
Machine Learning HW6

ML TAs

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Outline

- Task Introduction
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- Submission
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Task Introduction

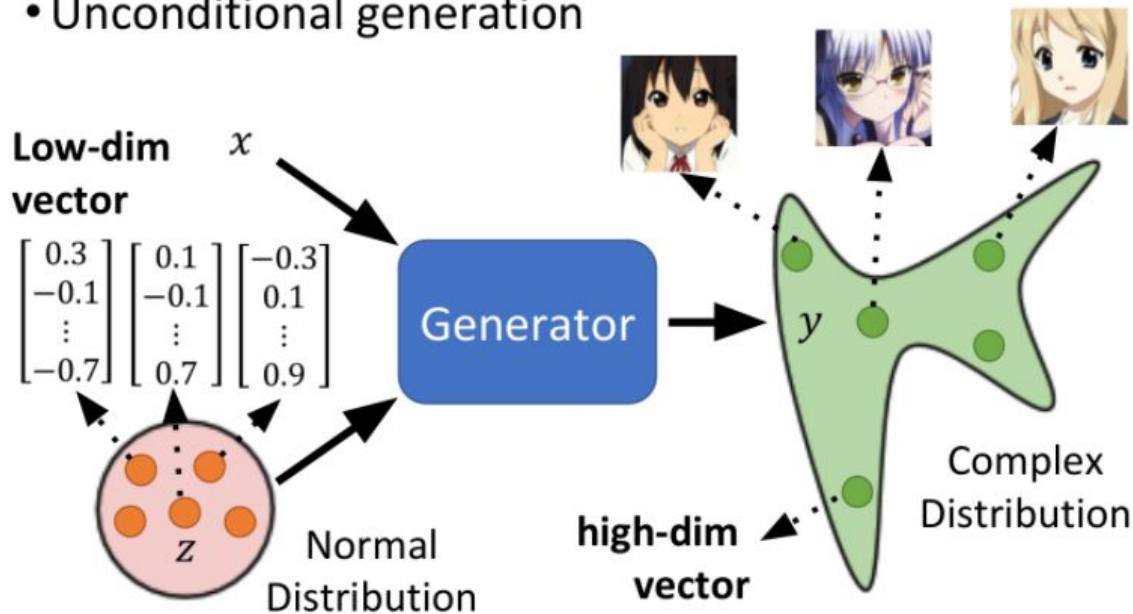
Anime Face Generation



TODO

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

- Unconditional generation



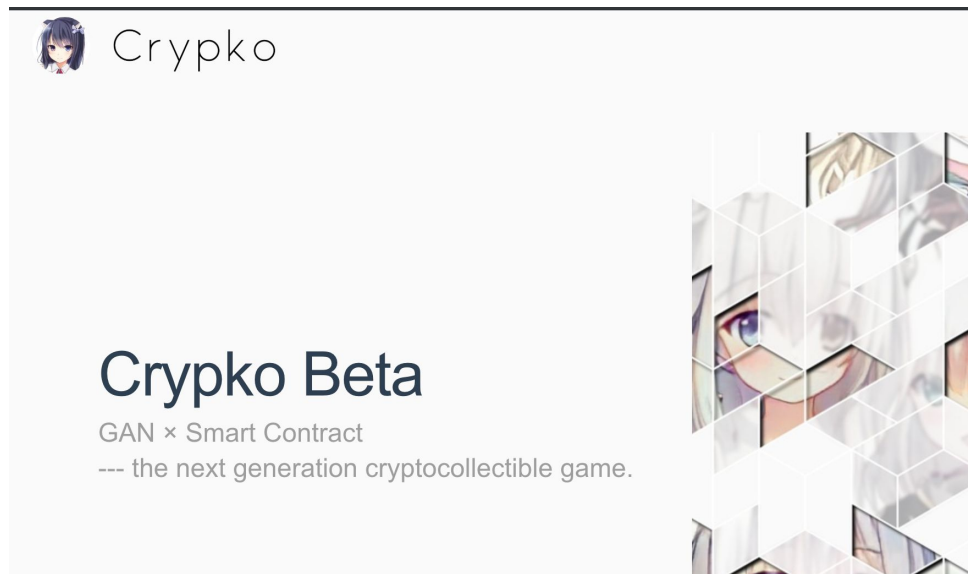
Dataset

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.

JudgeBoi

- Since the evaluation metric in this homework requires GPU computation, the JudgeBoi server cannot serve too many submissions at the same time.
- Under normal circumstances, JudgeBoi will complete the evaluation **within one minute**. If pending conditions are encountered, it may be longer. Please wait patiently after you submit.
- However, if you have **waited more than two minutes** for the progress bar to finish, please **refresh the page and try to upload again**.
- ~~Please **DO NOT** upload at the last minute~~; no one knows if you can upload successfully.

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.**

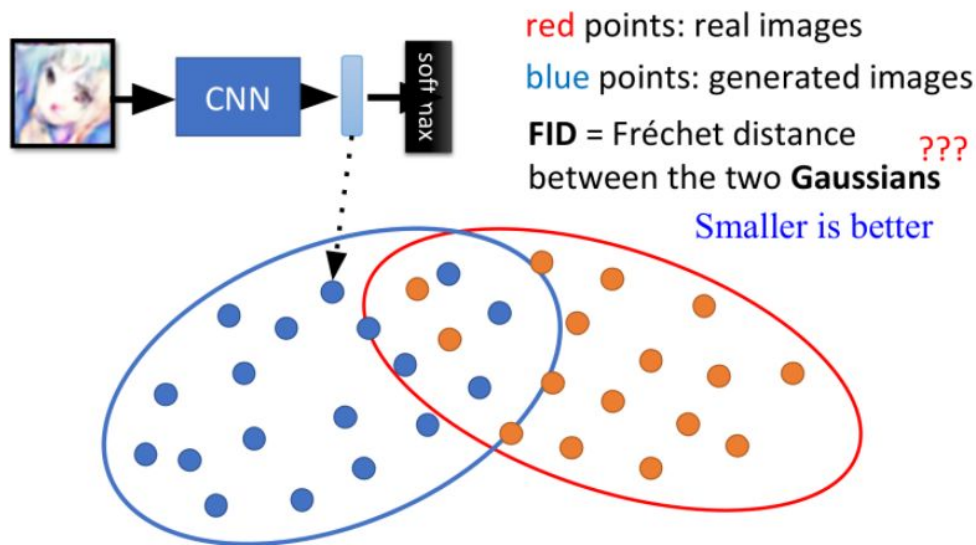
NTU Cool - Submission Format

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

Regulation

- Do **NOT** submit the training data to JudgeBoi directly.
- Data Augmentation (shifting, flipping, ...,etc.) on training data is allowed, while it is **forbidden** to submit these processed images to JudgeBoi.

Regulation (cont'd)

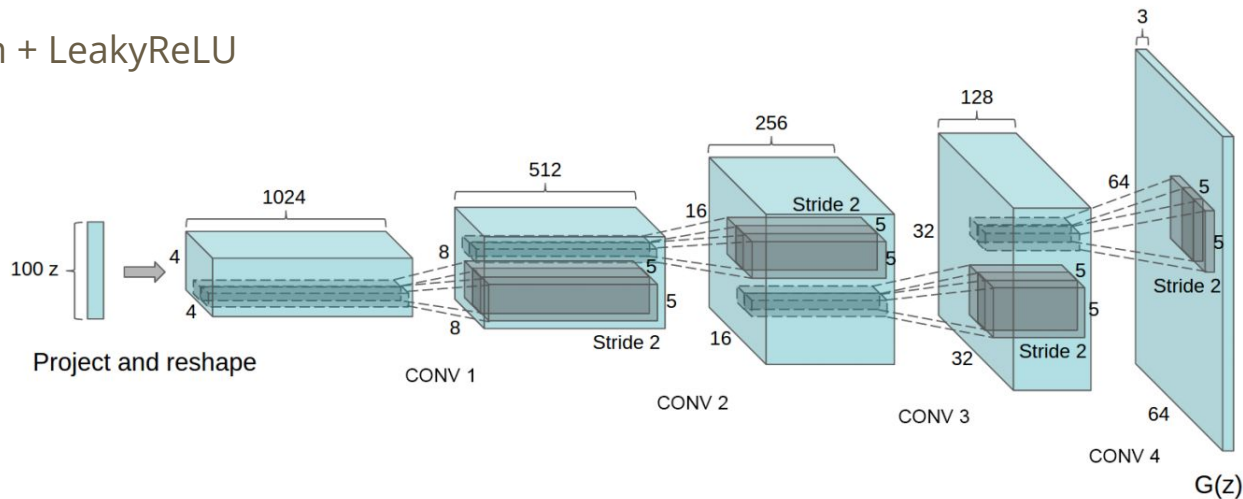
- You should NOT plagiarize, if you use any other resource, you should cite it in the reference. (*)
- You should NOT modify the generated images manually.
- Do NOT share codes or generated images with any living creatures.
- Do NOT use any approaches to submit your results more than **5 times** per day.
- Do NOT search or use additional data or pre-trained models.
- Your final grade $\times 0.9$ 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

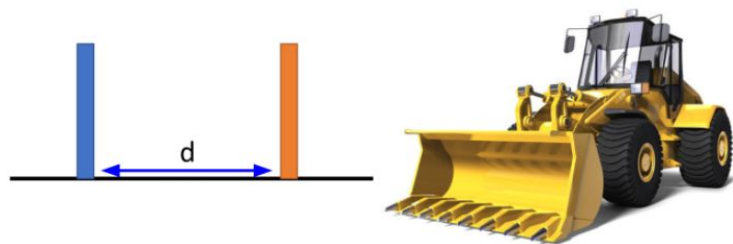
DCGAN (Sample code)

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



DCGAN

WGAN-GP

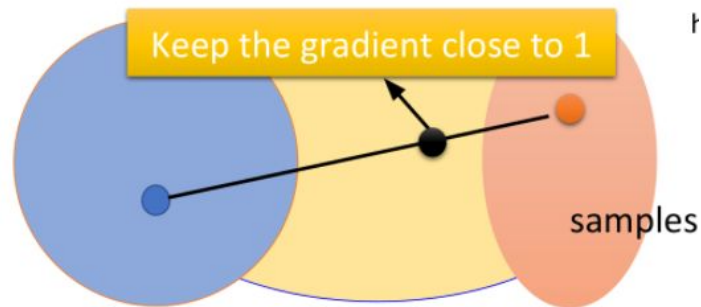


- Wasserstein GAN (WGAN)

- 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.

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