Machine Learning HW6

ML TAs
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Outline

- Task Introduction
- Dataset
- Submission
- Grading
- Hints
- Links

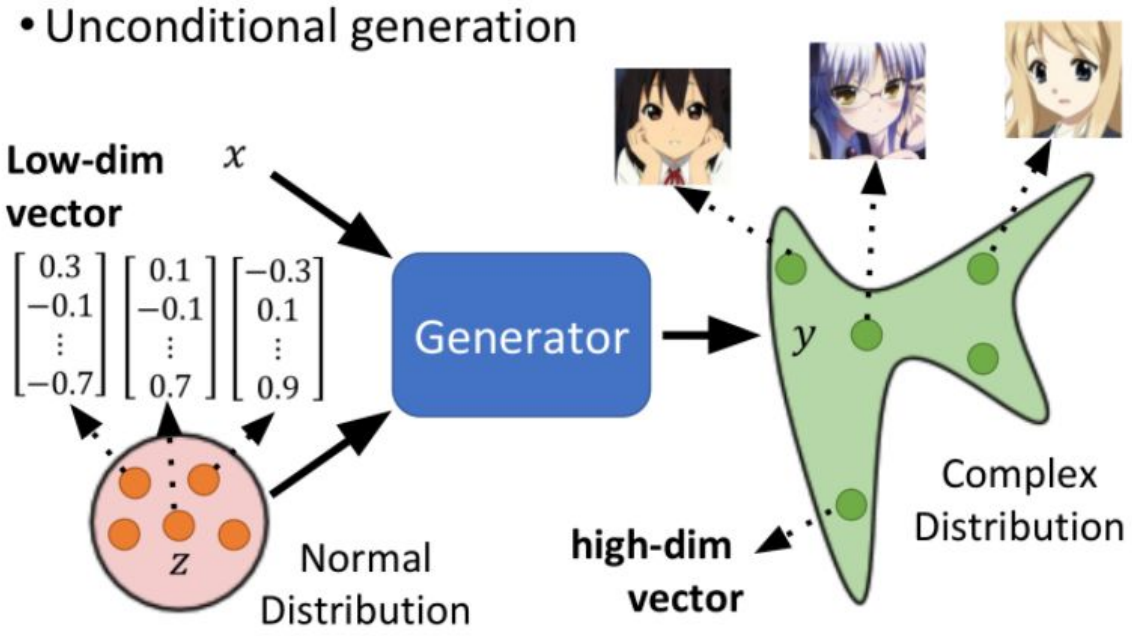
Task Introduction

Anime Face Generation

Generator

TODO

- Train your own anime face generator using **Generative Adversarial Networks**.

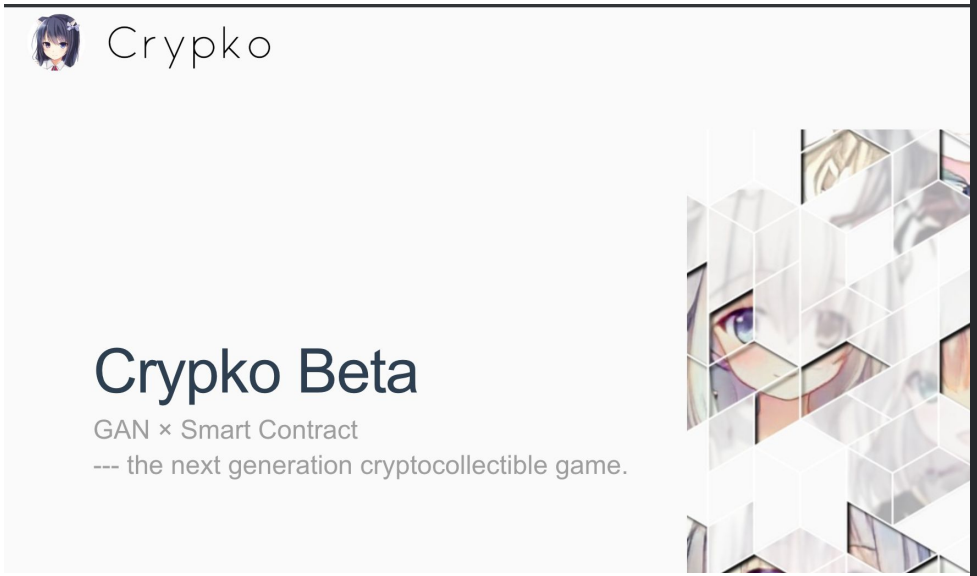


Dataset

Crypko

https://crypko.ai/#

Data Collections



Thanks to Arvin Liu for collecting this dataset.

Data Format

- The download link is in the sample code.
- Unzip **cripko_data.zip**, the data format is as below:
- faces/
  - 0.jpg
  - 1.jpg
  - ...
- Total 71314 .jpg files in a folder.
- DO NOT use any extra data and pretrained models.

Submission

JudgeBoi - Submission Format

- You should generate **1000 images**, and name each image **<number>.jpg**
  - e.g. **1.jpg, 2.jpg**, ... , **1000.jpg**
- Use **tar** to compress your images, and name the file with **.tgz** as extension.
  - e.g. **images.tgz**
- The untarred files should not contain the folder.
- The compressing code is provided in the sample code.
- To create such a compressed file by yourself, follow the 2 steps below:
  - cd <the folder containing your generated images>
  - tar -zcvf ../images.tgz *.jpg
- The folder containing your generated images should **only contain 1000 images**.

JudgeBoi

- **5 submission quota** per day, reset at midnight.
- Users not in whitelist will have no quota.
- Only ***.tgz** file is allowed, file size should be **smaller than 2MB**.
- The countdown timer on the homepage is for reference only.
- We do limit the number of connections and request rate for each ip. If you cannot access the website temporarily, please wait patiently.
- Please do not attempt to attack JudgeBoi, thank you.
- Every Wednesday and Saturday from 0:00 to 3:00 is our system maintenance time. If the website cannot be used during this time, please wait patiently for the completion of the maintenance.

NTU Cool

- Upload your code to NTU Cool.
  - TAs will check your code if necessary.
- If you beat the **boss baseline** in JudgeBoi, you may submit a report named **report.pdf** to explain the method you use to obtain the **extra 0.5 pt.**

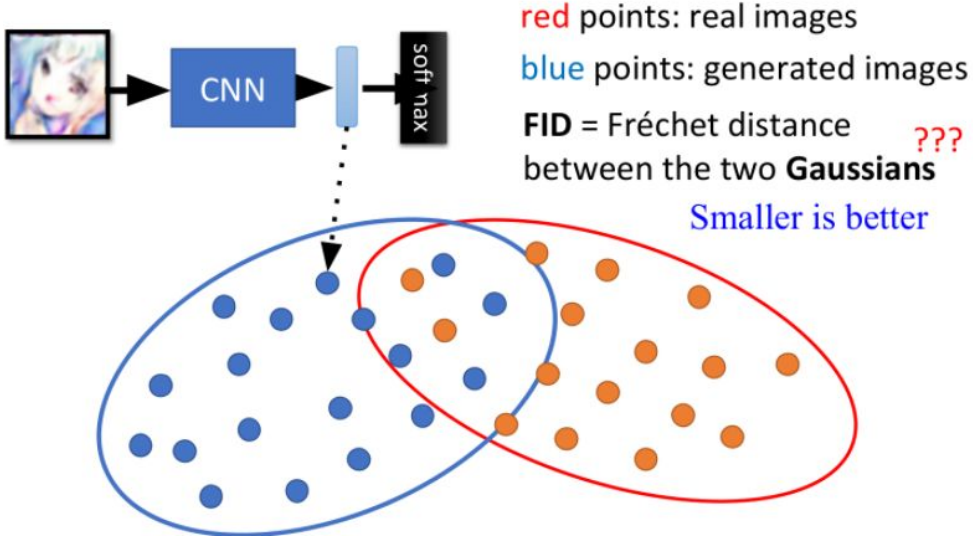
NTU Cool - Submission Format

- Zip your code and name the compressed file **<student_id>_hw6.zip**
  - e.g. **b06901234_hw6.zip**
- **Do not submit your model checkpoints and the dataset!!!**
- **Do not submit your generated images (images.tgz)!!!**
- We can only see your last submission before the deadline.

Grading

Evaluation Metrics

- FID (Frechet Inception Distance) score
  - We use the FID score as one of the evaluation metrics.
  - The FID score assesses the similarity between two datasets of images, which is **the lower the better** in this task.



Evaluation Metrics

- AFD (anime face detection) rate
  - To detect whether an anime face is in a given image.
  - The detection rate is **the higher the beter.**

Grading (10pt + 0.5pt)

- **Code** 4 pt
- **Simple Baseline** 2 pt
  - FID ≤ 30000 **AND** AFD ≥ 0.00
- **Medium Baseline** 2 pt
  - FID ≤ 11800 **AND** AFD ≥ 0.43
- **Strong Baseline** 1 pt
  - FID ≤ 9300 **AND** AFD ≥ 0.53
- **Boss Baseline** 1 pt
  - FID ≤ 8200 **AND** AFD ≥ 0.68
- **Bonus** 0.5 pt
  - Submit a PDF report to explain your method (< 100 words in English) if you beat the **Boss Baseline**.

Regulation

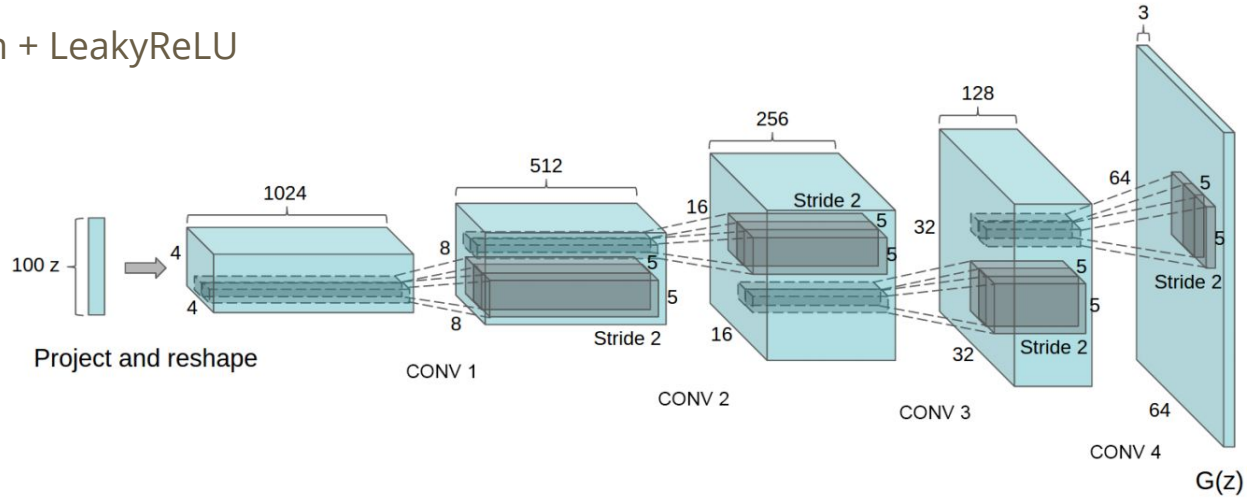
- You should NOT plagiarize, if you use any other resource, you should cite it in the reference. (*)
- You should NOT modify the generated images manually.
- Do NOT share codes or generated images with any living creatures.
- Do NOT use any approaches to submit your results more than **5 times** per day.
- Do NOT search or use additional data or pre-trained models.
- Your final grade x 0.9 if you violate any of the above rules.
- Prof. Lee & TAs preserve the rights to change the rules & grades.

(*) Academic Ethics Guidelines for Researchers by the Ministry of Science and Technology

Hints

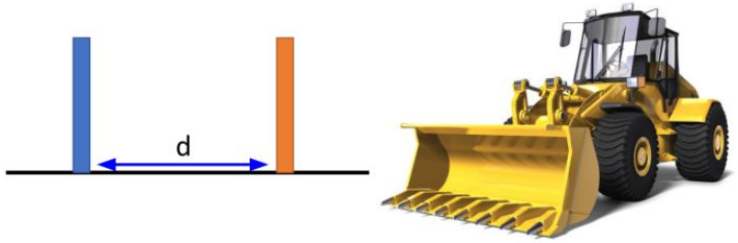
DCGAN (Sample code)

- Weight initialization
- Generator
  - ConvTranspose + BatchNorm + ReLU
- Discriminator
  - Conv + BatchNorm + LeakyReLU

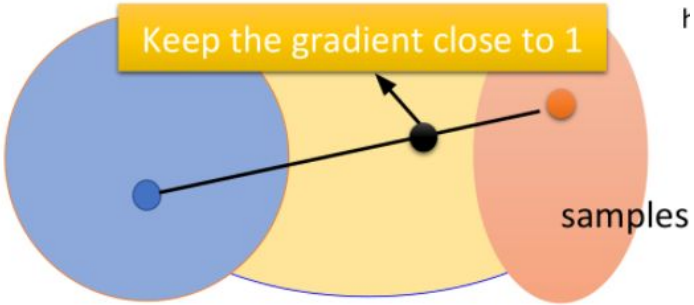


DCGAN

WGAN-GP



- Wasserstein GAN (WGAN)
  - Remove the last sigmoid layer from the discriminator.
  - Do not take the logarithm when calculating the loss.
  - Clip the weights of the discriminator to a constant.
  - Use RMSProp or SGD as the optimizer.
- Gradient penalty (GP)
  - Use gradient penalty instead of weight clipping.
  - Use Adam instead of RMSProp as the optimizer.



WGAN
WGAN-GP

Spectral Normalization GAN (SNGAN)

- Discriminator
  - Perform spectral normalization on the weights of each layer.

SNGAN

Baseline Guide

- Simple
  - Random submission
- Medium
  - DCGAN + WGAN (2~6 hr)
- Strong
  - DCGAN + SNGAN (2~6 hr)
- Boss
  - AutoGAN, BigGAN, Progressive GAN, Self-Attention GAN, StyleGAN, StyleGAN2
  - 6~16 hr

Links

Links

- Colab

Deadline

- JudgeBoi deadline 2021/05/14 23:59:59
- Code submission 2021/05/16 23:59:59
- Late submissions are **NOT** accepted.

Contact TAs

- NTU COOL (recommended)
  - https://cool.ntu.edu.tw/courses/4793
- Email
  - ntu-ml-2021spring-ta@googlegroups.com
  - The title **must** start with **[hw6]**
- TA hour
  - Each Friday in class