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# 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

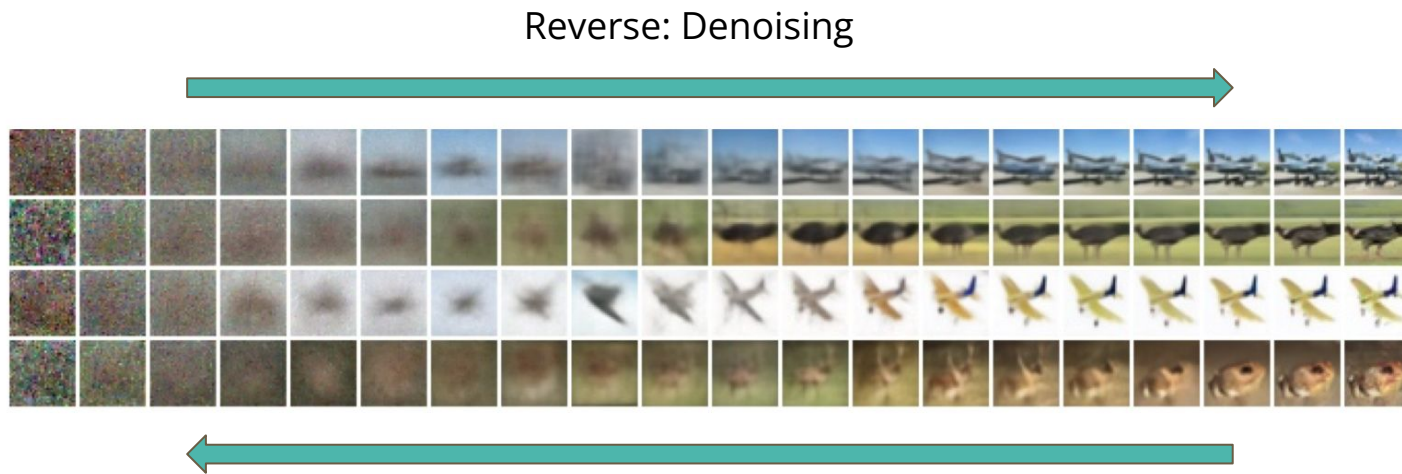


Image Source:  
<https://arxiv.org/abs/2006.11239> 4

# Task introduction - Anime face generation

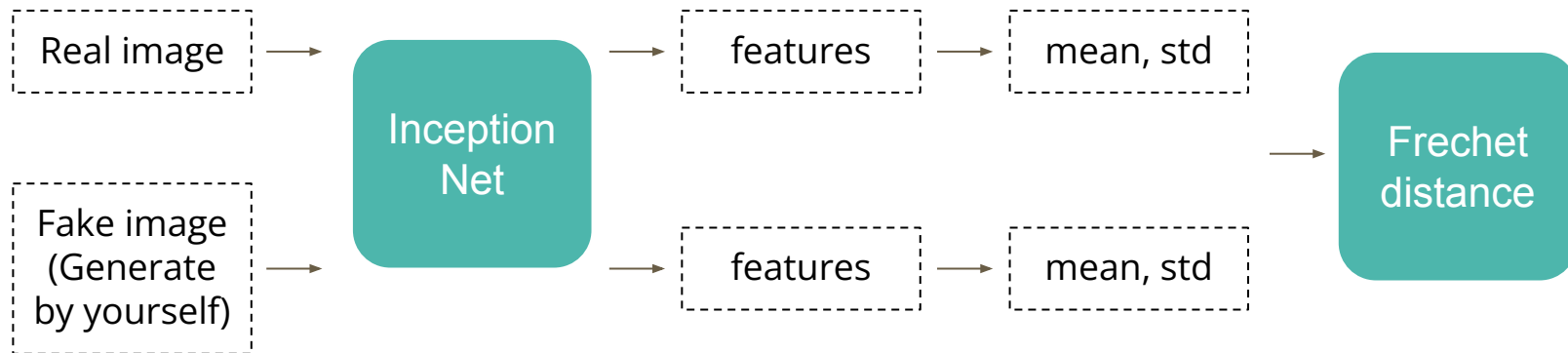
1. Input: random number
2. Output: Anime face
3. Implementation requirement: Diffusion Model
4. Target: generate 1000 anime face images



# 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

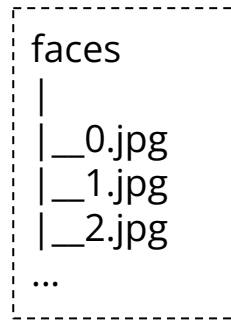
1. Website which can generate anime face by yourself
2. Thanks Arvin Liu for collecting the dataset
3. [Website Link](#)



# 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\*



# 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](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 | $\text{FID} \leq 30000$ | $\text{AFD} \geq 0$   |
| 1%    | Medium baseline | $\text{FID} \leq 12000$ | $\text{AFD} \geq 0.4$ |
| 1%    | Strong baseline | $\text{FID} \leq 10000$ | $\text{AFD} \geq 0.5$ |
| 1%    | Boss baseline   | $\text{FID} \leq 9000$  | $\text{AFD} \geq 0.6$ |

**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

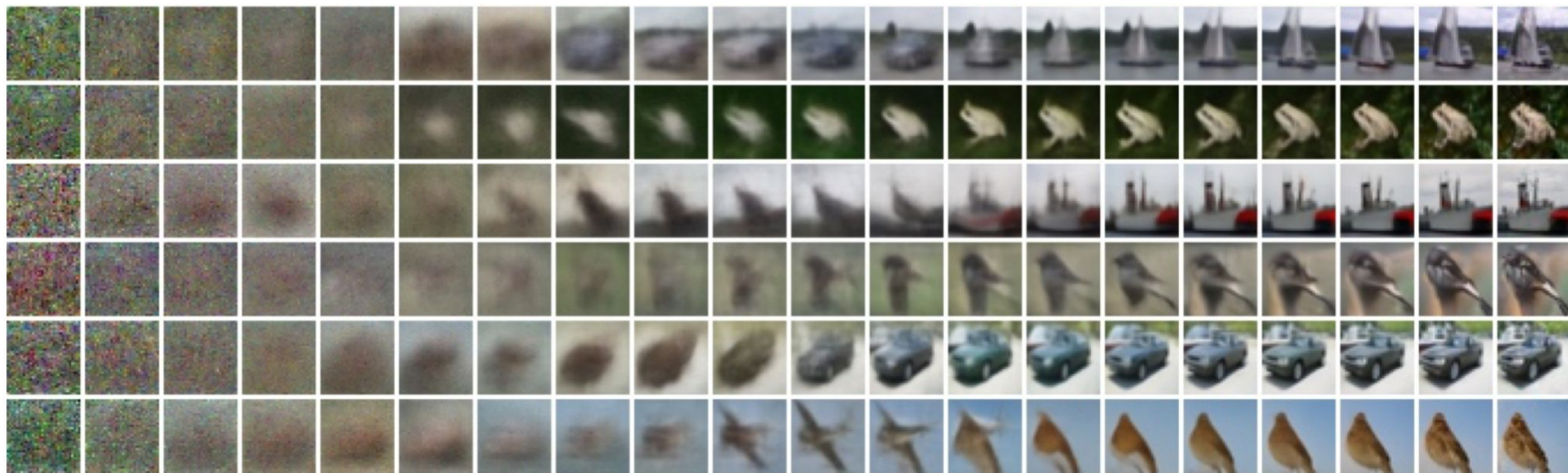
Report questions:

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.



## 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