Sketch to Face Translation

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Can we generate realistic faces from drawn sketches?
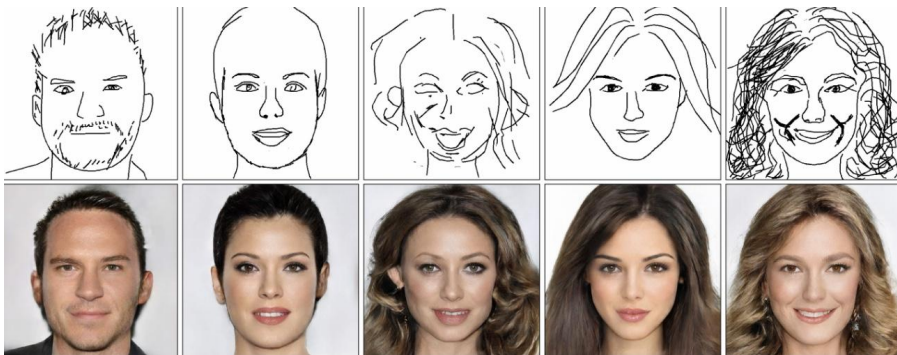
Problem Description

We aim to train a model capable of synthesizing realistic faces from outline sketches

- Can be used for rendering and animation tasks
- Useful to create new training data
- Useful for forensic purposes

State of the art | Related work

In past years GANs have had a lot of success in image translation tasks

DeepFaceDrawing (2020)

High-Resolution Image Synthesis and Semantic Manipulation with Conditional GANs (2018)
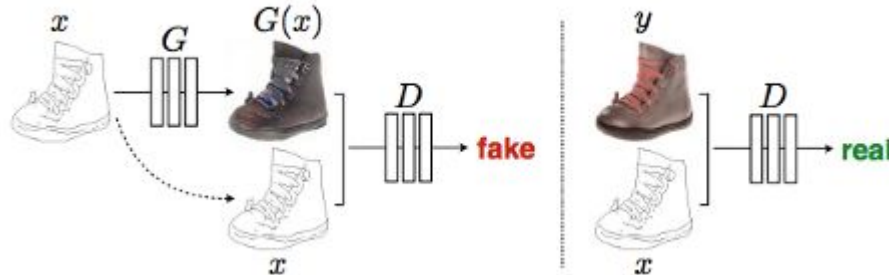
Approach: Algorithms to be investigated

We will be using datasets of facial images and accompanying outline images

We will explore different neural networks and Generative Adversarial Networks (GANs)

We will explore unsupervised and semi supervised approaches

Some models include:

- Conditional GANs
- CycleGan
- Scribbler (colors)

Team Roles

We will be using 3 different models for our project.

We will learn each model and what benefits/limitations each model has.

We plan to create our own model based by combining our research and different approaches together.

Evaluation

Evaluating the results of image synthesis models is still an open problem

Traditional metrics such as perpixel mean-squared error does not assess joint statistics of the result. Previous studies evaluate the visual quality of the results based on perceptual studies, which involves human experiments (i.e. We don't have the time or money for human observers)

We plan to rate the performance of our models using a qualitative metric called the FCN score metric, this involves pre-trained semantic classifiers.

We will score the results of a pre-trained classifier on our model outputs

$$G^* = \arg \min_G \max_D \mathcal{L}_{cGAN}(G, D) + \lambda \mathcal{L}_{L1}(G).$$

Final objective for conditional GAN combines L1 and adversarial loss

Timeline

Compile and process dataset, generate outline images from facial images

Deliverable 1: Create a conditional GAN model trained on paired images

Deliverable 2: Create a GAN model that takes in color as an input vector and Create a GAN model trained on unpaired images

Deliverable 3: Create our own model using what we learned

Timeline cont.

Week of 11/2:

~~-Download and compile dataset of facial images~~

~~Generate dataset of facial outlines to be used for model training~~

~~-Download weights for the model that will be used for FCN score~~

-Begin work on conditional GAN model

Week of 11/9:

-Continue work on conditional GAN model

-Identify the optimal architecture and hyperparameters of cGAN model

-Save weights of optimal model and record FCN score metrics

Week of 11/16:

-Begin work on scribbler based model

-Continue working on second model

-Experiment with approaches to train a network to add color

-Begin work on cycle consistent GAN model

Week of 11/23:

-Work on novice approach based on our previous testing

Week of 11/30:

-Finish working on our created model

-Prepare the deliverables, start working on presentation

-Finish evaluations of approach

-Work on documentation

Week of 12/7:

-Stop training of both generator and discriminator

-Complete documentation, presentation and demonstration

Presentation Day (12/15)

References

Phillip Isola, Jun-Yan Zhu, Tinghui Zhou, Alexei A. Efros "Image-to-Image Translation with Conditional Adversarial Networks" CVPR, 2017

Jun-Yan Zhu, Taesung Park, Phillip Isola, and Alexei A. Efros. "Unpaired Image-to-Image Translation using Cycle-Consistent Adversarial Networks", in IEEE International Conference on Computer Vision (ICCV), 2017.

Patsorn Sangkloy, Jingwan Lu, Chen Fang, Fisher Yu, James Hays "Scribbler: Controlling Deep Image Synthesis with Sketch and Color" CVPR 2017