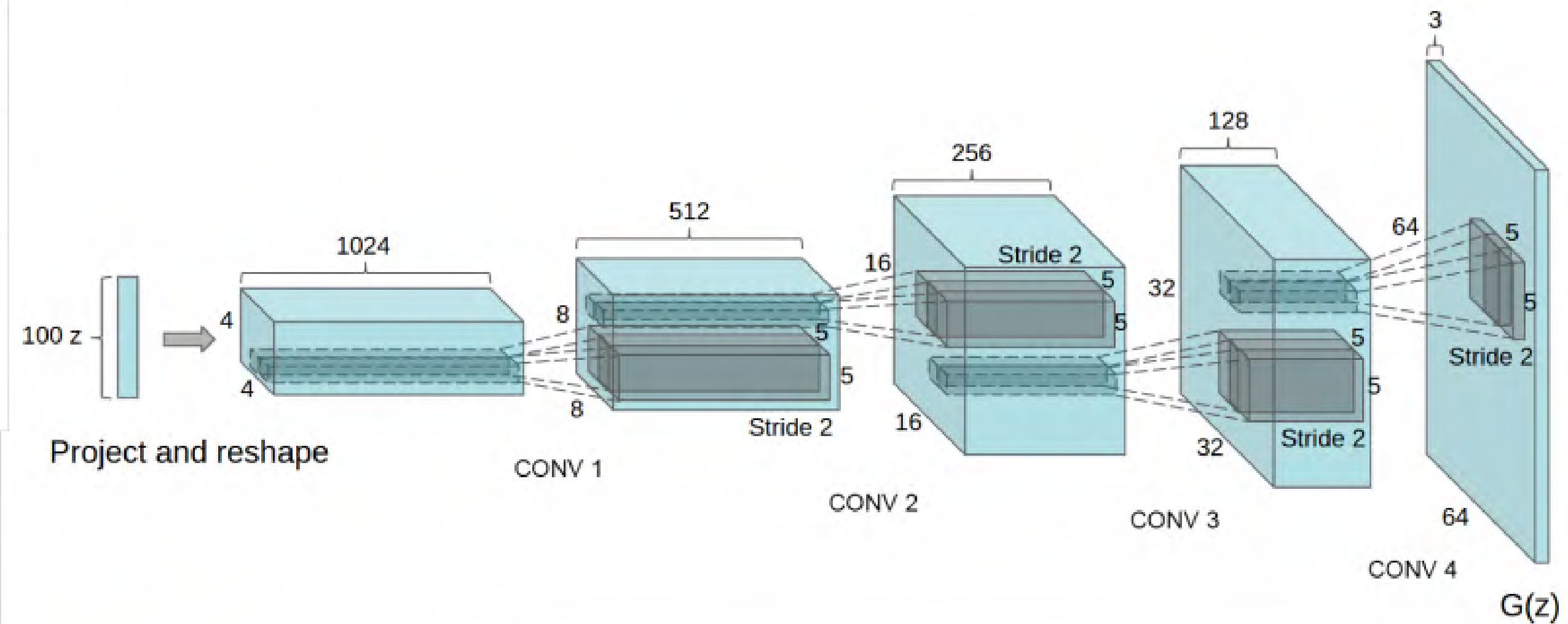
DCGAN

Unsupervised Representation Learning with Deep Convolutional Generative Adversarial Networks

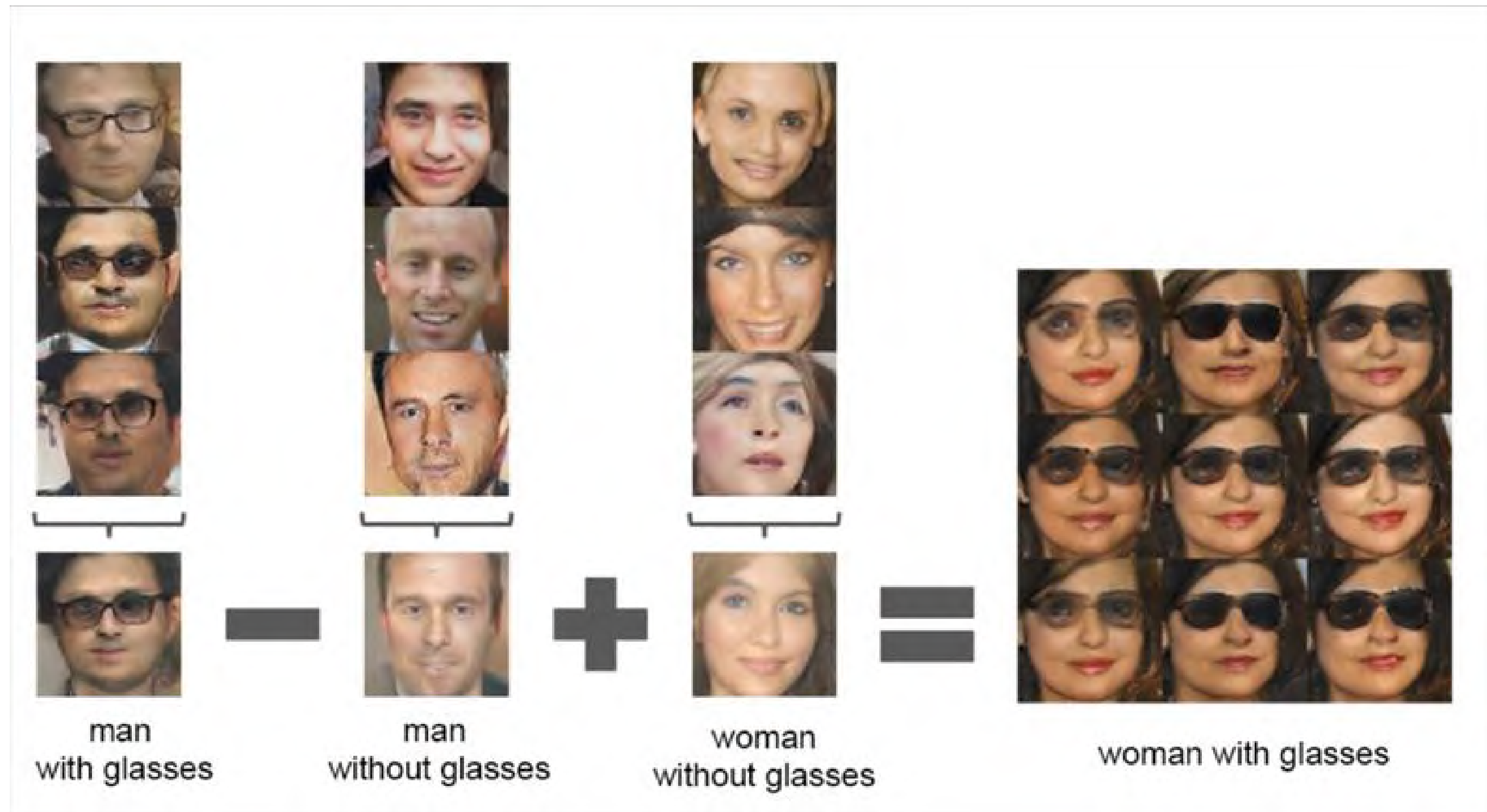
Alec Radford, Luke Metz, Soumith Chintala

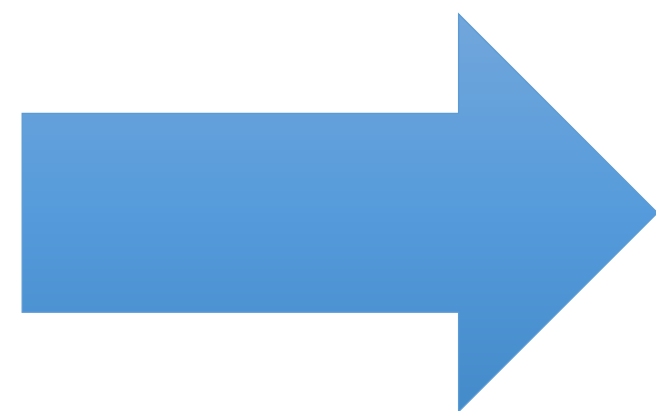
All images in this paper are generated by a neural network. They are NOT REAL.

Full paper here: <http://arxiv.org/abs/1511.06434>



https://github.com/Newmu/dcgan_code





<http://bamos.github.io/2016/08/09/deep-completion/>

VideoGan

Generating Videos with Scene Dynamics

[Carl Vondrick](#) [Hamed Pirsiavash](#) [Antonio Torralba](#)

NIPS 2016

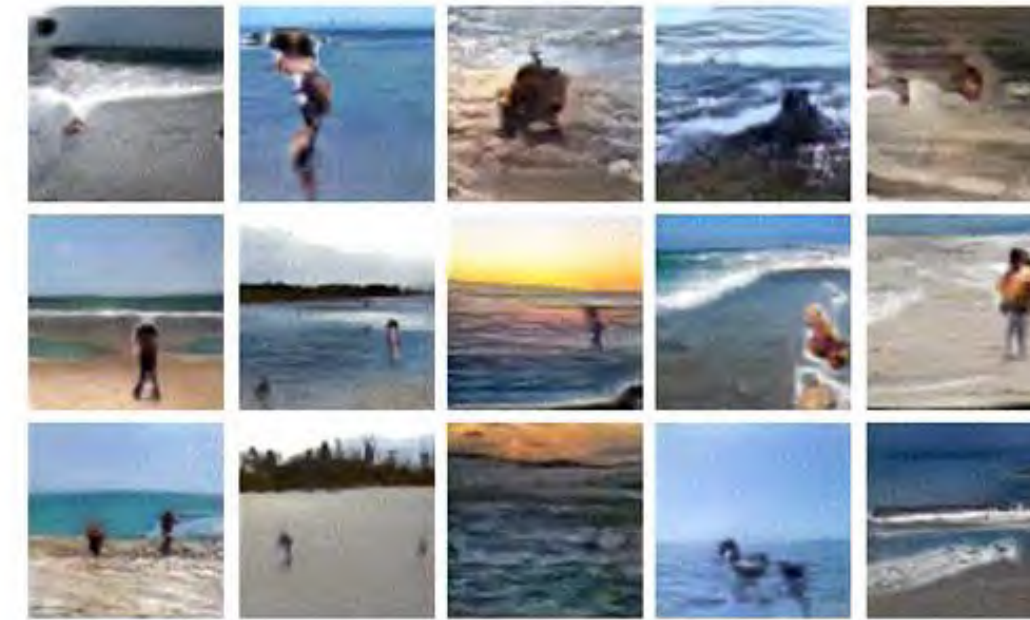
Abstract

We capitalize on large amounts of unlabeled video in order to learn a model of scene dynamics for both video recognition tasks (e.g. action classification) and video generation tasks (e.g. future prediction). We propose a generative adversarial network for video with a spatio-temporal convolutional architecture that untangles the scene's foreground from the background. Experiments suggest this model can generate tiny videos up to a second at full frame rate better than simple baselines, and we show its utility at predicting plausible futures of static images. Moreover, experiments and visualizations show the model internally learns useful features for recognizing actions with minimal supervision, suggesting scene dynamics are a promising signal for representation learning. We believe generative video models can impact many applications in video understanding and simulation.



[Download Paper](#)

Beach



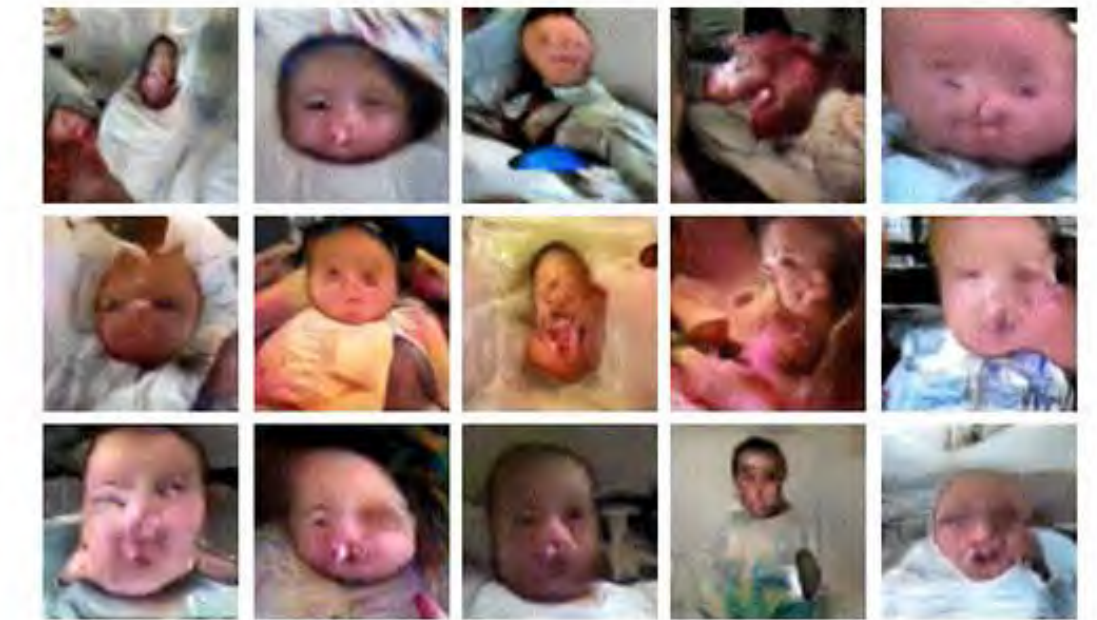
Golf



Train Station



Baby



<http://web.mit.edu/vondrick/tinyvideo/>

总结&展望

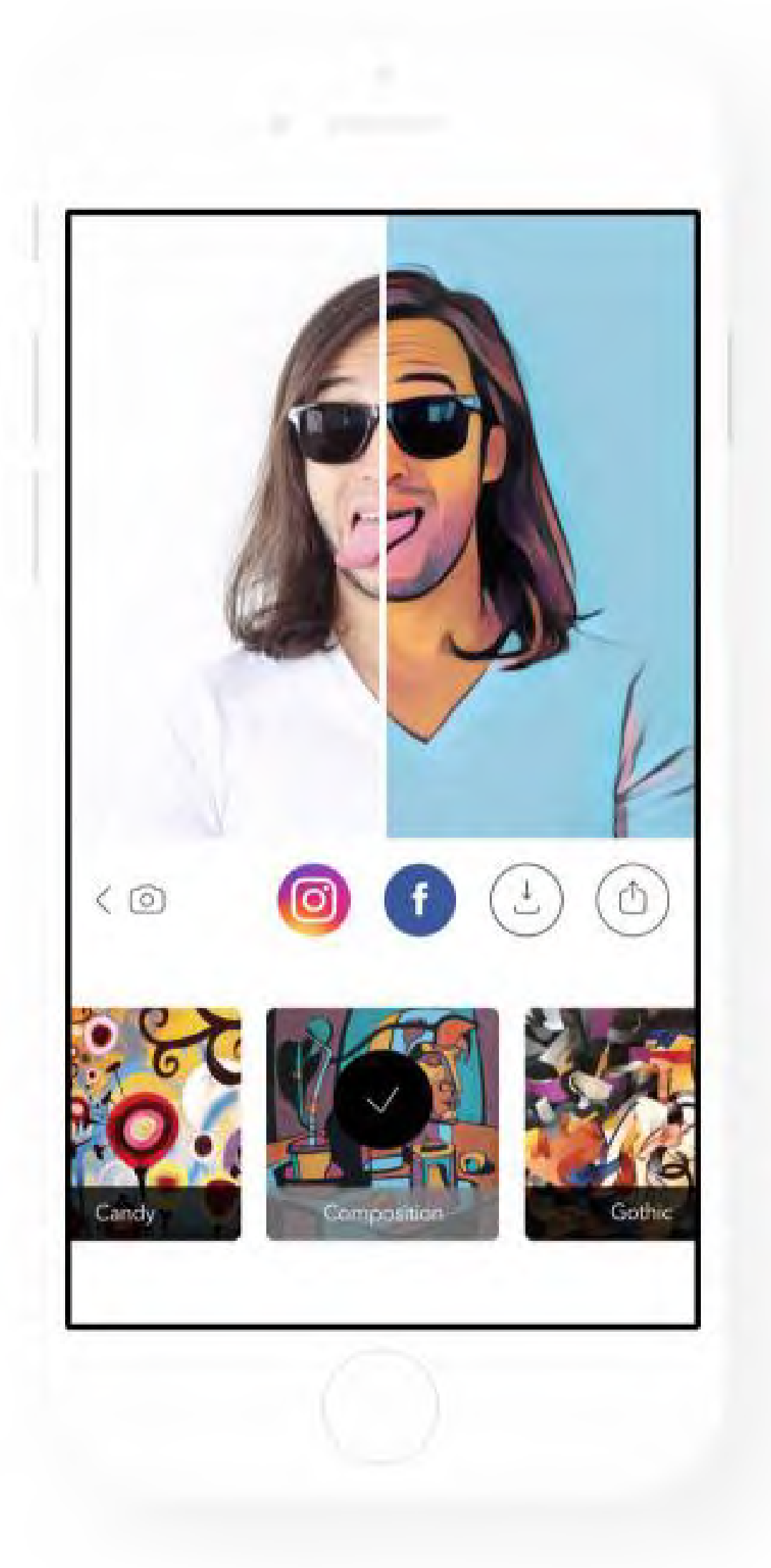
从端到端

➤ 终端

- ✓ 图像和视频的第一生产平台
- ✓ 用户体验入口
- ✓ 用户交互入口

➤ 云端

- ✓ 图像和视频的第一加工平台
- ✓ 服务化出口



下一步：云上的智能美工



再下一步：智能设计



<https://techcrunch.com/2016/09/02/googles-new-project-muse-proves-machines-arent-that-great-at-fashion-design/>



<http://www.deepdraw.cn/>

为了无法计算的价值 |  阿里云

