Machine Learning HW6

ML TAs
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Outline

1. Task introduction
2. Dataset & Submit format
3. Submission & Grading
4. Useful information

Task introduction

Task introduction - Diffusion Model

1. Project some random variables into specific space
2. Diffusion Process: forward process and reverse process

Reverse: Denoising

Forward: Adding noise

Image Source:
https://arxiv.org/abs/2006.11239

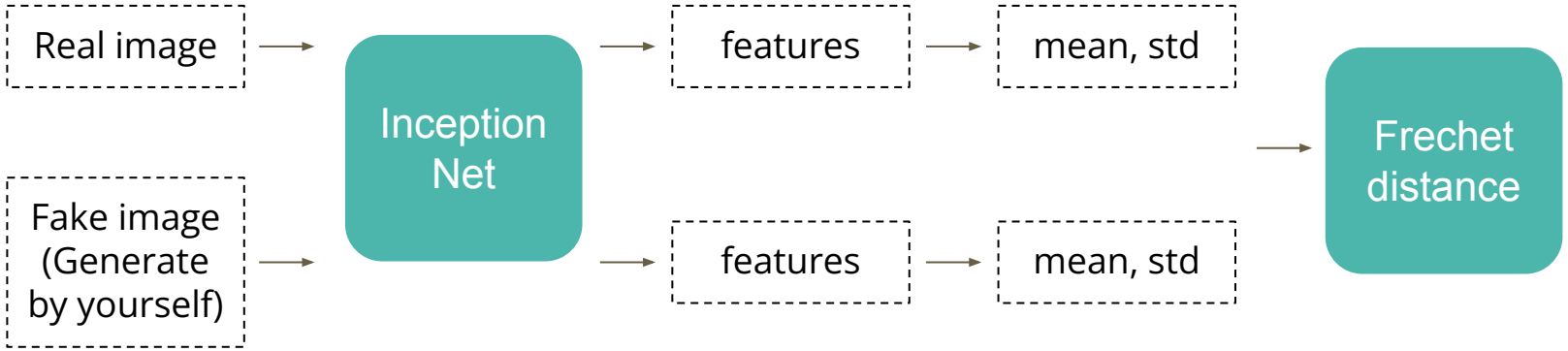
Task introduction - Anime face generation

1. Input: random number
2. Output: Anime face
3. Implementation requirement: Diffusion Model
4. Target: generate 1000 anime face images

Task introduction - Evaluation metrics

FID (Frechet Inception Distance) score

1. Use another model to create features for real and fake images
2. Calculate the Frechet distance between distribution of two features



Task introduction - Evaluation metrics

AFD (Anime face detection) rate

1. To detect how many anime faces in your submission
2. The higher, the better

Dataset & Summit format

Dataset & Submit format

Crypko

1. Website which can generate anime face by yourself
2. Thanks Arvin Liu for collecting the dataset
3. [Website Link]

Dataset & Submit format

Crypko

1. Dataset link is in the colab
2. Dataset format
3. There are 71,314 pictures in the folder
4. You can use additional data to increase the performance*

```
faces
 |
 |__0.jpg
 |__1.jpg
 |__2.jpg
 ...
```

*If you use additional data, please keep the relevant data and we reserve the right to verify additional data.

Submission & Grading

Submission & Grading

1. You should generate **1000** images, and name each image **<number>**.jpg
   a. e.g. 1.jpg, 2.jpg, ... , 1000.jpg
2. Use **tar** to compress your images, and name the file with **.tgz** as extension.
3. The untarred files should not contain the folder.
4. The compressing code is provided in the sample code.
5. Sample script:

   cd <the images folder> && tar -zcvf ../images.tgz *.jpg

6. The folder containing your generated images **should only contain 1000 images.**

Submission & Grading - JudgeBoi Rules (1/2)

- We do limit the number of connections and request rate for each IP.
  - If you cannot access the website temporarily, please wait a moment.
- The system can be very busy as the deadline approaches.
  - If this prevents uploads, we do not offer additional submission opportunities.
- Please do not attempt to attack JudgeBoi.
- Every **Saturday** from **6:00 to 9:00** is our system maintenance time.
- For any JudgeBoi issues, please post on NTUCOOL discussion.
  - Discussion Link: https://cool.ntu.edu.tw/courses/24108/discussion_topics/182915

Submission & Grading - JudgeBoi Rules (2/2)

- 5 submission quota per day, reset at **midnight**.
  - Guest users have no quota.
- Only *.tgz file is allowed, file size should be smaller than **2MB**.
- **Please DO NOT directly upload the anime pictures from internet**

Submission & Grading

- Leaderboard: JudgeBoi (4%)
- Code submission: NTU COOL (2%)
- Report submission: Gradescope (4%)

Submission & Grading - Leaderboard

Score	Name	FID score	AFD rate
1%	Simple baseline	FID ≤ 30000	AFD ≥ 0
1%	Medium baseline	FID ≤ 12000	AFD ≥ 0.4
1%	Strong baseline	FID ≤ 10000	AFD ≥ 0.5
1%	Boss baseline	FID ≤ 9000	AFD ≥ 0.6

Deadline: 2023/4/21 23:59

Submission & Grading - Leaderboard

Baseline	Suggestion	Estimated time
Simple baseline	Just Run Sample Code	1hr
Medium baseline	data augmentation, More Timestep	3hr
Strong baseline	Model Arch, Variance Scheduler	6hr
Boss baseline	styleGAN	8hr

Submission & Grading - NTU COOL

1. Compress the code, and submit to NTU COOL, the format is show below

   Ex: <student_id>_hw6.zip

2. Only submit the code you use, do not submit other files (model ,data...)
3. Deadline: 2023/4/21 23:59

Submission & Grading - Gradescope

Report questions:

1. Sample **5** images and show the progressive generation. Then, briefly describe their differences in different time steps.

2. Canonical diffusion model (DDPM) is slow during inference, Denoising Diffusion Implicit Model (DDIM) is at least 10 times faster than DDPM during inference, and preserve the qualities.

   Please describe the differences of training, inference process, and the generated images of the two models respectively. Briefly explain why DDIM is faster.

Gradescope – Question 1

Sample **5** images and show the progressive generation. Then, briefly describe their differences in different time steps.

https://arxiv.org/abs/2006.11239

Gradescope – Question 2

Canonical diffusion model (DDPM) is slow during inference, Denoising Diffusion Implicit Model (DDIM) is at least 10 times faster than DDPM during inference, and preserve the qualities.

Please describe the differences of training, inference process, and the generated images of the two models respectively. Briefly explain why DDIM is faster.

Submission & Grading - Gradescope

Report submission:

1. Submit the files on gradescope
2. Deadline: 2023/4/21 23:59

Regulations

- You should **NOT** plagiarize, if you use any other resource, you should cite it in the reference.(*)
- You should **NOT** modify your prediction files manually.
- Do **NOT** share codes or prediction files with any living creatures.
- Do **NOT** use any approaches to submit your results more than 5 times a day. Do **NOT** use pre-trained models.
- Your assignment will not be graded and 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 (MOST)

Notice

助教們會優先回答NTU Cool討論區上的問題，如果同學的問題不涉及作業答案或隱私，請同學們善用NTU Cool討論區。若真的需要私下詢問助教，再以信件開頭[hw6]寄到助教信箱。

Useful Links

- Course Website
- NTU COOL
- JudgeBoi
- Gradescope
- sample_code

Deadline

- Leaderboard: JudgeBoi
  - 2023/04/21 23:59 (UTC+8)
- Code submission: NTU COOL
  - 2023/04/21 23:59 (UTC+8)
- Report submission: Gradescope
  - 2023/04/21 23:59 (UTC+8)

Useful information

Link

秘密武器