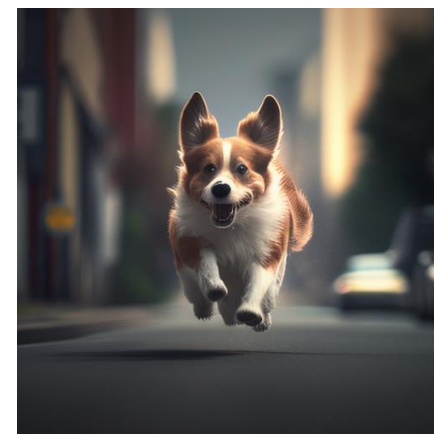




速覽圖像生成模型

圖像生成

一隻在奔跑的狗
千言萬語的一部分



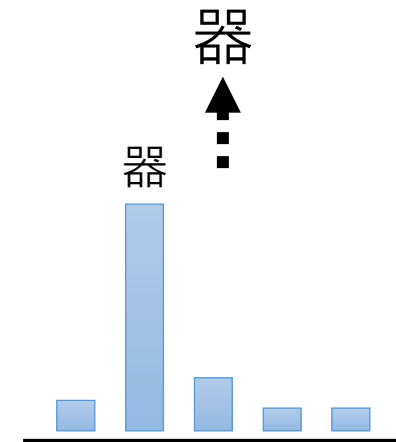
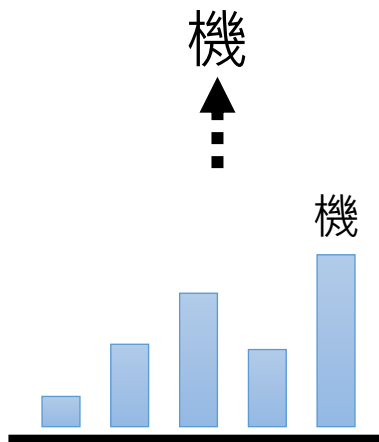
一張圖勝過千言萬語

... 一隻在街道上奔跑的柯基狗 ...

機器需要大量腦補

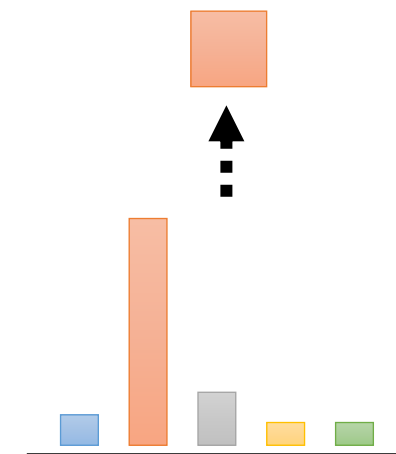
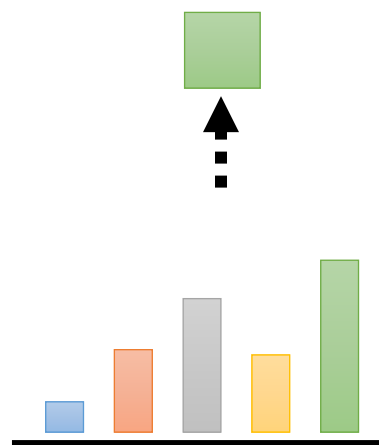
文字生成多採取 Autoregressive (各個擊破)

機器學習是甚麼？



影像生成好像也可以用同樣的道理

一隻在奔跑的狗



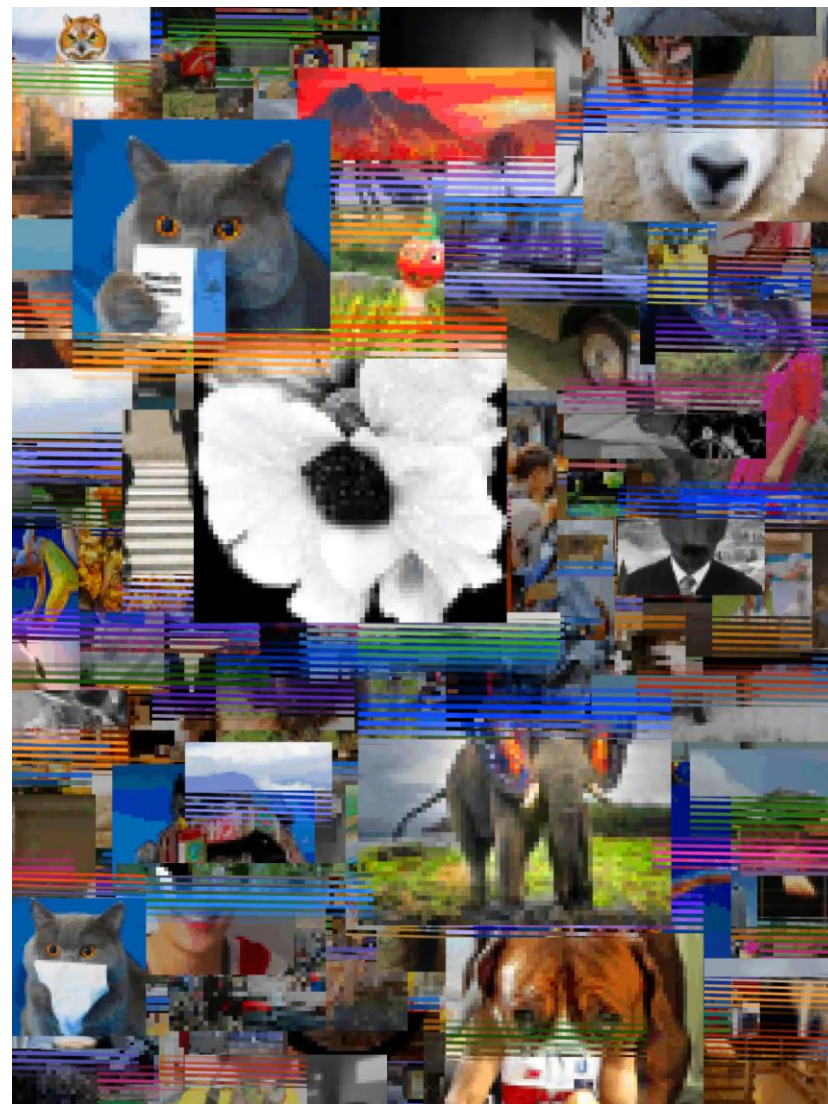
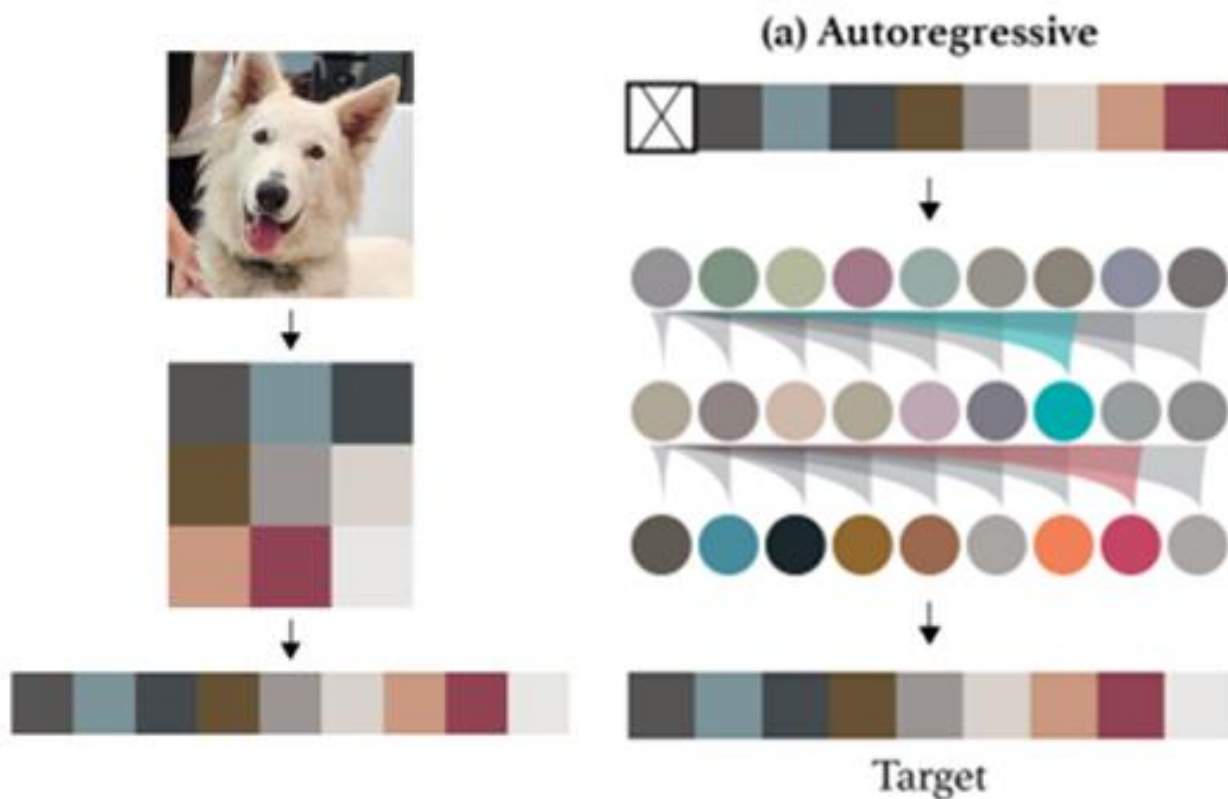
256 x 256 images → 65536 pixels

影像也可以採取 Autoregressive (各個擊破)

<https://openai.com/blog/image-gpt/>

raster order

影像版 GPT

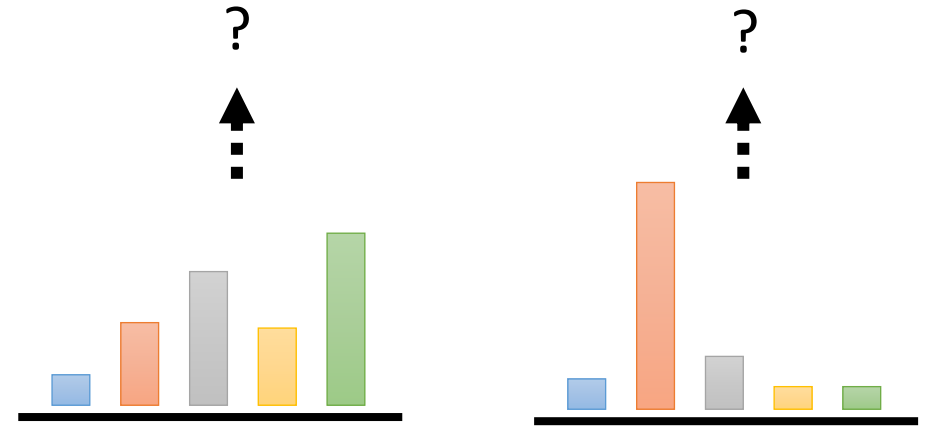


一次到位有甚麼問題

一隻在奔跑的狗

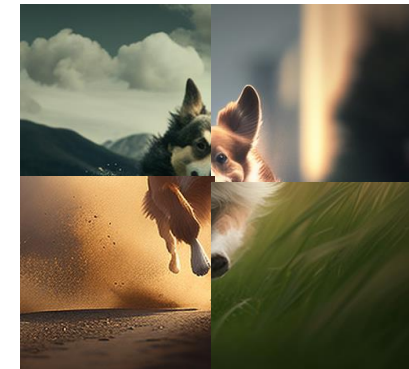
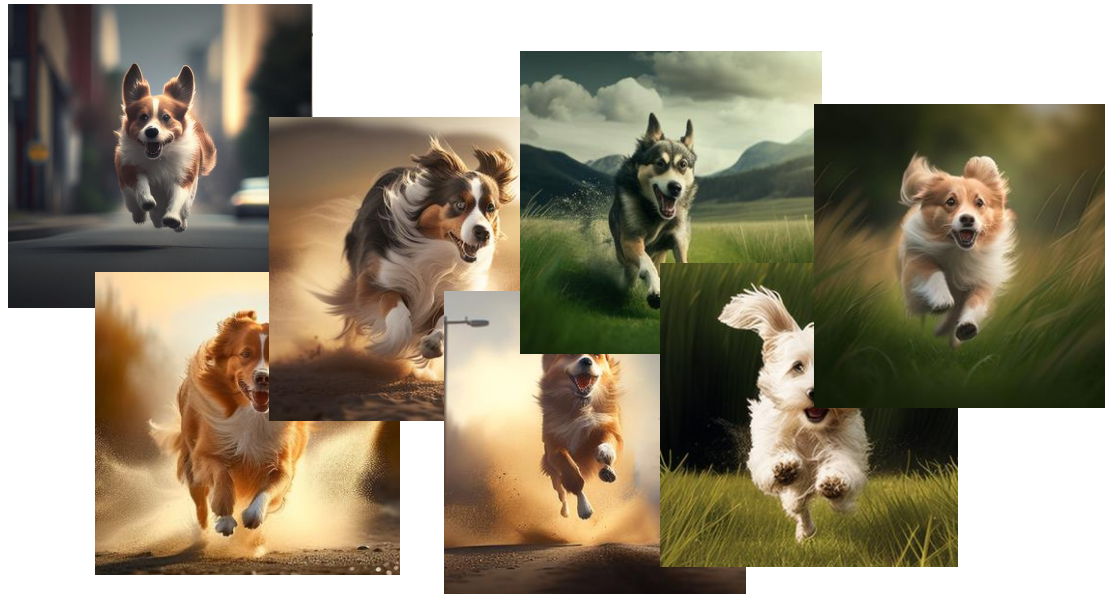


影像生成



256 x 256 images → 65536 pixels

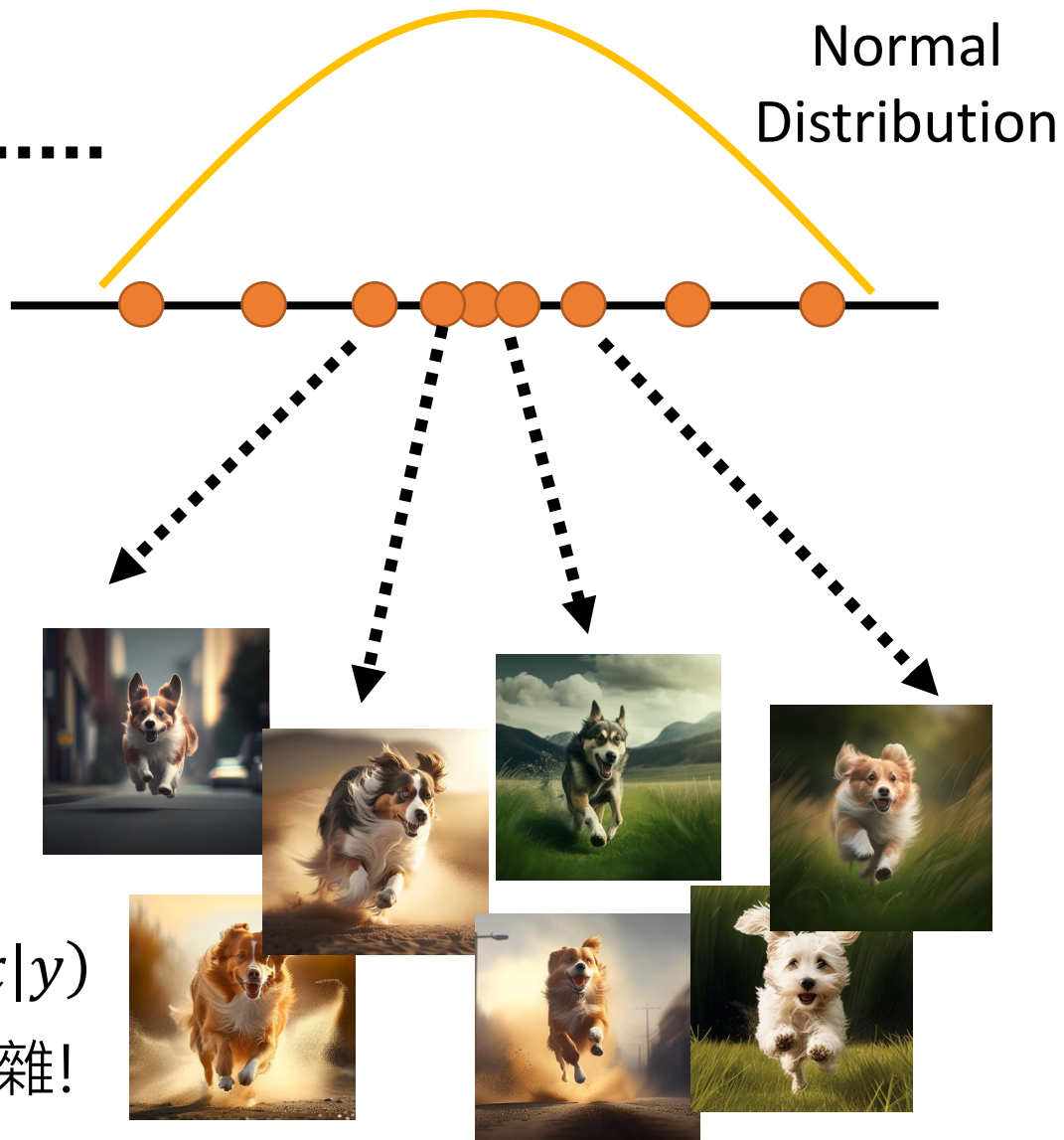
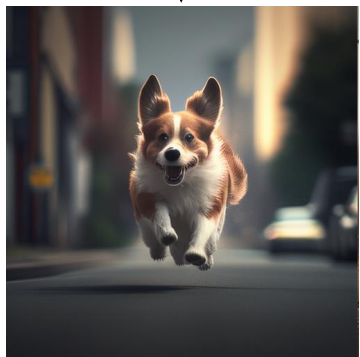
每一個像素獨立繪製



一隻在奔跑的狗

影像生成

y : 文字
 x : 影像



影像常用生成模型速覽

以下說明都非常簡略
詳細內容請見參考資料

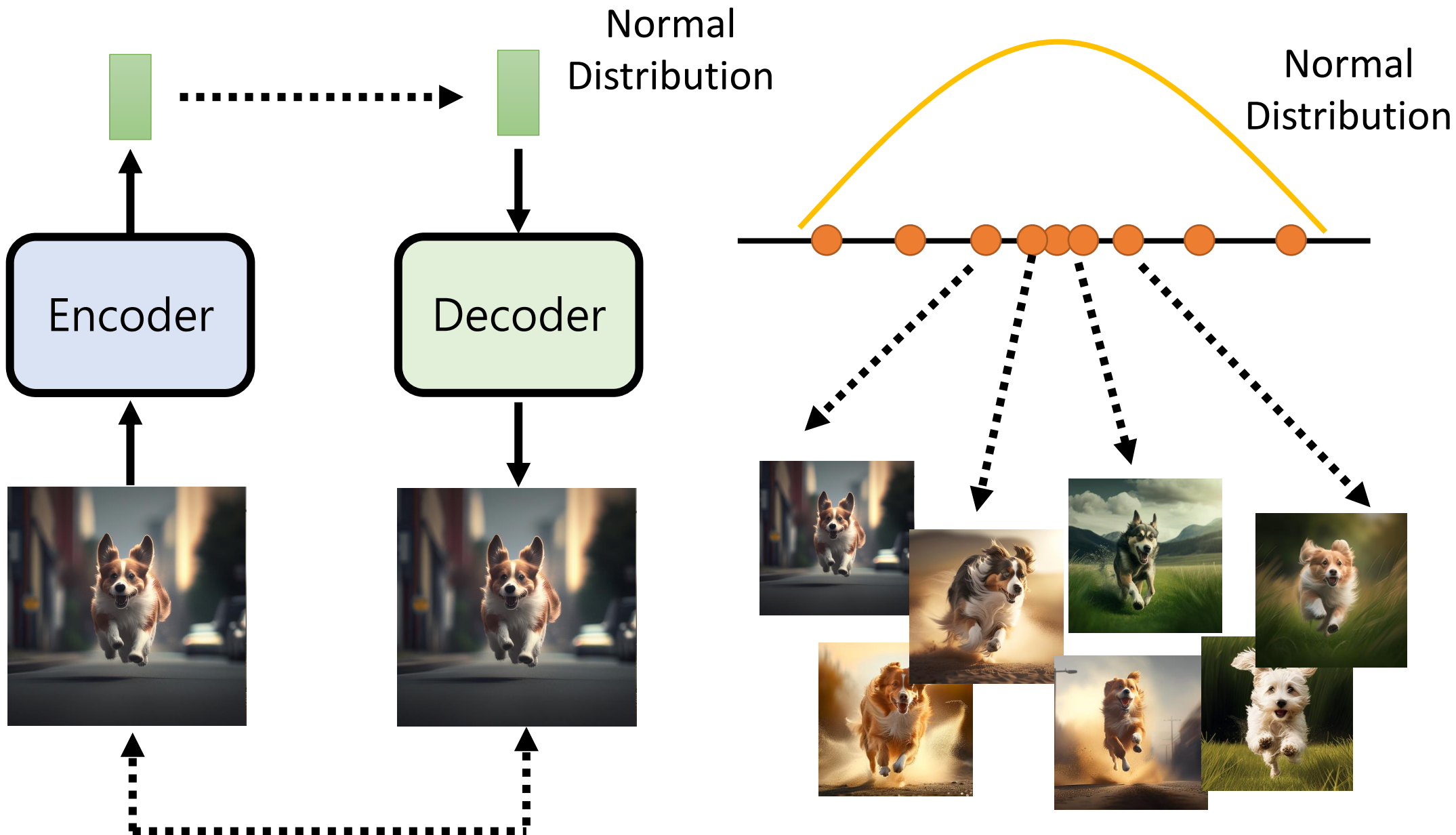
Variational Auto-encoder (VAE)

Flow-based Generative Model

Diffusion Model

Generative Adversarial Network (GAN)

VAE



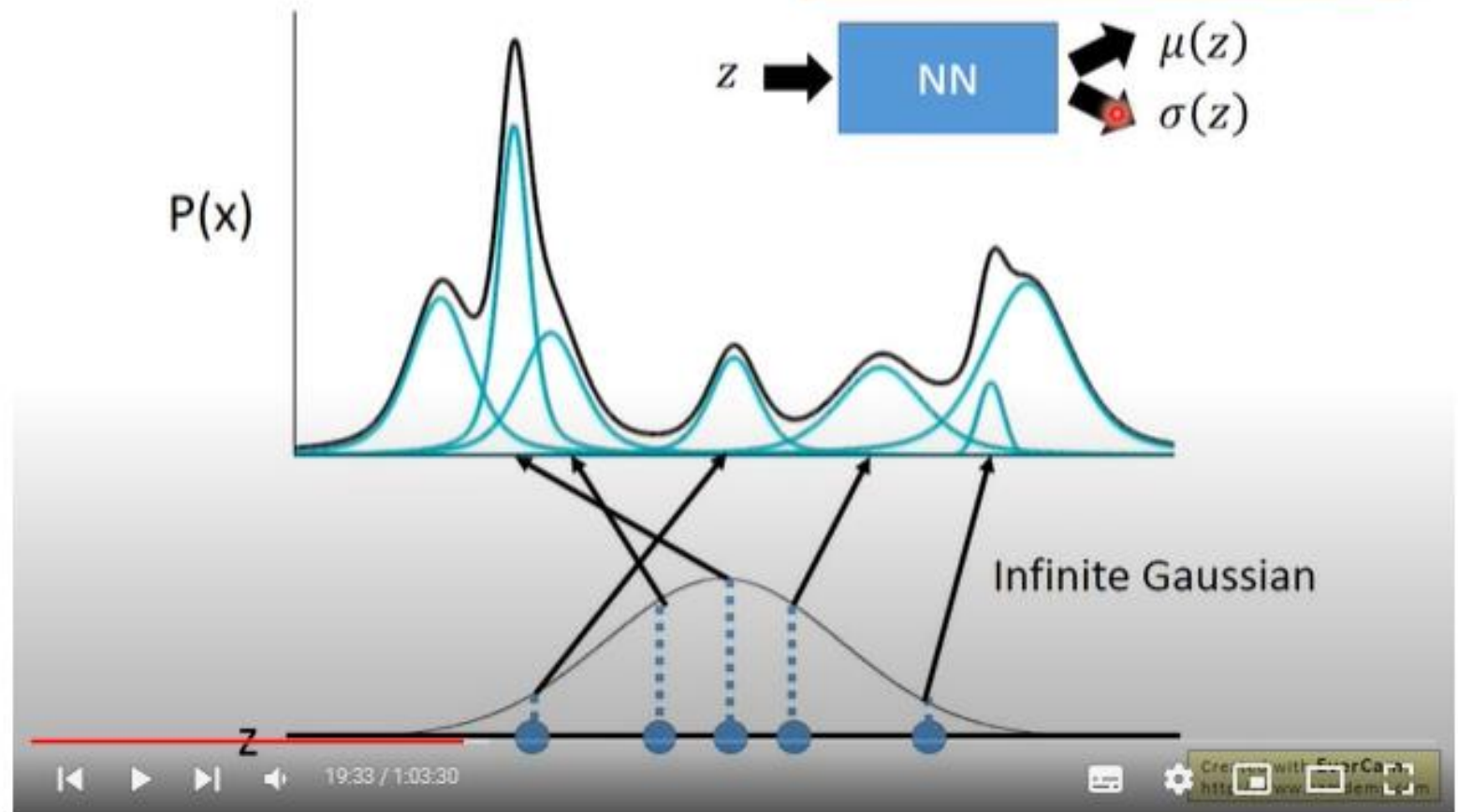
VAE

$$z \sim N(0, I)$$

z is a vector from normal distribution

$$x|z \sim N(\mu(z), \sigma(z))$$

Each dimension of z represents an attribute



ML Lecture 18: Unsupervised Learning - Deep Generative Model (Part II)

<https://youtu.be/8zomhgKrsmQ>

影像常用生成模型速覽

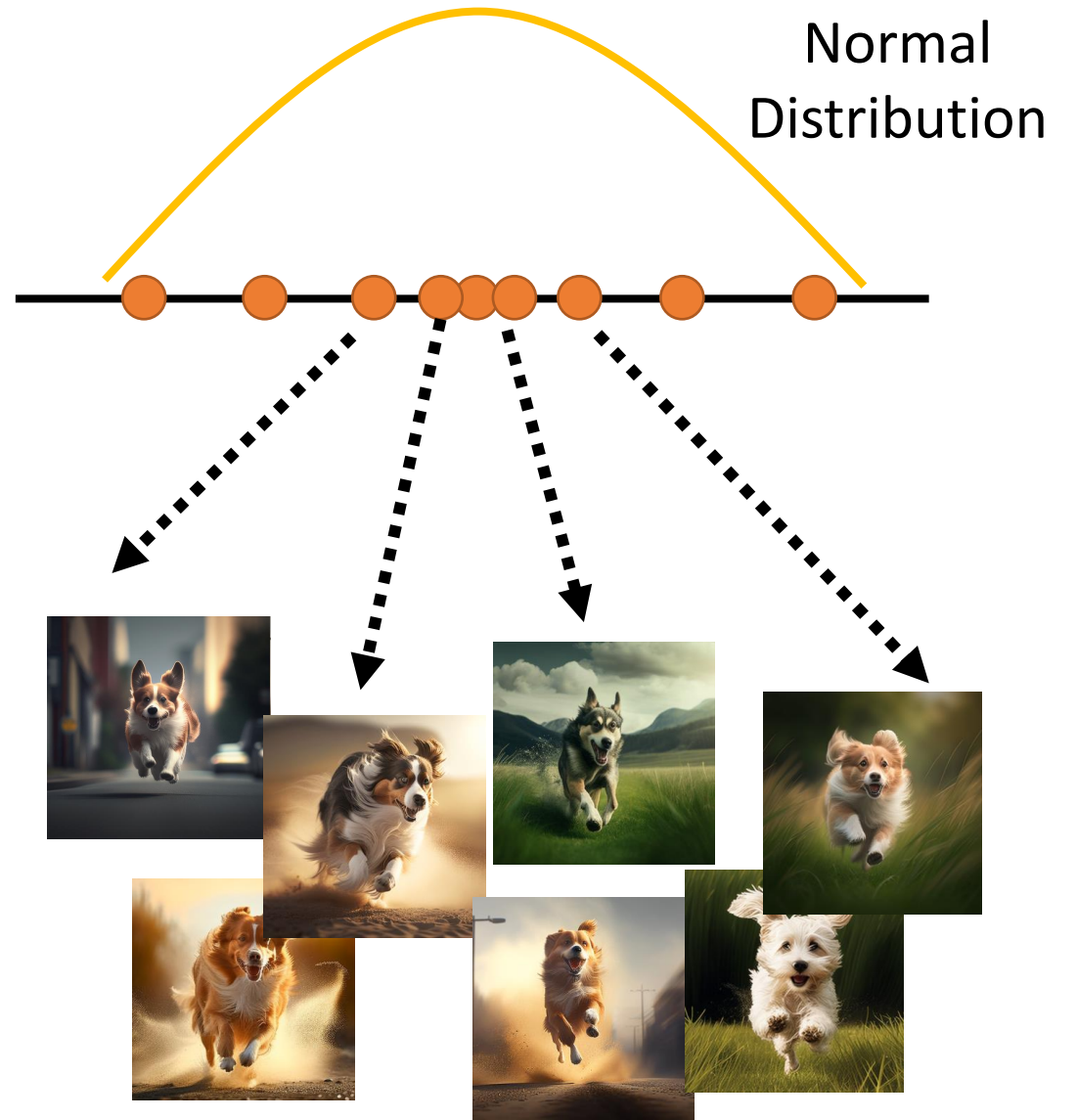
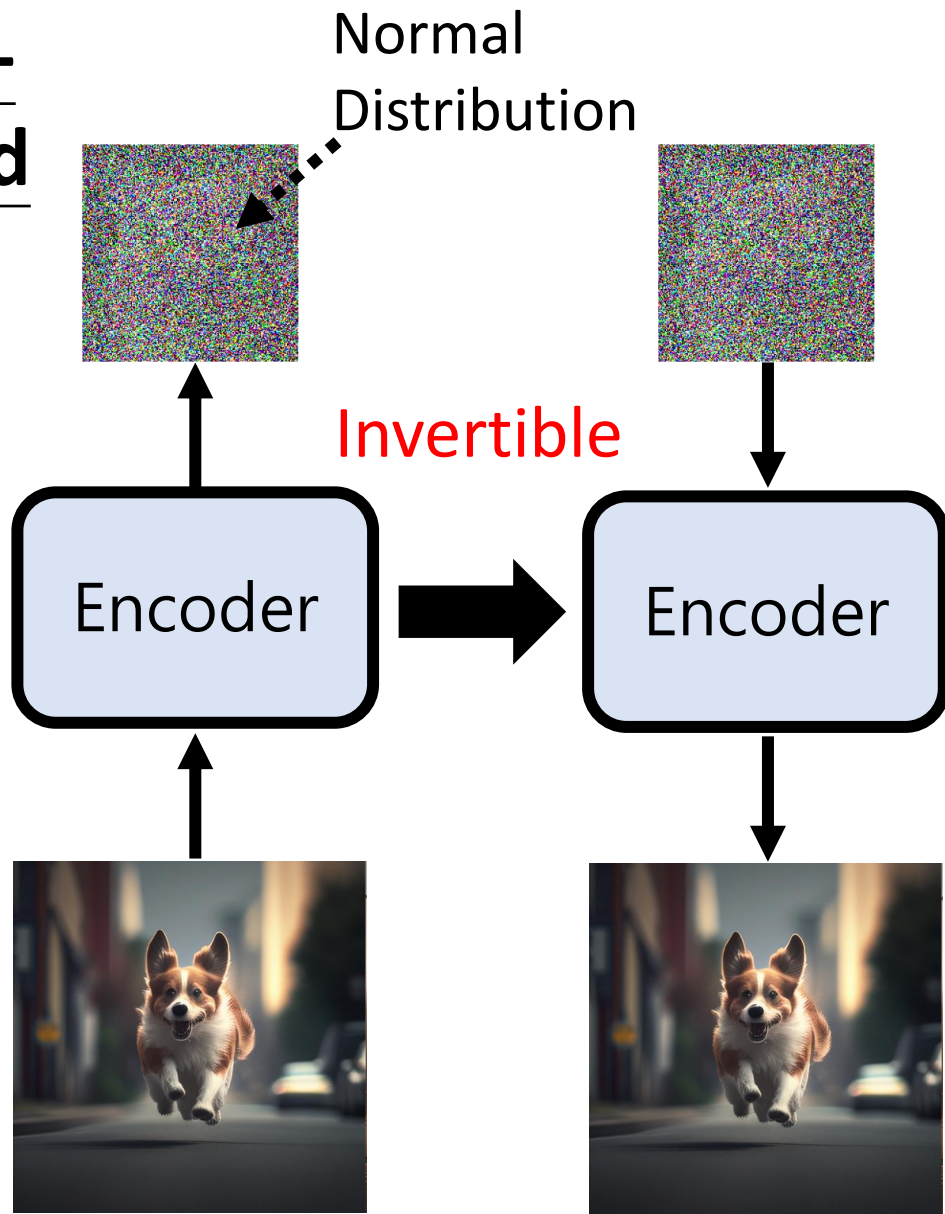
Variational Auto-encoder (VAE)

Flow-based Generative Model

Diffusion Model

Generative Adversarial Network (GAN)

Flow-based



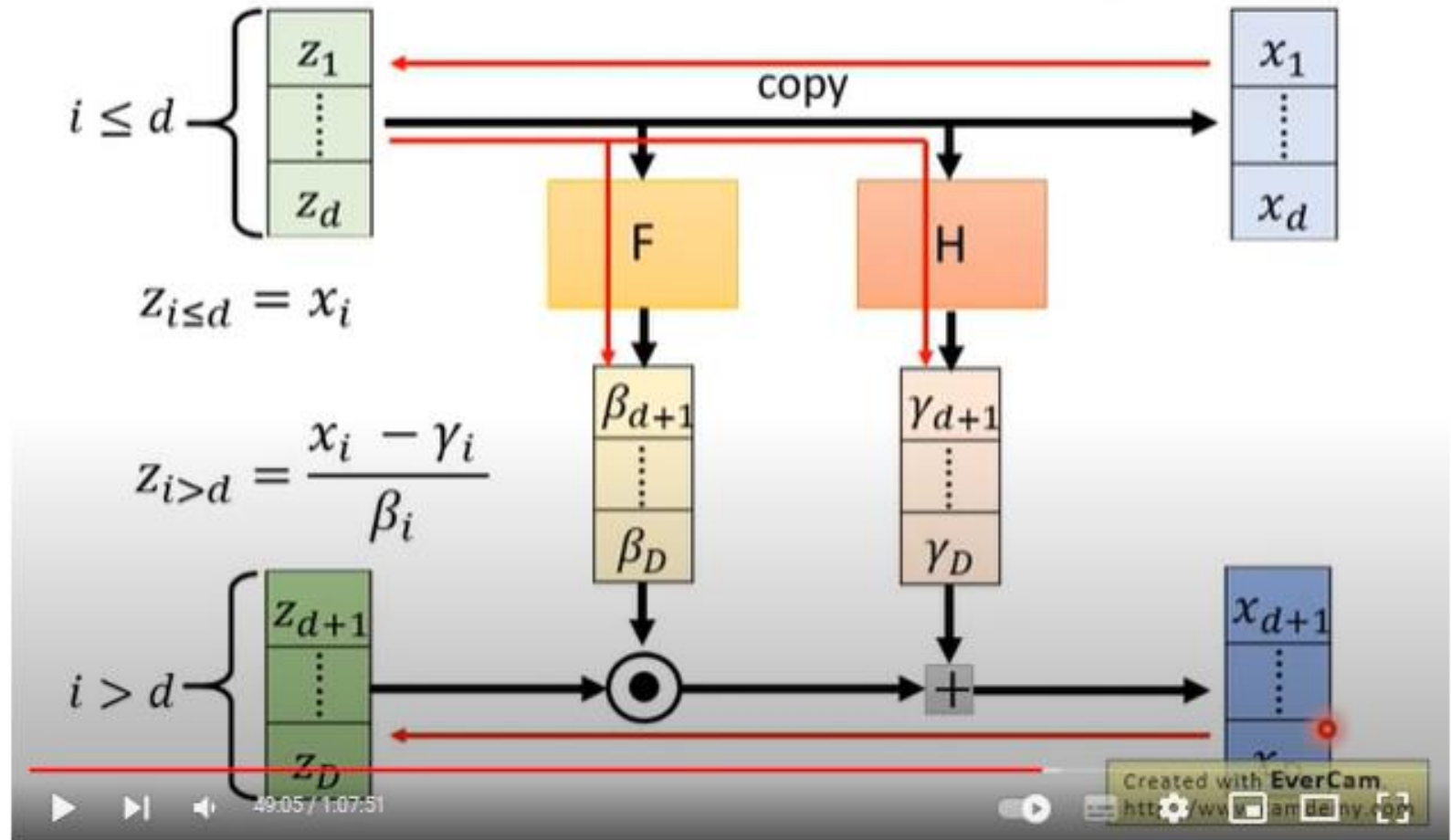
Coupling Layer

NICE

<https://arxiv.org/abs/1410.8516>

Real NVP

<https://arxiv.org/abs/1605.08803>



Flow-based Generative Model

<https://youtu.be/uXY18nzdSsM>

影像常用生成模型速覽

Variational Auto-encoder (VAE)

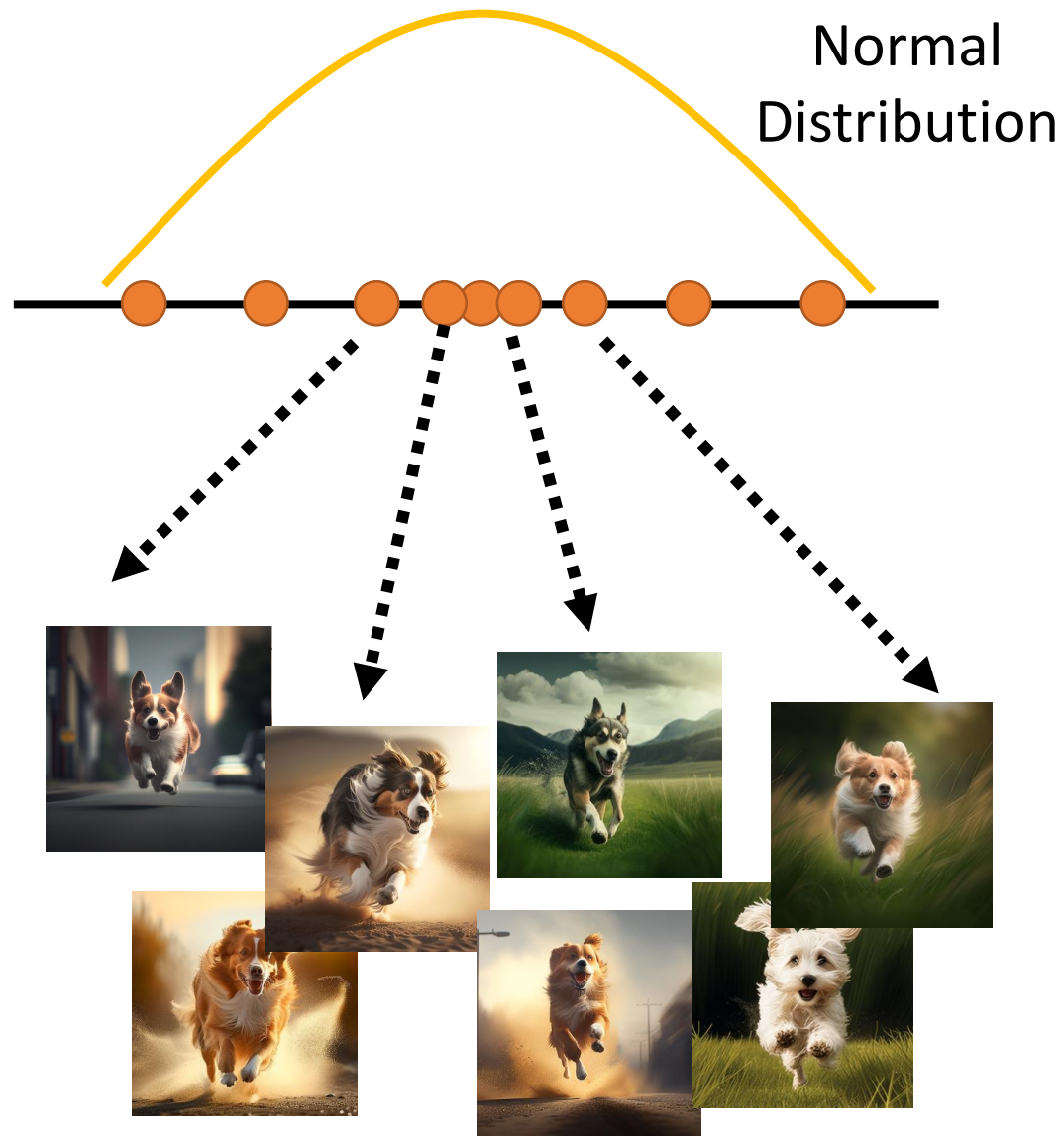
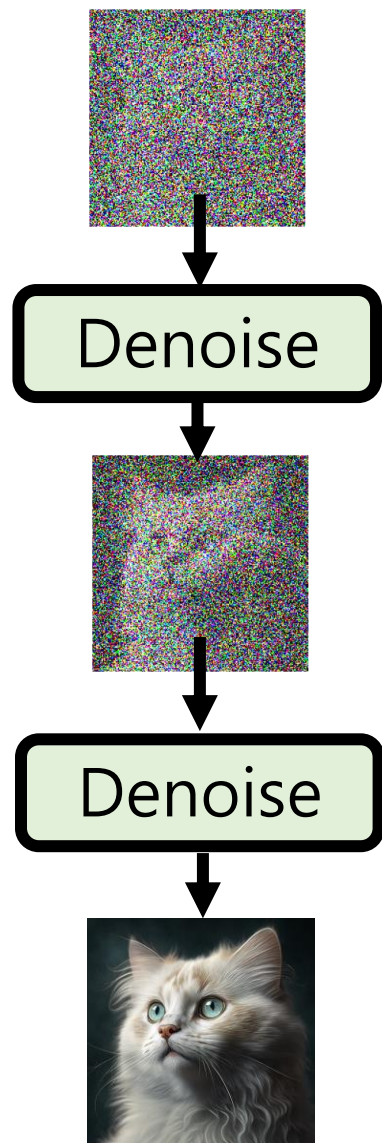
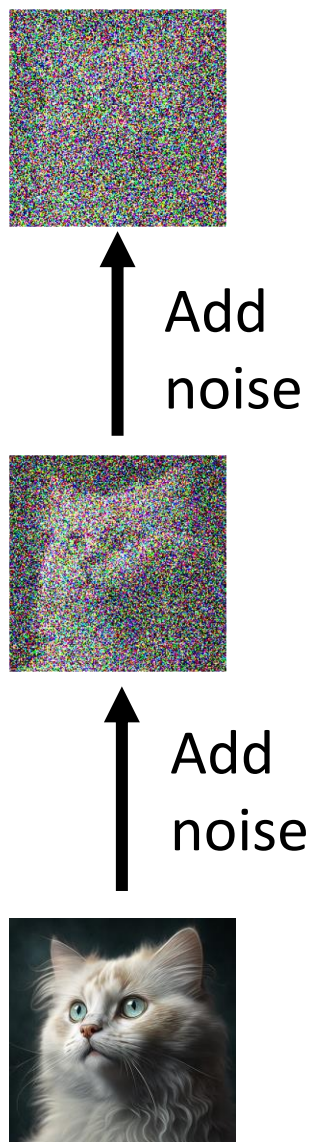
Flow-based Generative Model

Diffusion Model

Generative Adversarial Network (GAN)

Diffusion

下一段課程會再細講



影像常用生成模型速覽

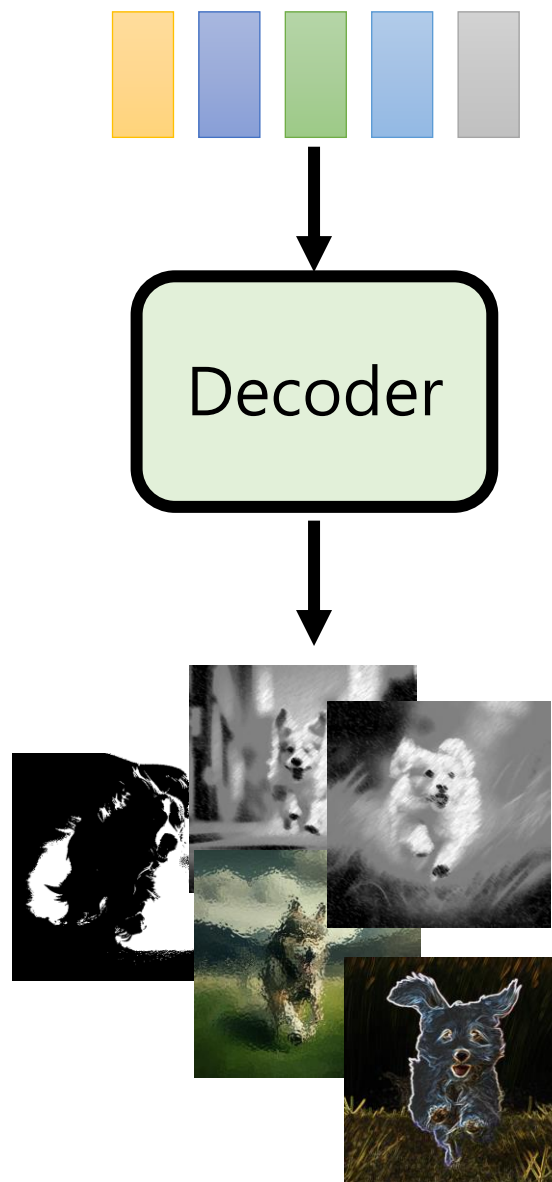
Variational Auto-encoder (VAE)

Flow-based Generative Model

Diffusion Model

Generative Adversarial Network (GAN)

GAN



$P(x)$ and $P'(x)$ are close

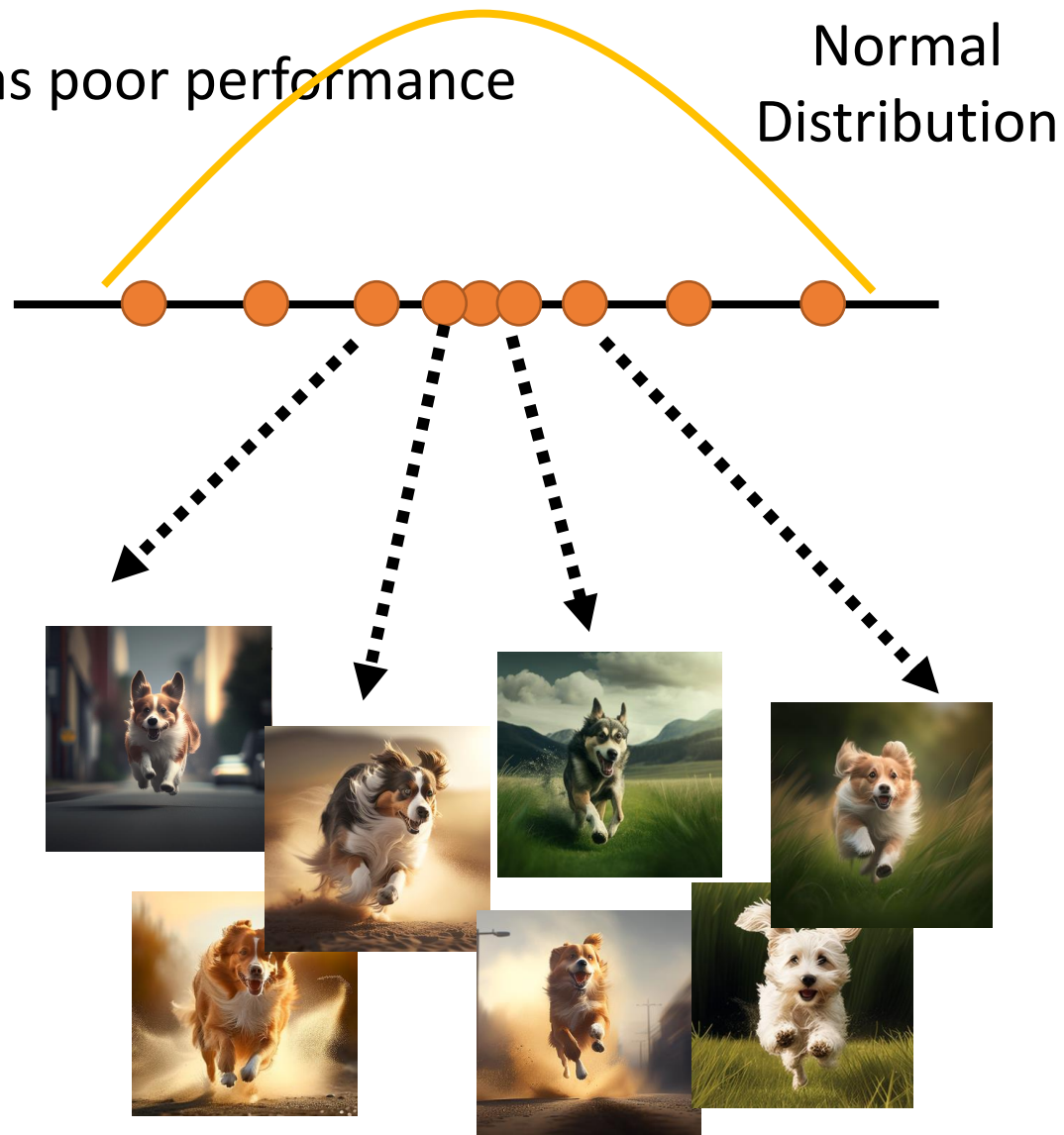
Discriminator has poor performance

Real / Generated



$P'(x)$

$P(x)$



Introduction of Generative Adversarial Network (GAN)

李宏毅

Hung-yi Lee

播放 (k)

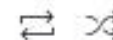
0:02 / 1:33:14

Created with EverCam

http://www.iamliany.com

Generative Adversarial Network (GAN)

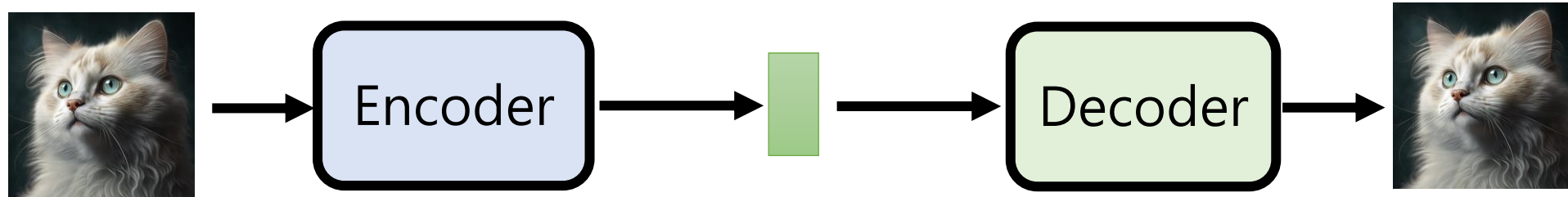
Hung-yi Lee - 1/10



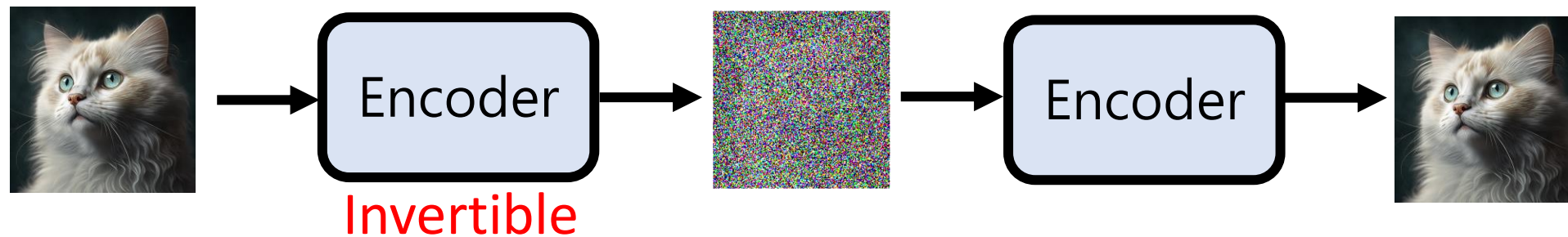
- ▶ GAN Lecture 1 (2018): Introduction
Hung-yi Lee
1:32:15
- 2 GAN Lecture 2 (2018): Conditional Generation
Hung-yi Lee
26:19
- 3 GAN Lecture 3 (2018): Unsupervised Conditional...
Hung-yi Lee
38:59
- 4 GAN Lecture 4 (2018): Basic Theory
Hung-yi Lee
1:20:19
- 5 GAN Lecture 5 (2018): General Framework
Hung-yi Lee
25:05
- 6 GAN Lecture 6 (2018): WGAN, EBGAN
Hung-yi Lee
50:07
- 7 GAN Lecture 7 (2018): Info GAN, VAE-GAN, BiGAN
Hung-yi Lee
46:03
- 8 GAN Lecture 8 (2018): Photo Editing
Hung-yi Lee
22:47
- 9 GAN Lecture 9 (2018): Sequence Generation

https://www.youtube.com/watch?v=DQNNMiAP5lw&list=PLJV_el3uVTsMq6JEFPW35BCiOQTsoqwNw

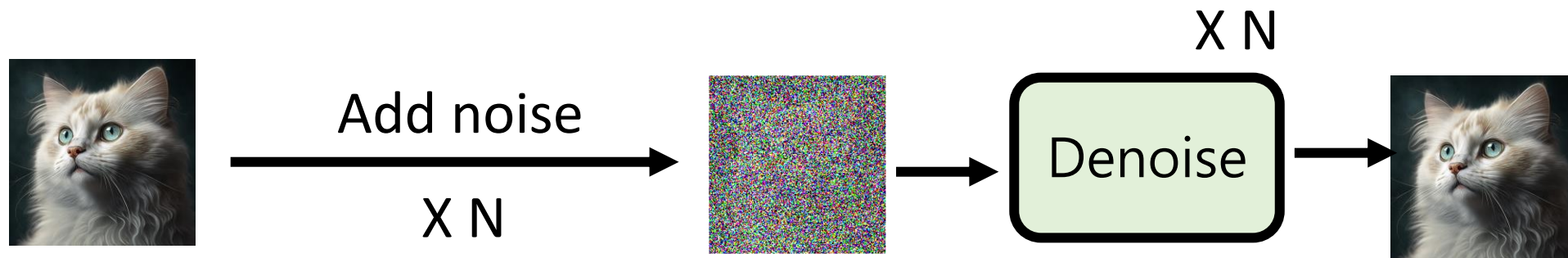
VAE



Flow-based

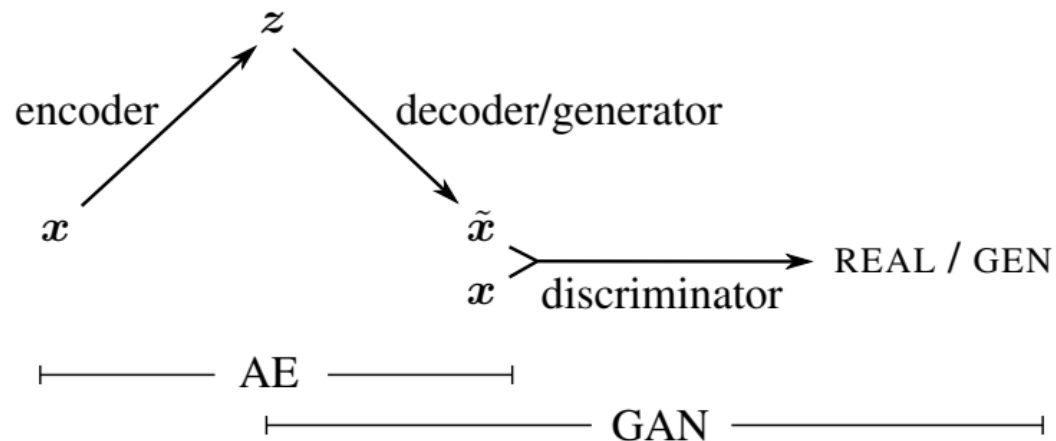


Diffusion



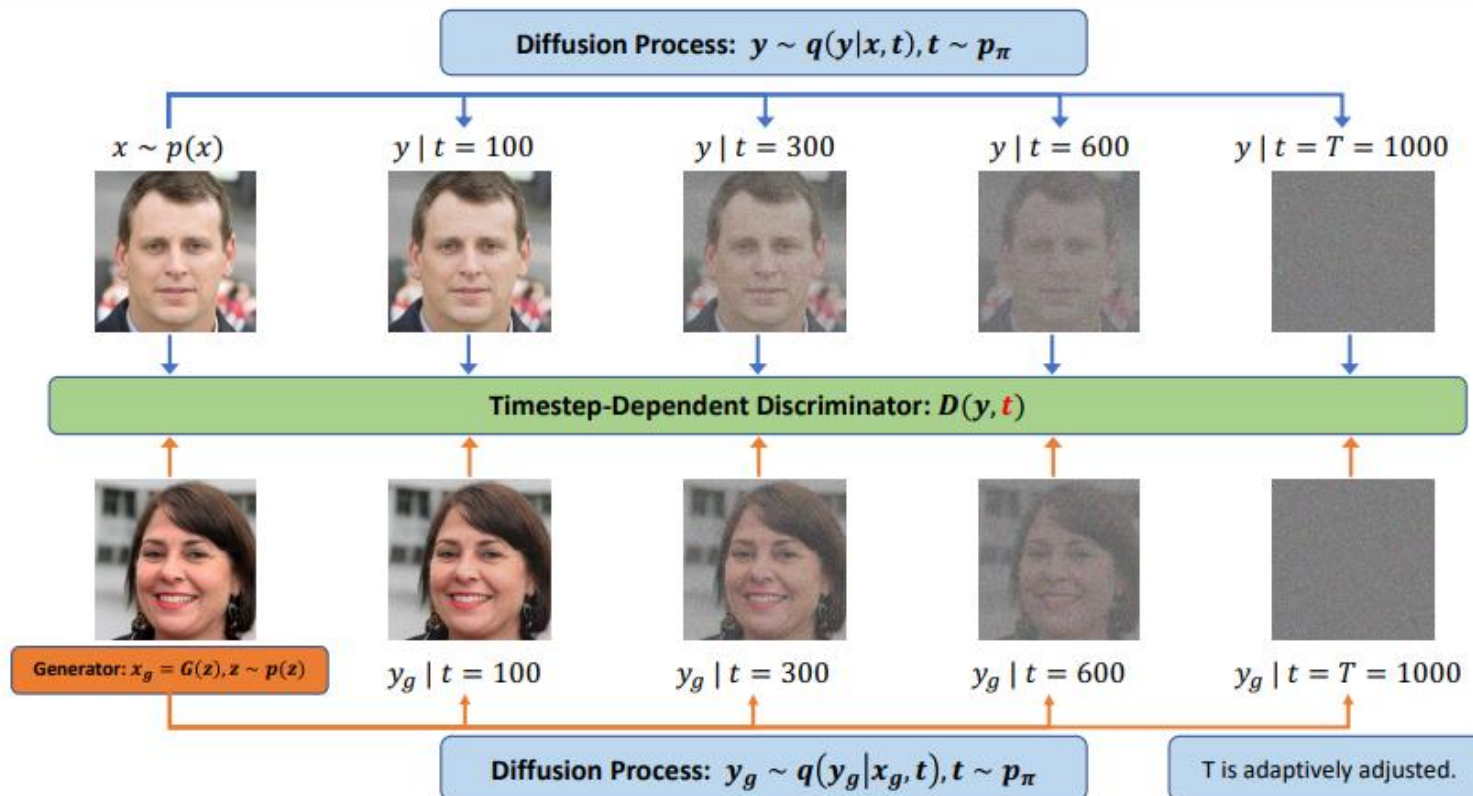
VAE + GAN

<https://arxiv.org/abs/1512.09300>



Flow + GAN

<https://arxiv.org/abs/1705.08868>



Diffusion + GAN

<https://arxiv.org/abs/2206.02262>

影像常用生成模型速覽

Variational Auto-encoder (VAE)

Flow-based Generative Model

Diffusion Model

Generative Adversarial Network (GAN)