

StarGAN: the Advanced Appearance Simulator

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How would that hairstyle look on me?

- Yes, it is perfect!
- Not bad, but I thought it could be better.
- No!!! It is a disaster!!! I need to hide my hair for a while.

01 / Problem Description

We need an effective way to predict the hairstyle on us

- Copy & paste: the easiest solution (many mobile apps)
- Landmark detection: the mainstream solutions (Photoshop, Dlib library, ...)
- Generative adversarial network: the latest solution (GauGAN, StarGAN, ...)



Generative Adversarial Network (GAN)

- Two neural networks
 generator & discriminator
- Two neural networks do zero-sum games.
- The generator wins if it can cheat discriminator. Otherwise, the discriminator wins.
- Update both networks and continue the next round.

Conditional GAN

- The generator in GAN can generate any image
- The conditional GANs restrict the type of image to be generated

Image-to-image translation

- Transfer the input image into targeted domain image
- The neural networks use the output images to learn
- StarGAN introduces multi-domain imageto-image translation

Two training datasets for StarGAN

CelebA datasets

contains 202,599 face images of celebrities, each annotated with 40 binary attributes

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RafD datesets

consists of 4,824 images collected from 67 participants. Each participant makes eight facial expressions in three different gaze directions

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The implementation

Phase I: using CelebA datasets

- Multi-step translations to generate images with multiple attributes
- Change the argument of the selected feature and apply more attributes to train the discriminator

Phase II: including RafD datasets

- Split images into training & test data, the discriminator wins
- Crop all images to assure that all images are valid and display faces at the center

02 / APPROACH



The training results from CelebA dataset – part I

The selected attributes

- Black hair
- Blond hair
- Brown hair
- Male
- Young

03 / RESULTS



The training results from CelebA dataset – part II

The selected attributes

- Black hair
- Blond hair
- Brown hair
- Male
- Young

03 / RESULTS



Perceptual evaluation - StarGAN vs others

The diagram at left displays the perceptual evaluation for ranking different model on a single attribute

03/RESULTS



Lesson Learned

- GANs can achieve higher accuracy since it includes the advantages of CNNs and indirect training features
- Image-to-image translation engines can drastically affect the training results by comparing StarGAN with other GANs

Future Work

- Use StarGAN to generate more images with different facial features
- Integrate the RafD dataset to train images with more subtle expressions

Questions from Audience

