Machine Learning HW6

ML TAs
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Outline

- Task Introduction
- Dataset
- Submission
- Grading
- Hints
- Links
Task Introduction
Anime Face Generation
TODO

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

https://crypko.ai/#
Data Collections

Crypko Beta
GAN × Smart Contract
--- the next generation cryptocollectible game.

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.
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**.
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.
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 (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 better**.
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

- 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 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.
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