User-Guided Sketch Colorization Interface with Conditional Generative Adversarial Network

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Overview

- Paints 2 Sketches with XDoG Algorithm
- Sketches 2 Paints with U-net & CGAN
- Web & Andriod under one backened
- Q & A

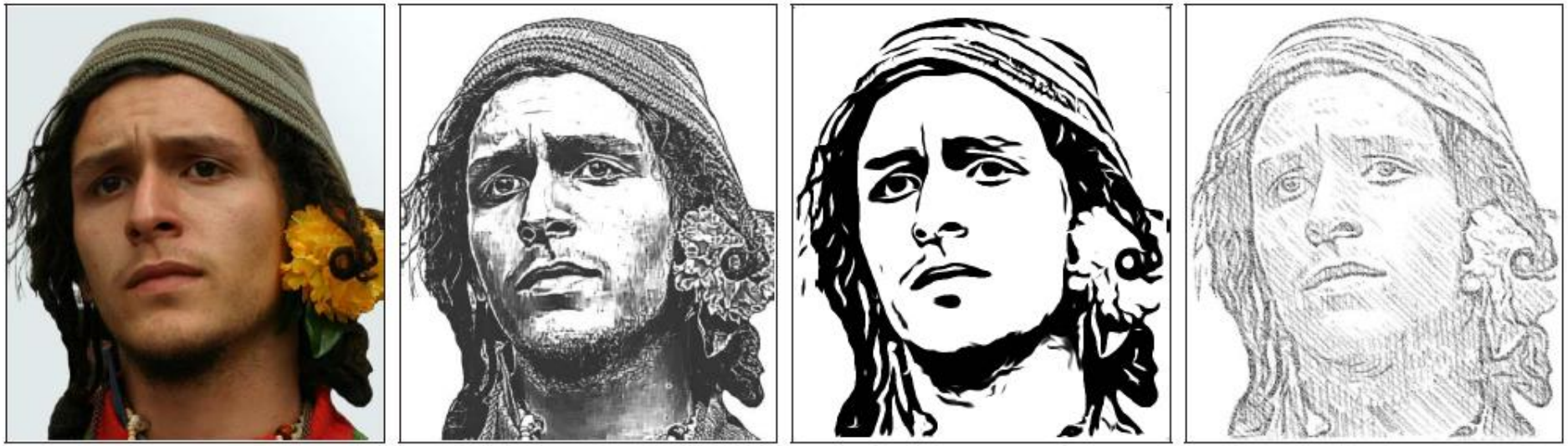
[Winnemöller et al., 2012]

Paints 2 Sketches

XDoG: An eXtended difference-of-Gaussians compendium including advanced image stylization☆

Holger Winnemöller[a], Jan Eric Kyprianidis[b], Sven C. Olsen

[a] *Adobe Systems, Inc.*
[b] *Hasso-Plattner-Institut*



(a) Source (b) XDoG (c) XDoG Thresholding (d) XDoG-Hatching

Figure 1: *Style variations:* All of these images are produced based on slight modifications to a *difference-of-Gaussians* operator. Source © Andrew Calder

Paints 2 Sketches

original

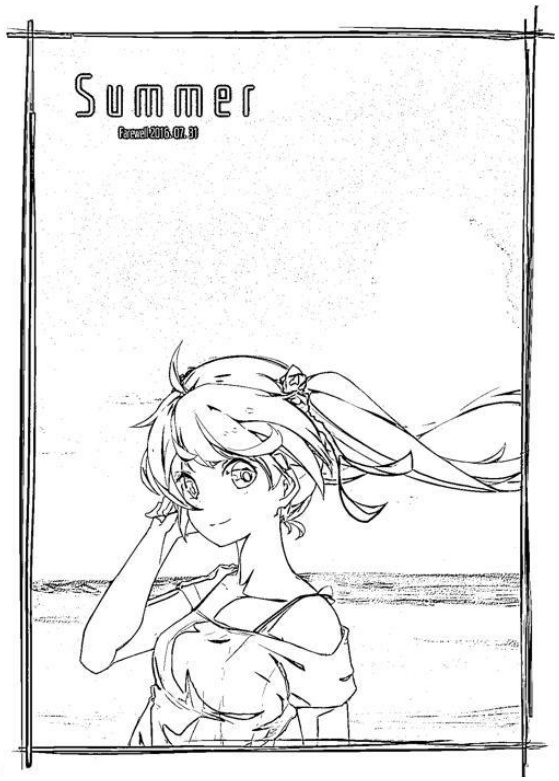
openCV
high-pass algorithm

PaintsChainer
Inet
(Deep Method)

sketchKeras
(Deep Method)

Ours with XDoG
(sig=0.55,
tau=0.95
phi=10000)

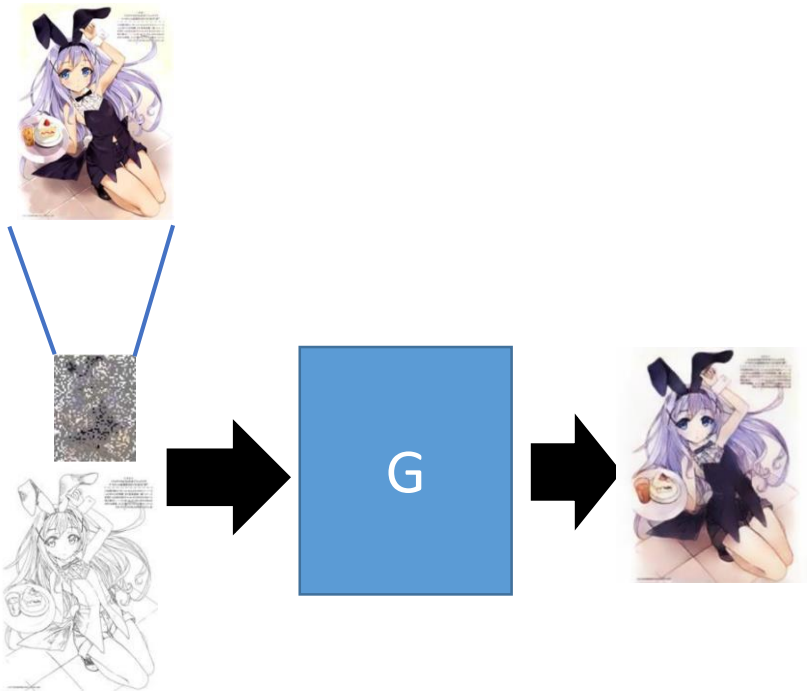
Paints 2 Sketches

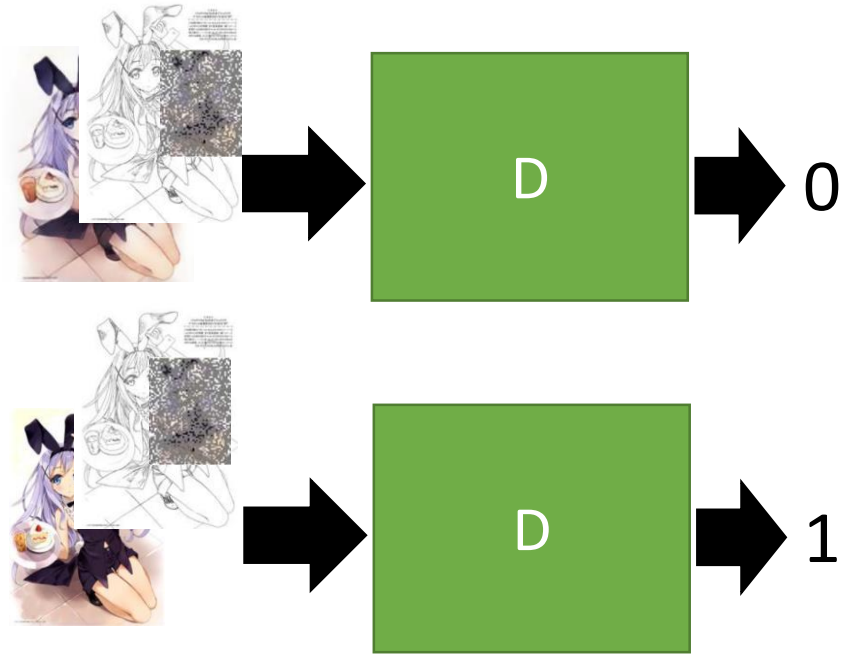


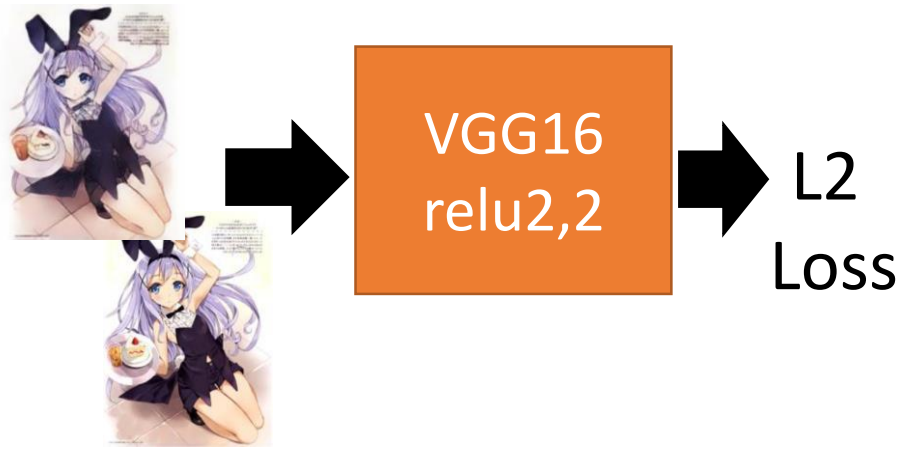
Ours with XDoG
(sig=0.55,
tau=0.95
phi=10000)

Sketches 2 Paints

UCGAN (proposed)

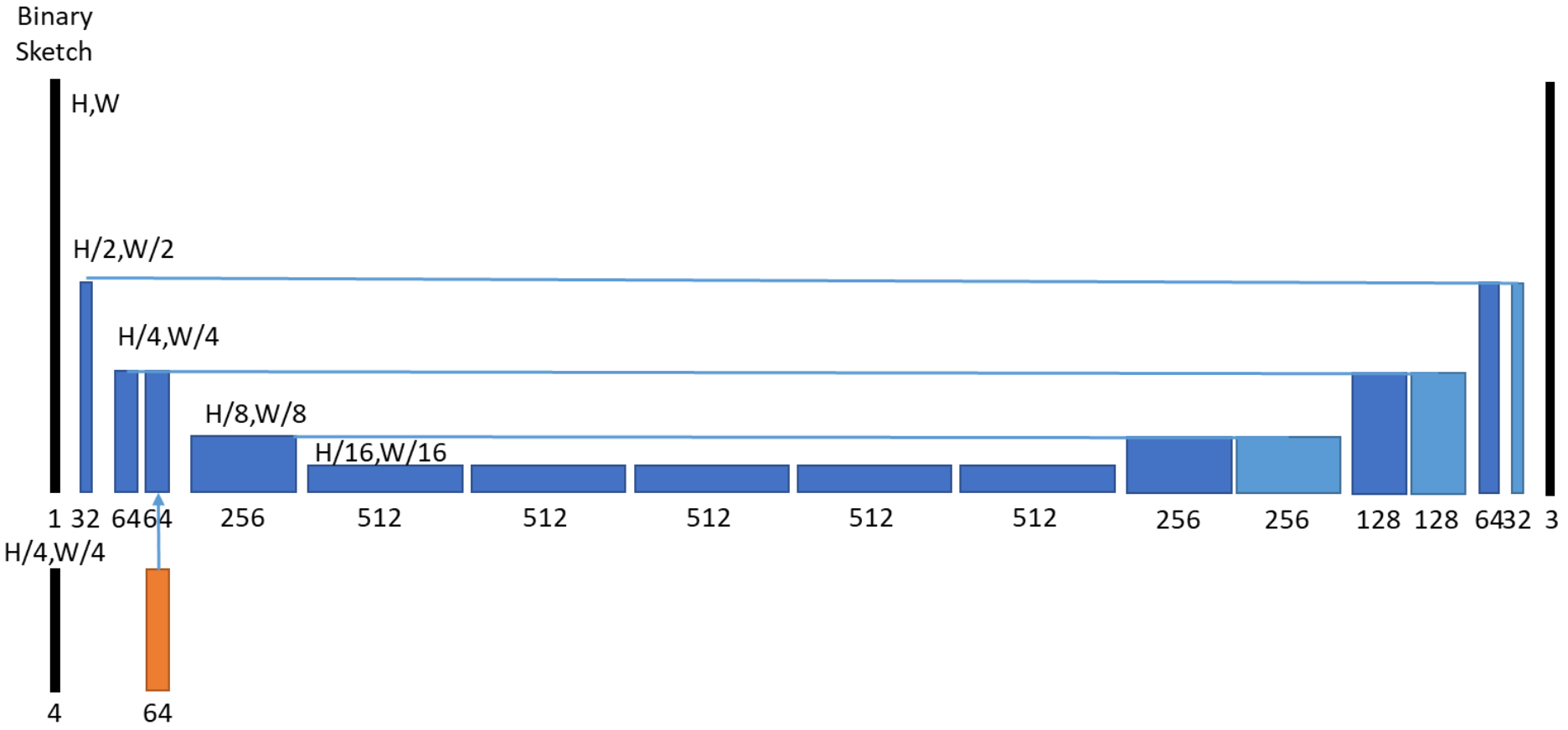






UCGAN (proposed) Generator: **Unet**

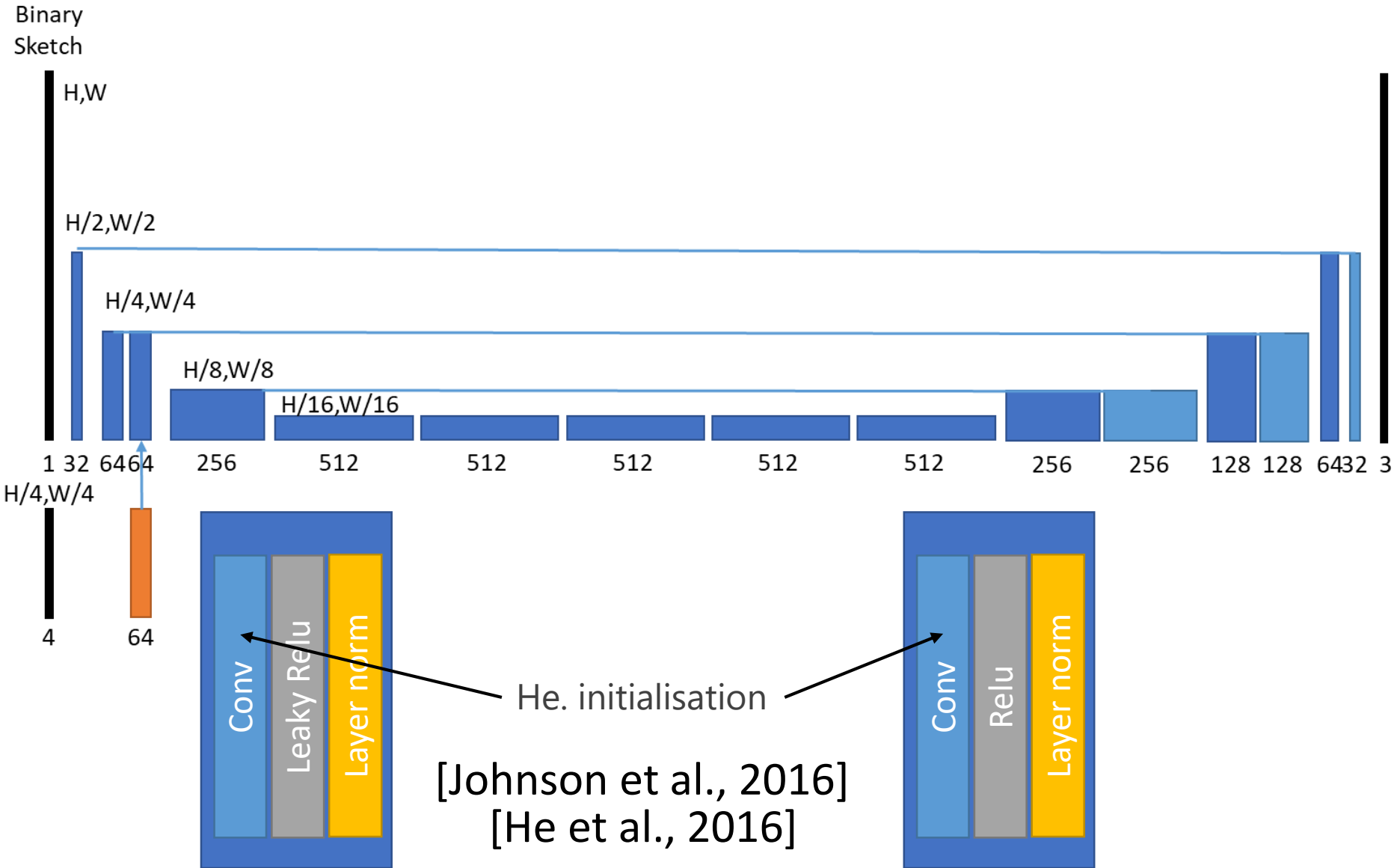
[Zhang et al., 2017]



[Johnson et al., 2016]
[He et al., 2016]

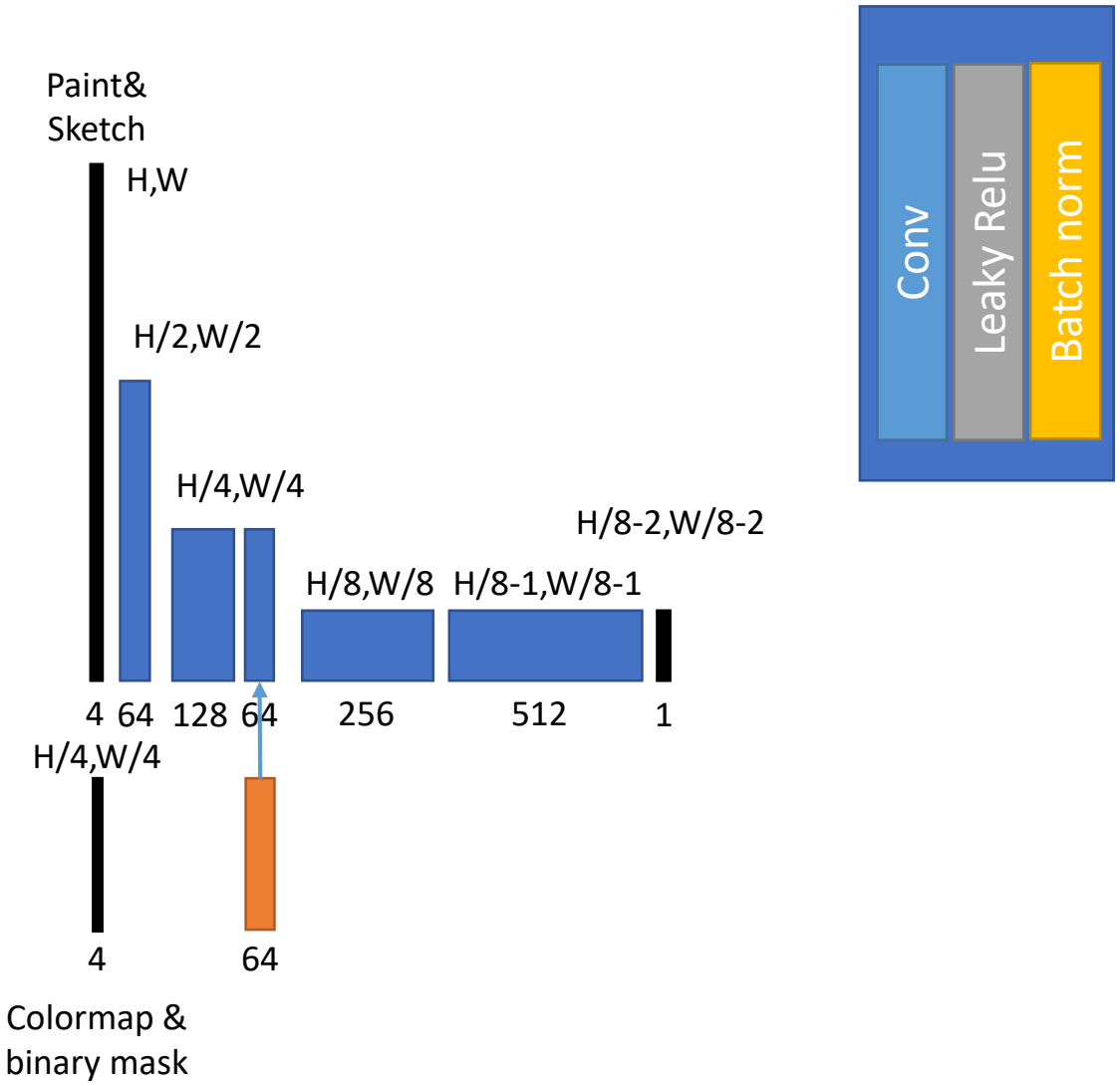
UCGAN (proposed) Generator: **Unet**

[Zhang et al., 2017]

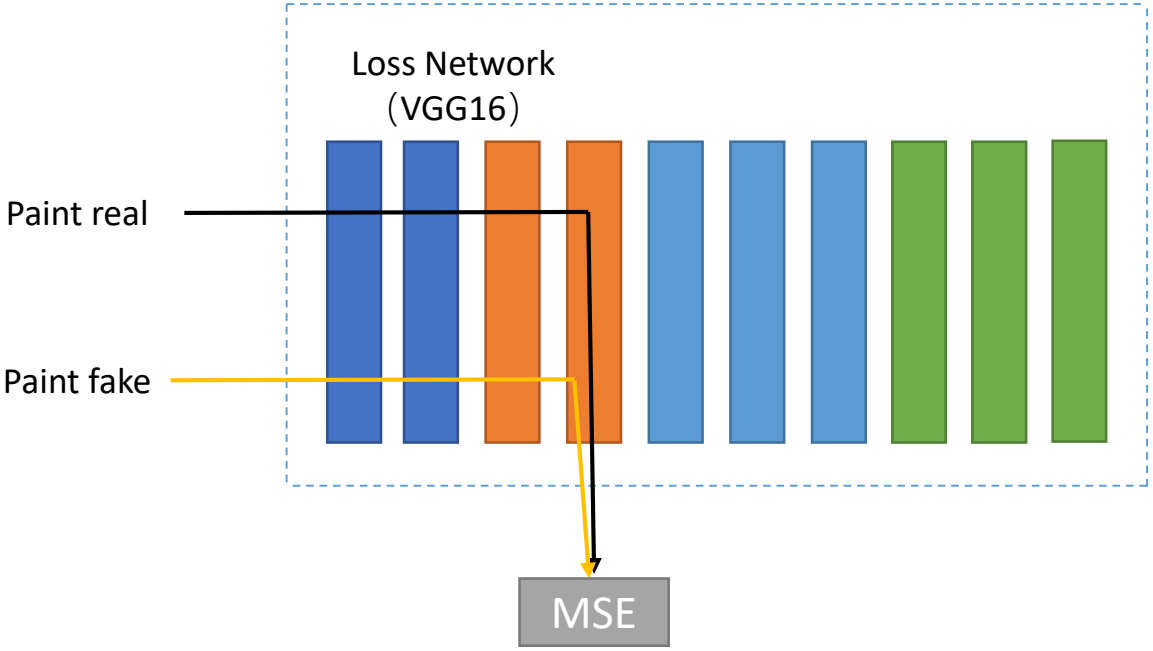


UCGAN (proposed)
Discriminator: **70x70 PatchGAN**

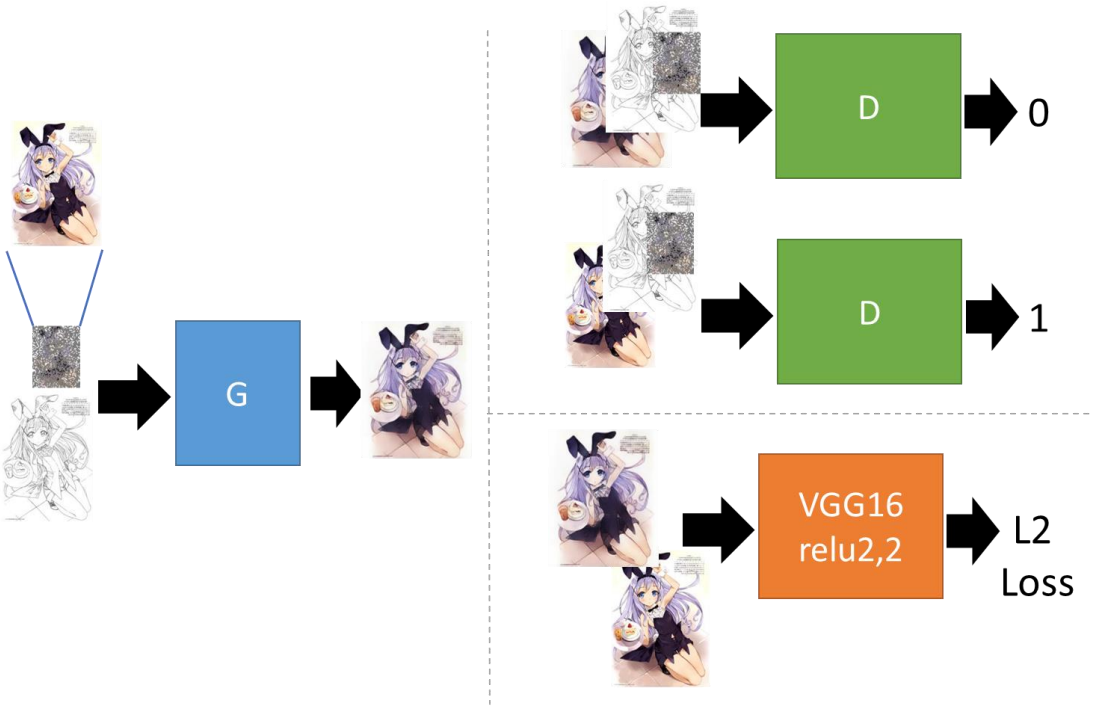
[Isola et al., 2016]



UCGAN (proposed)　VGG Loss



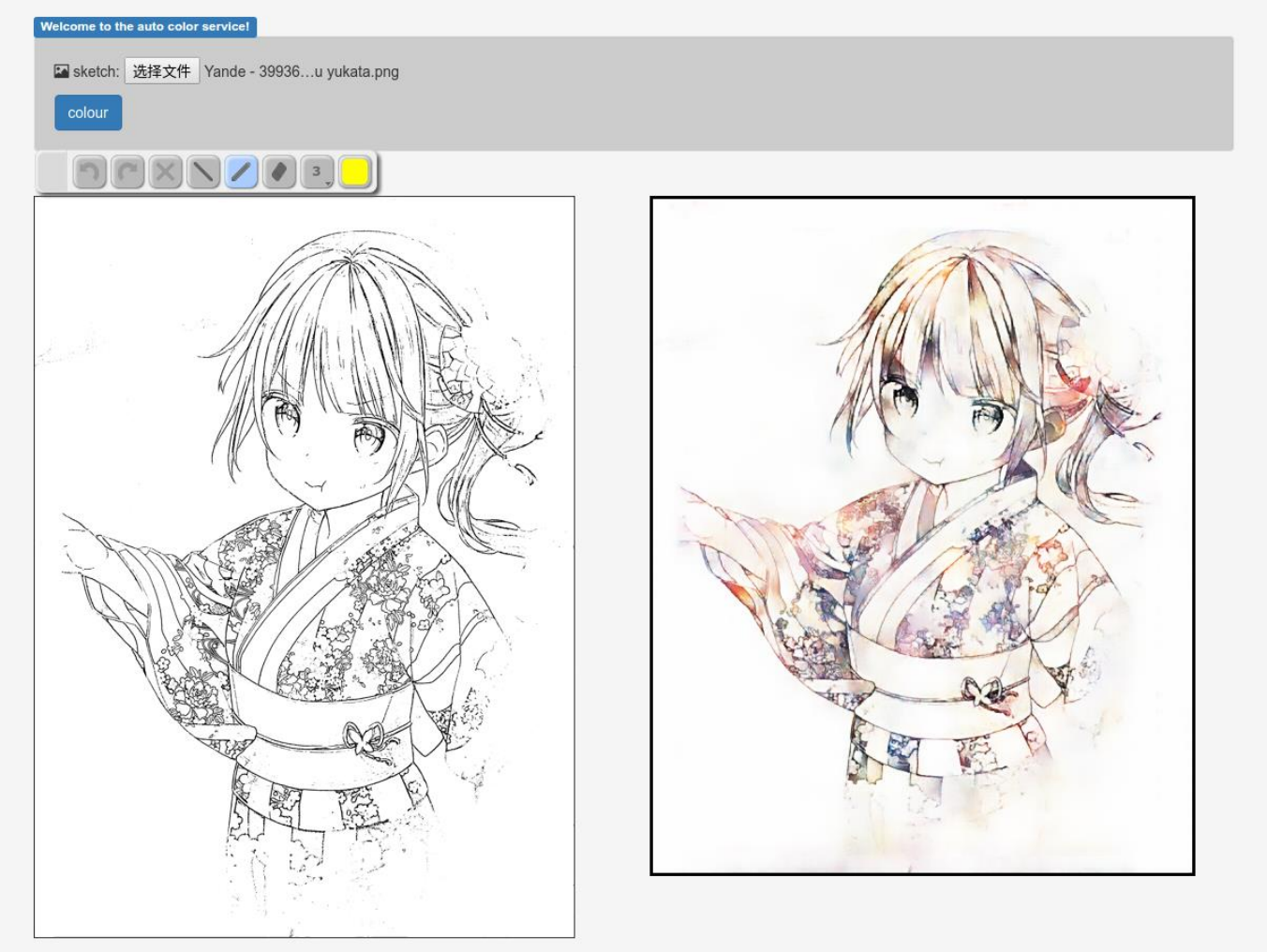
UCGAN (proposed)　Loss Function



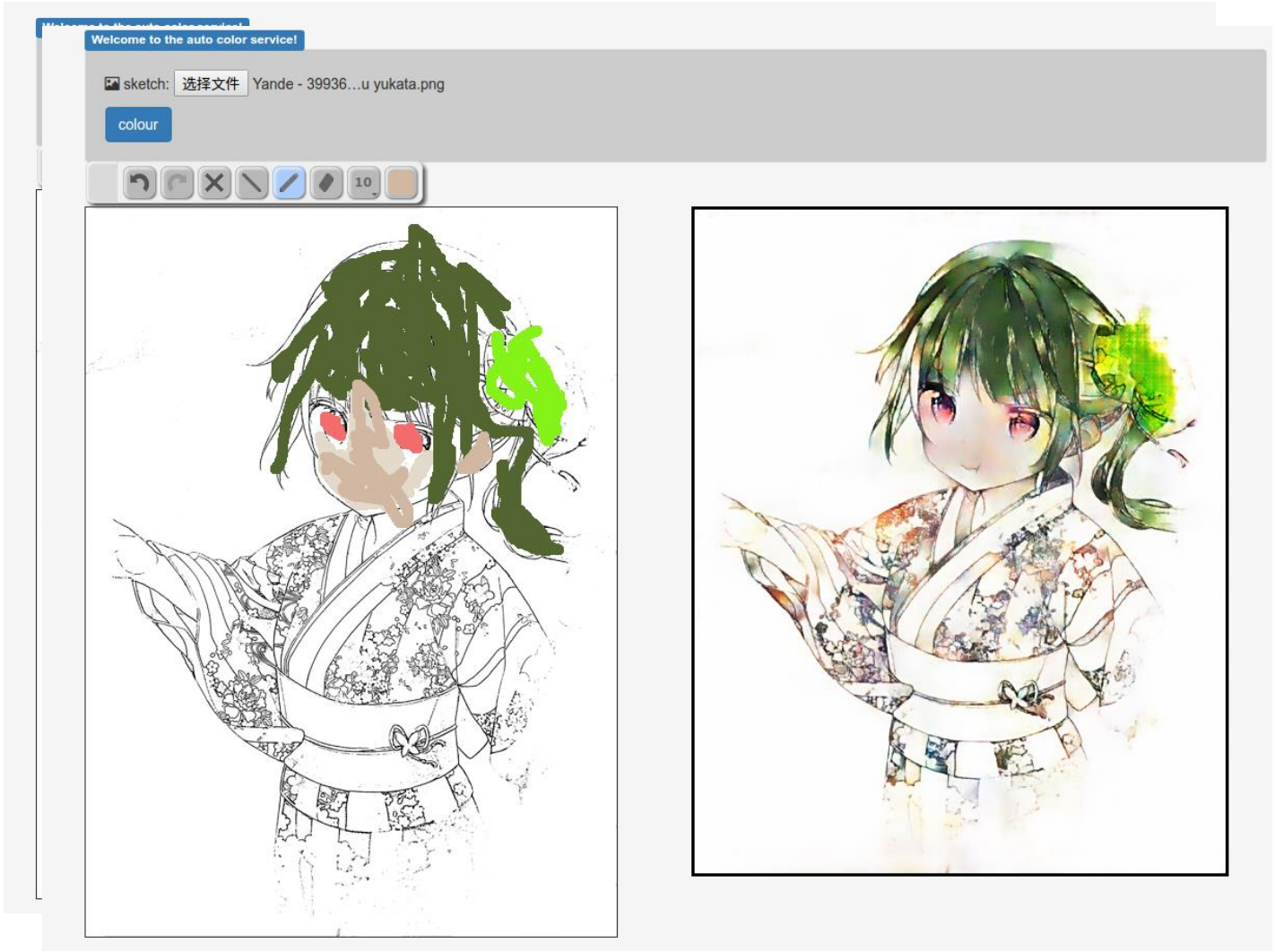
$$L_G$$
$$= E_{x \sim P_{sketch}}[\|D(G(x)) - 1\|_2]$$
$$+ E_{x \sim P_{sktch}, y \sim P_{paint}}[\|VGG16_{22}(G(x)) - VGG16_{22}(y)\|_2]$$

Sketches 2 Paints （White）

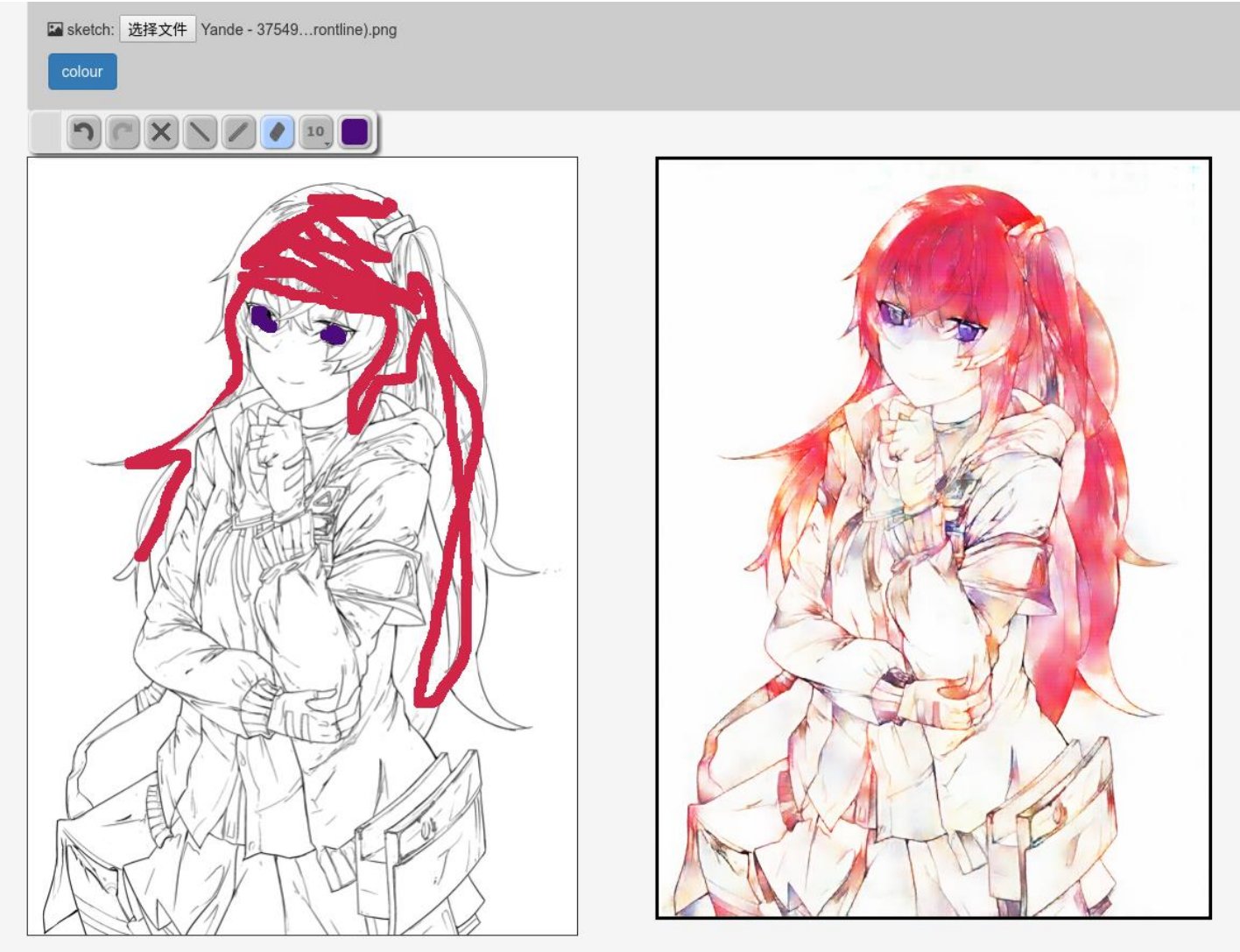
Sketches 2 Paints （Web interface）



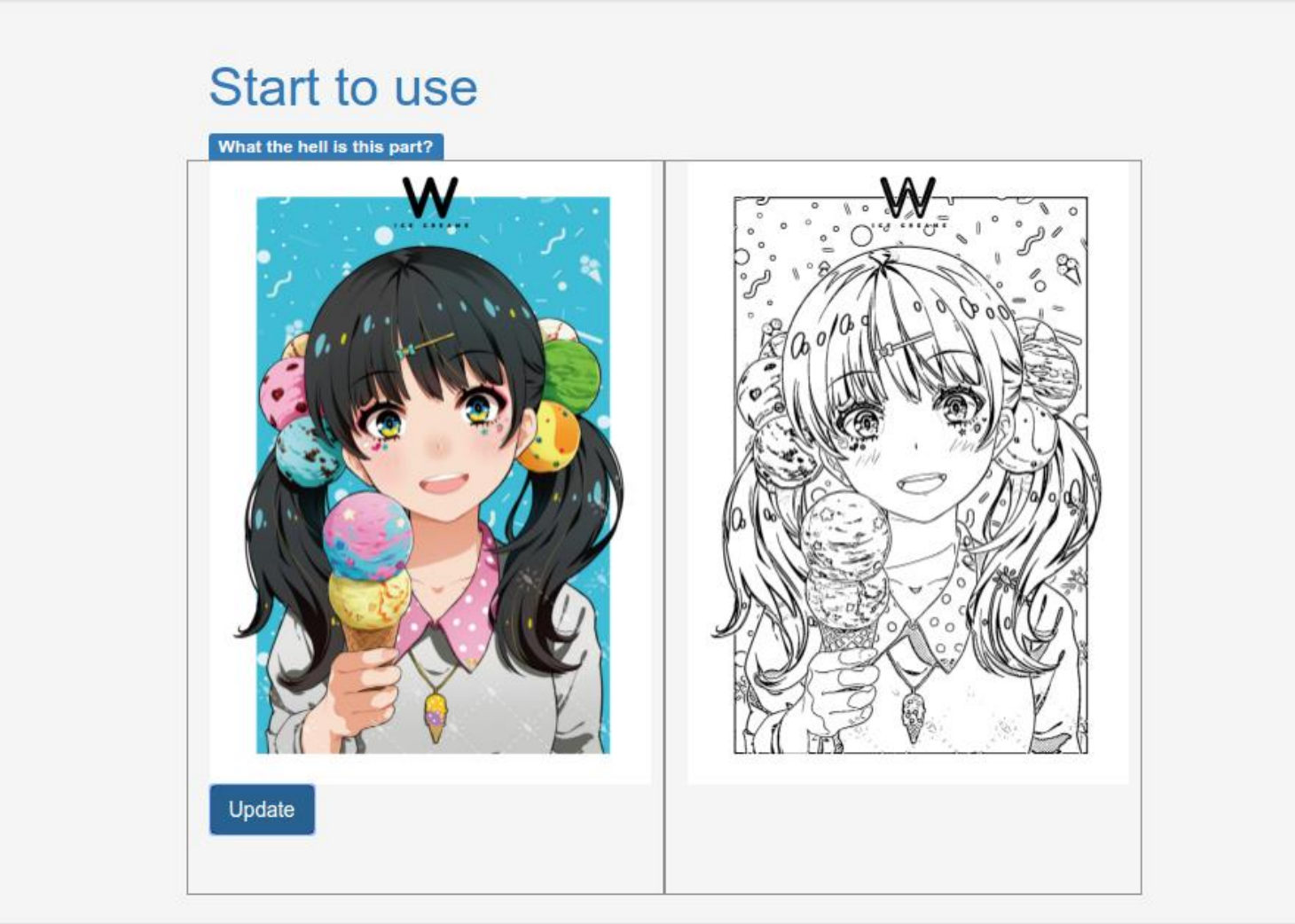
Sketches 2 Paints （Web interface）



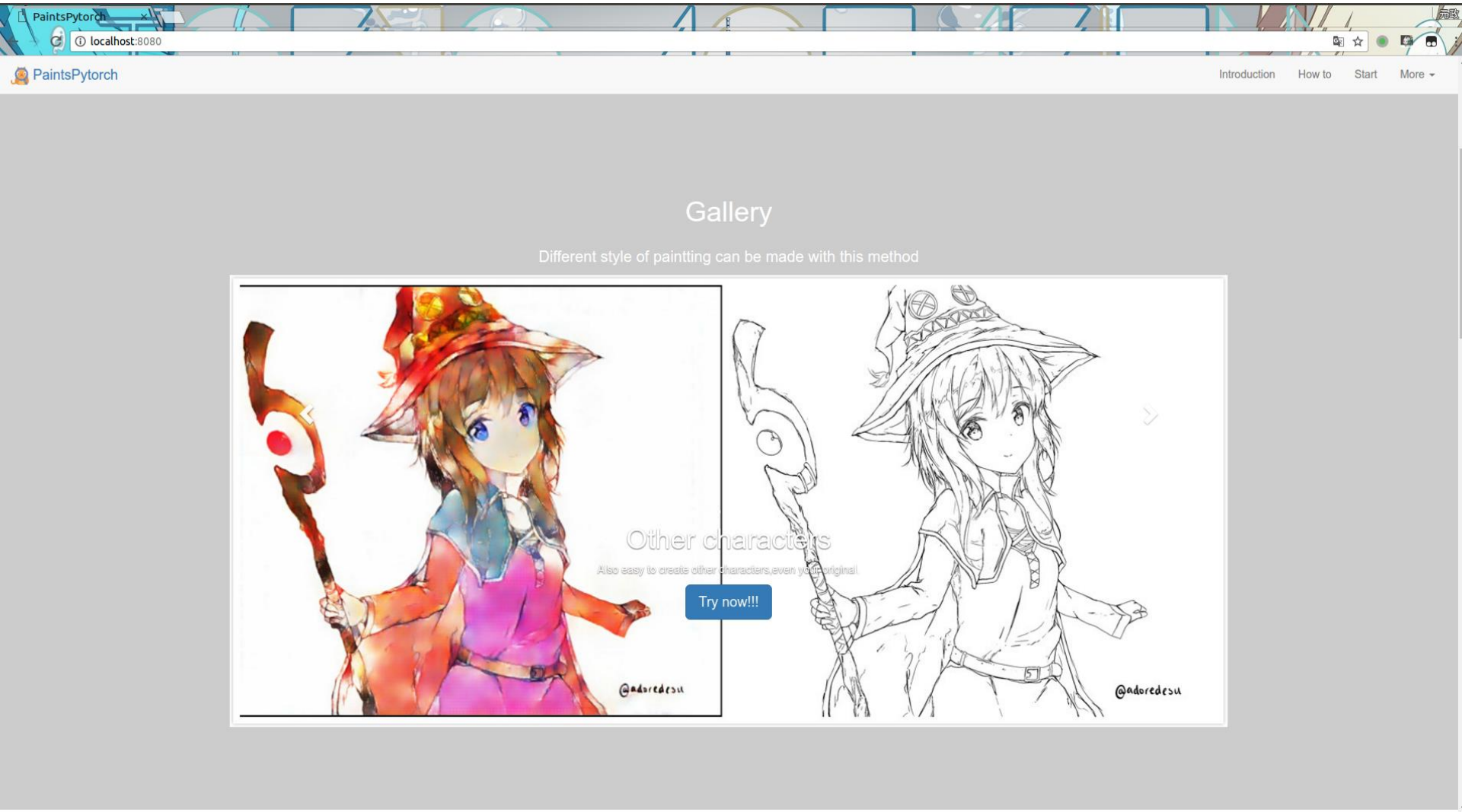
Sketches 2 Paints （Web interface）



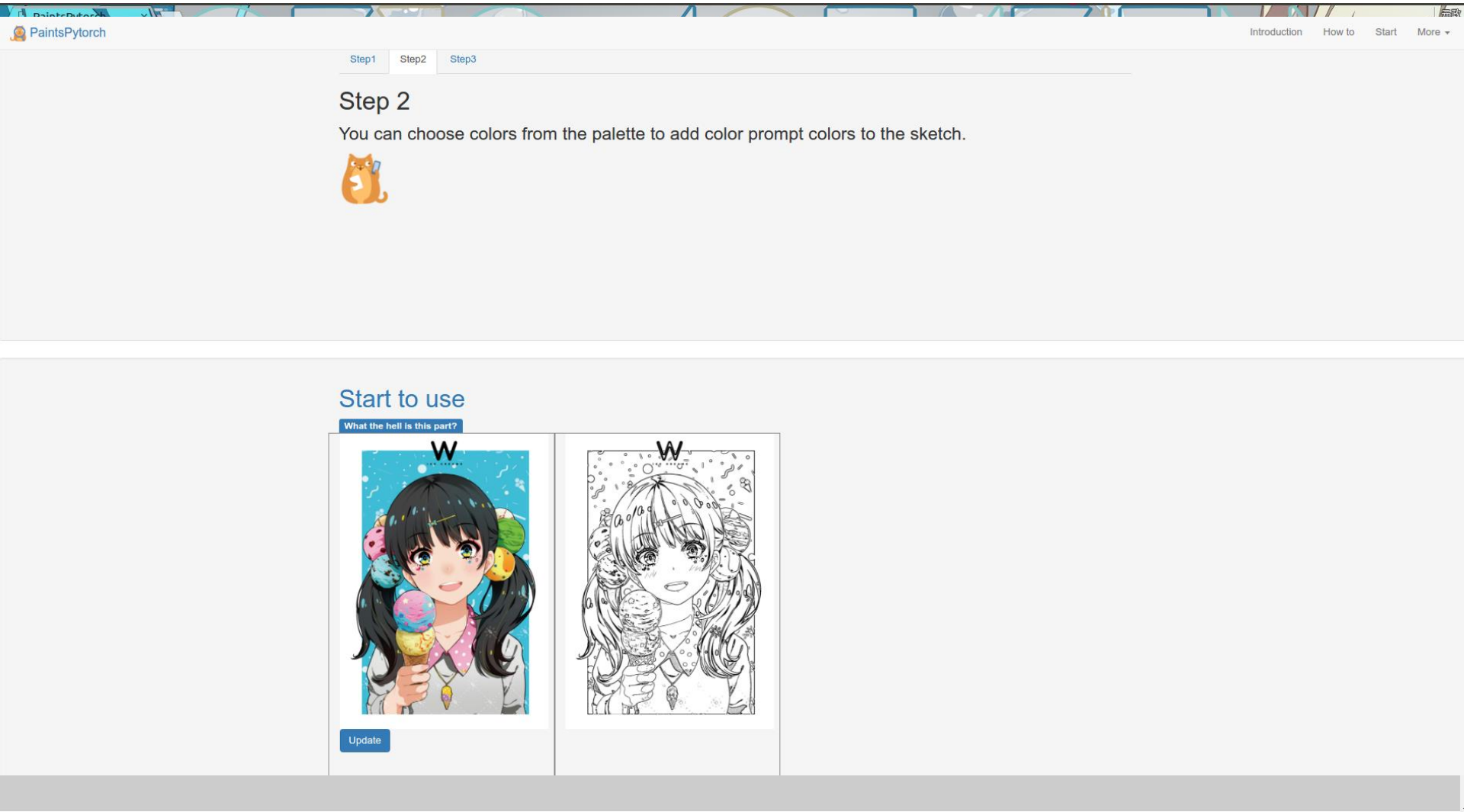
Paints 2 Sketches （Web interface）



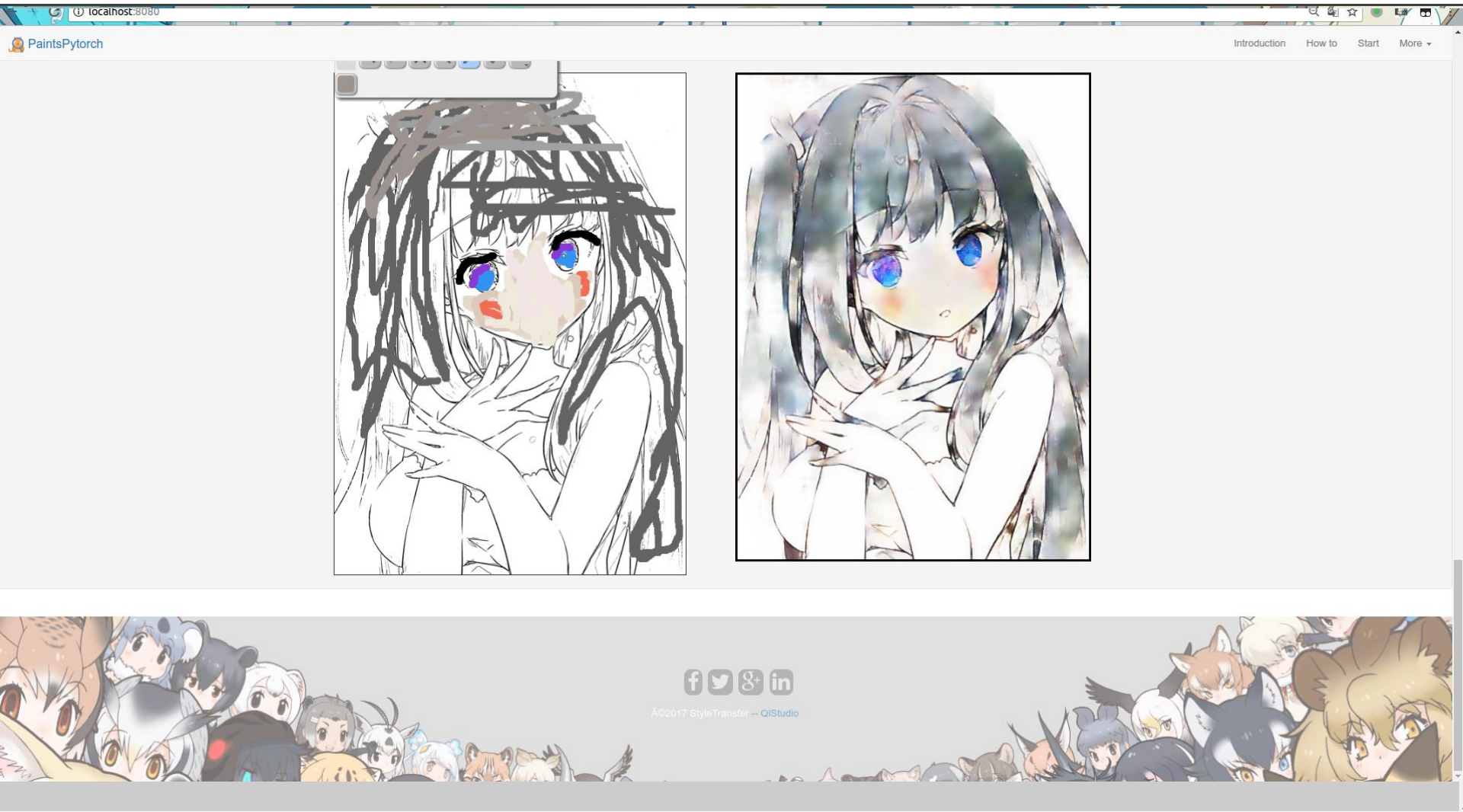
Web interface



Web interface



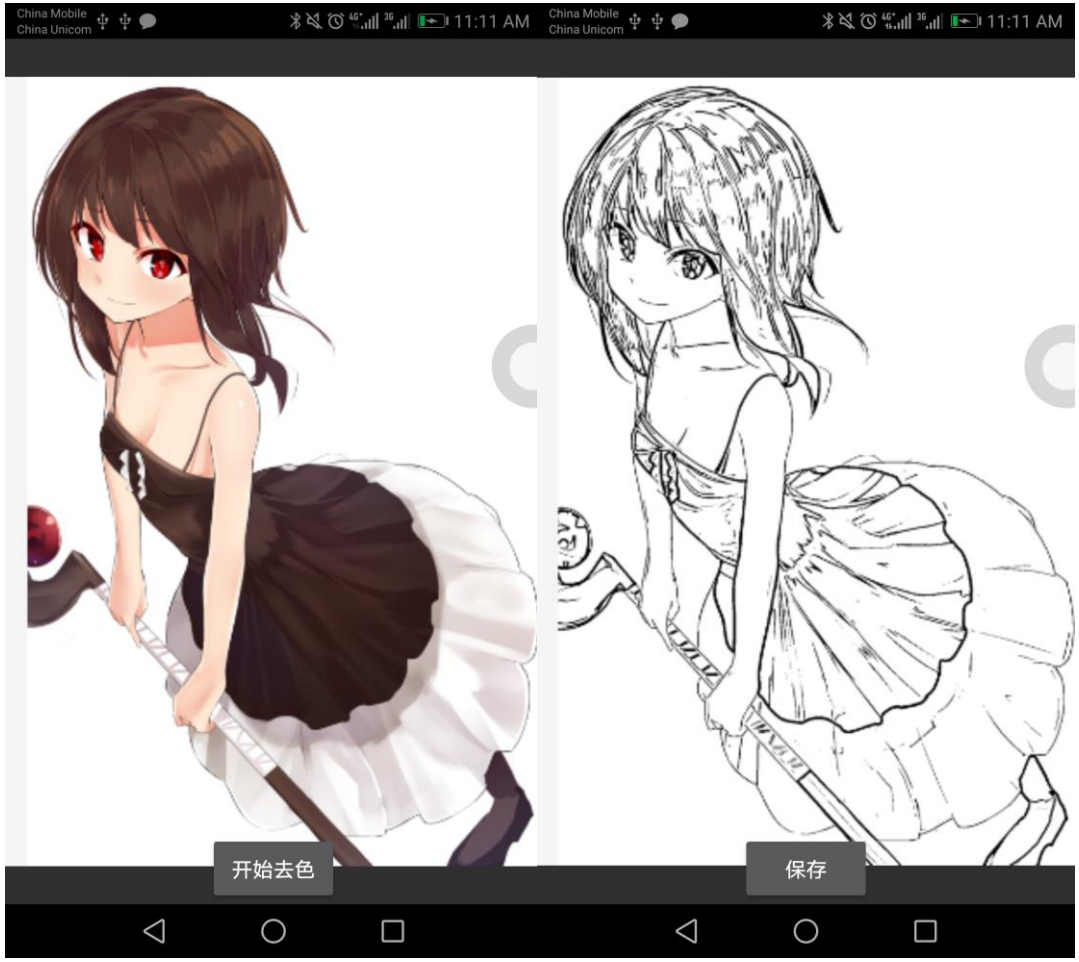
Web interface



Android interface

Android interface

Android interface



Architecture

XDoG：OpenCV、lime
Training Details：PyTorch，Visdom，1676 images random rotated、resized and corped（256*256），on NVIDIA TITAN X trained for 1day
Web/Android Backend：Spring+SpringMVC+Mybatis+Apache Tomcat
Web：Bootstrap+Ajax+wpaint
Android：Android Studio
IDE：PyCharm，Intellij Idea，WebStorm

Future Work

- Picture Prior
- Support higher resolution
- Enhance model
- Train longer with more data

Thank you!

Q&A