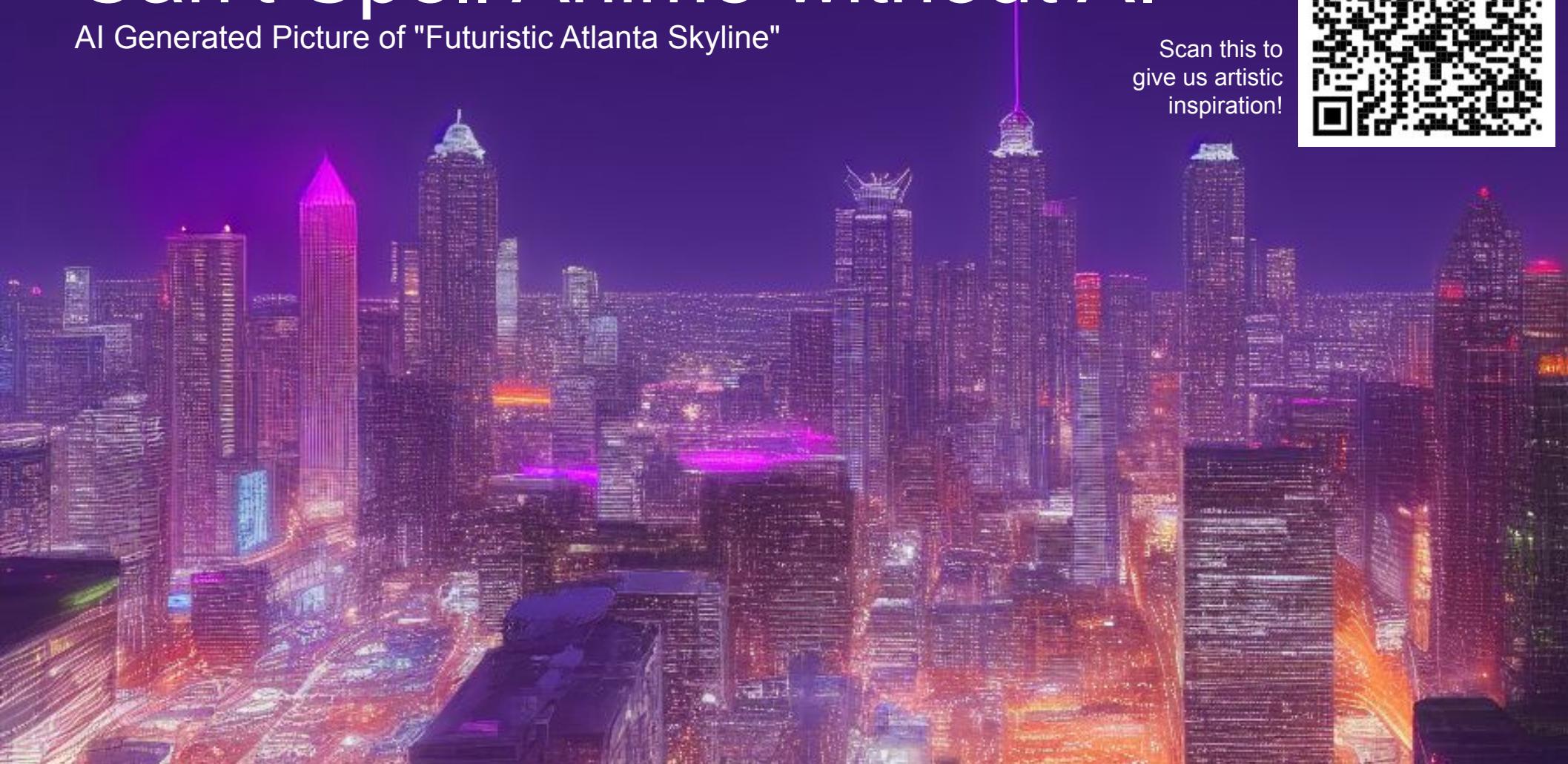


# Can't Spell Anime without AI

AI Generated Picture of "Futuristic Atlanta Skyline"

Scan this to  
give us artistic  
inspiration!



# Introductions



**Kiran Kokilepersaud**

PhD Student, Georgia Tech, Electrical & Computer Engineering Program

Favorite Anime: Grimgar of Fantasy and Ash



**Brighton Ancelin**

PhD Student, Georgia Tech, Machine Learning Program

Favorite Anime: Attack on Titan



**Max Xu**

PhD Student, Georgia Tech, Machine Learning Program

Favorite Anime: A Silent Voice

# Interact with the Panel!

Please fill out as much of the following form as you want:



# Audience

We think this presentation is most useful for...

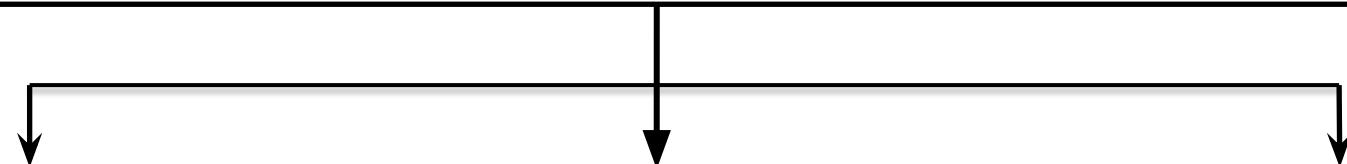
- Artists
- Weebs
- Computer Geeks
- Everyone interested in Artificial Intelligence

# Free and Open Source

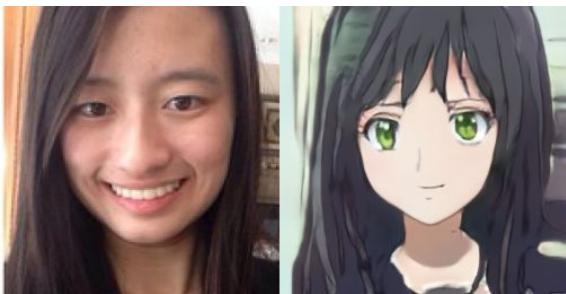
*This presentation was developed using free-and-open-source software; references to almost every source used today is freely available at:*

[github.com/kkokilep/Cant-Spell-Anime-Without-AI](https://github.com/kkokilep/Cant-Spell-Anime-Without-AI)

**Goal:** Convince you all that we are cool, smart, and handsome.



## Style Transfer



## Image Coloring Manga/Art

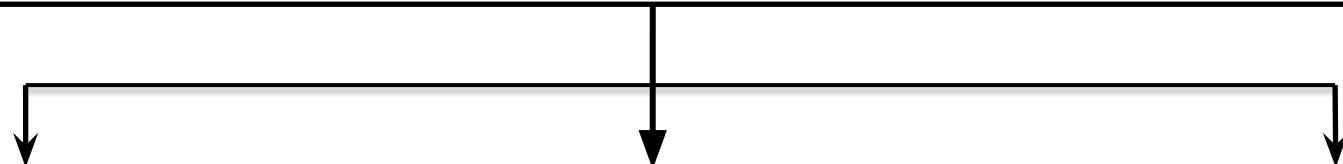


## Art Generation



The newest JoJo stand!

**Goal:** Convince you all that we are cool, smart, and handsome.



## Style Transfer



## Image Coloring Manga/Art



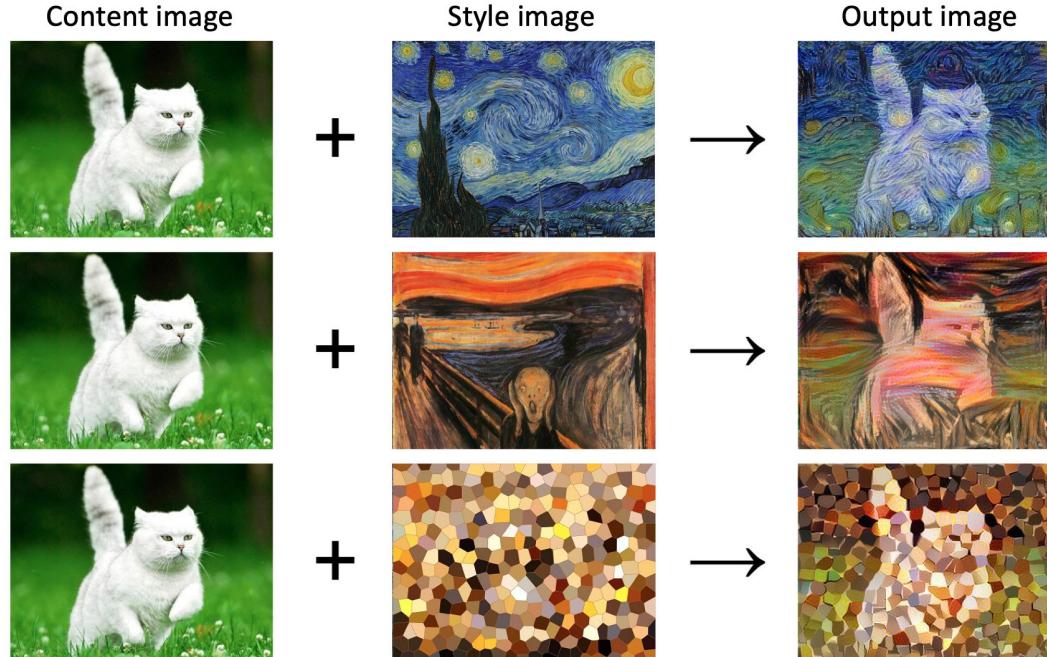
## Art Generation



The newest JoJo stand!

# What is Style Transfer?

Recompose the content of an image in the style of another.



# Anime Style Transfer

Given an image of a person, then redraw it in another anime style.



# How does it work?

In a traditional approach, we have inputs and targets, but rare to have pictures in multiple different styles

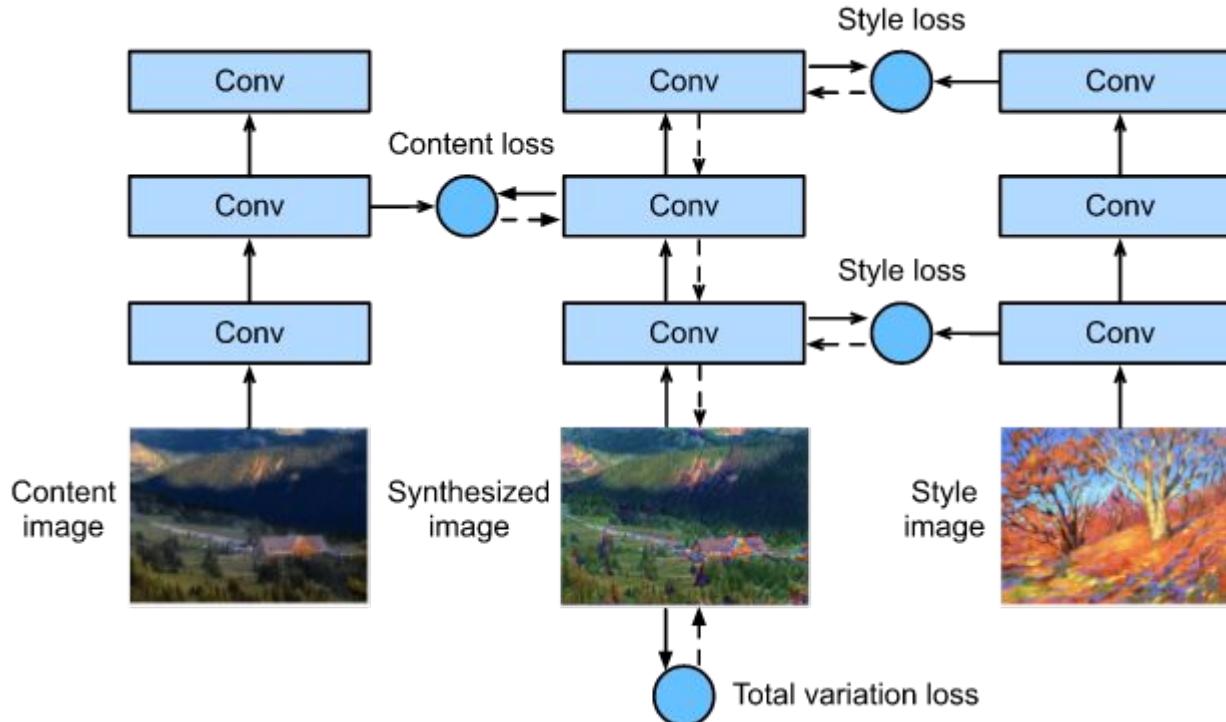


# How does it work?

- In a traditional approach, we have inputs and targets, but rare to have pictures in multiple different styles
- Use a ML model to extract content and style features instead
  - Allows us to quantify style transferability without pairs

$$\mathcal{L}_{total}(\vec{p}, \vec{a}, \vec{x}) = \alpha \mathcal{L}_{content}(\vec{p}, \vec{x}) + \beta \mathcal{L}_{style}(\vec{a}, \vec{x})$$

# Architecture of Style Transfer Models



# Demo

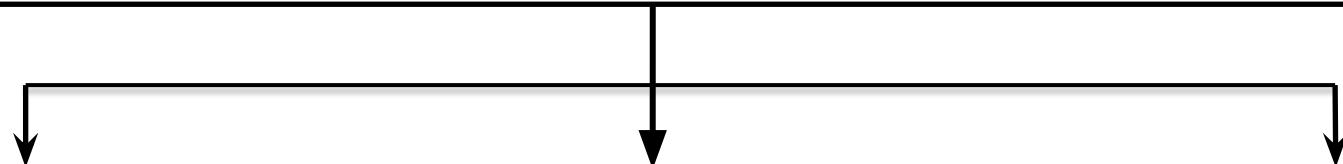
- Let's Animefy some images
  - Reminder: All of our code is publicly available online and you can run our code!
  - The code is hosted on colab, which runs on google servers and can be saved on the google drive

# Style Transfer

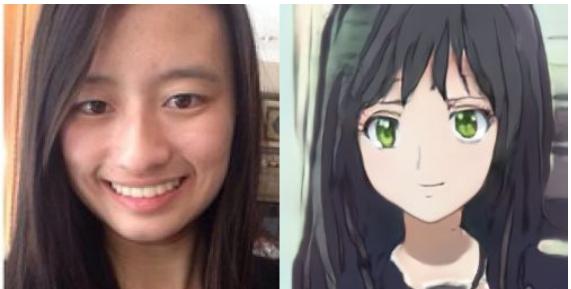
Freely available online tools:

- [waifu.lofiu.com](http://waifu.lofiu.com)
- [huggingface.co/spaces/akhaliq/AnimeGANv2](https://huggingface.co/spaces/akhaliq/AnimeGANv2)
- [Animefilter.com](http://Animefilter.com)
- <https://selfie2anime.com/>

**Goal:** Convince you all that we are cool, smart, and handsome.



## Style Transfer



## Image Coloring Manga/Art



## Art Generation



The newest JoJo stand!

# Auto-Coloring

Given a black-and-white sketch, color it in a reasonable manner, optionally with color information specified.



Original B&W Sketch



Random colorization



Purple hair, Cyan eyes

# Problem

---

Merry is my waifu.

---



# Problem

---

Merry is my waifu.  
I am sad.

---



# Problem

---

Merry is my waifu.

I am sad.

I do not know the color of her eyes.

---



# Problem

---

Merry is my waifu.

I am sad.

I do not know the color of her eyes.

I do not know the color of her hair.

---



# Problem

---

Merry is my waifu.

I am sad.

I do not know the color of her eyes.

I do not know the color of her hair.

Pickup line I cannot use:

I didn't know I liked [insert color] eyes,  
until I saw yours.

---



# Manga Artists Don't Care About Me ):

Why isn't the manga colored?

What is the color of my waifu's hair!!!?

How soft is her hair!!@@??



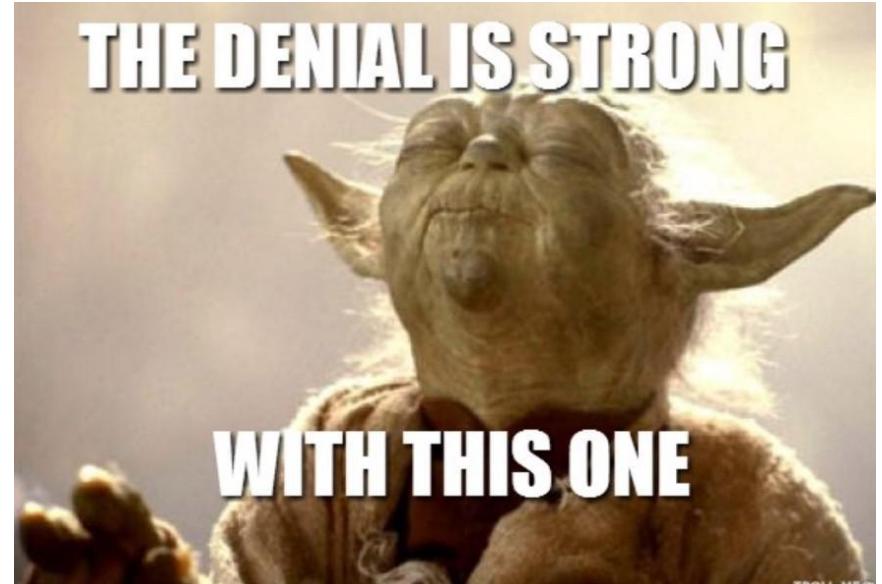
# It Can't Be True

Why don't you give me the zip code of the state of denial you're living in, and I'll send you a postcard.



**THE DENIAL IS STRONG**

**WITH THIS ONE**



# Manga Artists are Lazy

Sample Schedule of an Anonymous Weekly Manga Magazine Artist

Shiihashi Hiroshi

■某月某週の椎橋寛先生のスケジュール

M 月曜日	Tu 火曜日	W 水曜日	Th 木曜日	F 金曜日	Sa 土曜日	Su 日曜日
0:00 ネーム	ネーム直し	カバー(リスト執筆)	執筆	執筆	シナリオ(ネーム)	
1:00 ネーム	ネーム直し	カバー(リスト執筆)	執筆	執筆	シナリオ(ネーム)	
2:00 ネーム	ネーム直し	カバー(リスト執筆)	執筆	執筆	休憩	
3:00 ネーム	ネーム直し		休憩	執筆	執筆	休憩
4:00 ネーム	ネーム直し		休憩	執筆	執筆	休憩
5:00 ネーム	ネーム直し		休憩	休憩	執筆	休憩
6:00 朝食	担当さん打合せ		休憩	休憩	原稿アップ	
7:00 朝食	担当さん打合せ		休憩	休憩	休憩	休憩
8:00 朝食		休憩	休憩	休憩	休憩	休憩
9:00 ネーム		休憩	休憩	休憩	休憩	休憩
10:00 ネーム		朝食	朝食	朝食	朝食	朝食
11:00 ネーム	休憩	スタッフ入り/執筆	執筆	執筆	休憩	ネーム
12:00 ネーム	休憩		執筆	執筆	休憩	ネーム
13:00 ネーム	休憩		執筆	執筆	休憩	ネーム
14:00 ネーム	休憩		執筆	執筆	休憩	ネーム
15:00 ネーム	昼食		執筆	執筆	昼食	ネーム
16:00 ネーム	カラー(リスト)執筆		執筆	執筆	オフ	ネーム
17:00 ネーム	カラー(リスト)執筆		執筆	執筆	オフ	ネーム
18:00 ネーム	カラー(リスト)執筆		執筆	執筆	オフ	ネーム
19:00 担当さん打合せ	カラー(リスト)執筆	夕食	夕食	夕食	担当さん原稿渡し	ネーム
20:00 担当さん打合せ	カラー(リスト)執筆		執筆	執筆	ネーム打合せ	ネーム
21:00 ネーム直し	夕食		執筆	執筆	ネーム打合せ	ネーム
22:00 ネーム直し	カラー(リスト)執筆		執筆	執筆	シナリオ(ネーム)	ネーム
23:00 ネーム直し	カラー(リスト)執筆		執筆	執筆	シナリオ(ネーム)	ネーム

ネーム Working on thumbnails, rough pages called "Nemu"

朝食 Meal break

休憩 Sleeping

担当さん打合せ Meeting with his Editor

カラー(リスト)執筆 Working on the cover or color pages

執筆 Time that the assistants are helping

オフ Free time not spent working on the comic  
(...three hours on Saturday)

-126 Hours Per Week

~130 Hours Per Week with modern coloring technologies



Korean  
Manhwas  
Exclusively  
have Color

# Solution



Use Generative Adversarial Networks (GANs) to learn contextualized colors.

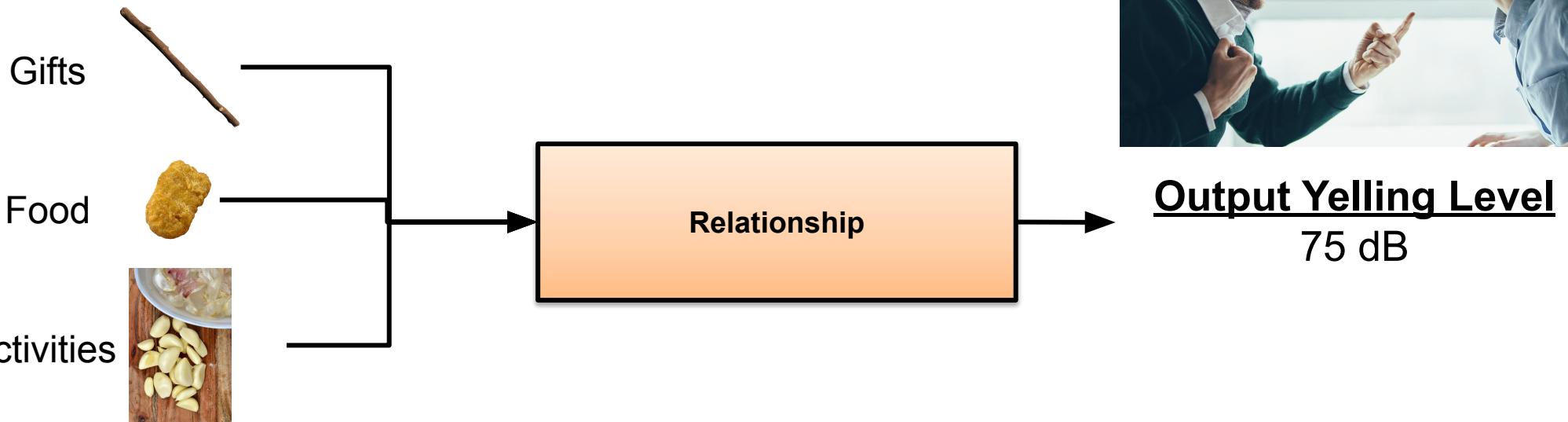
Original intent was to add color to historical records.

<https://github.com/jantic/DeOldify>

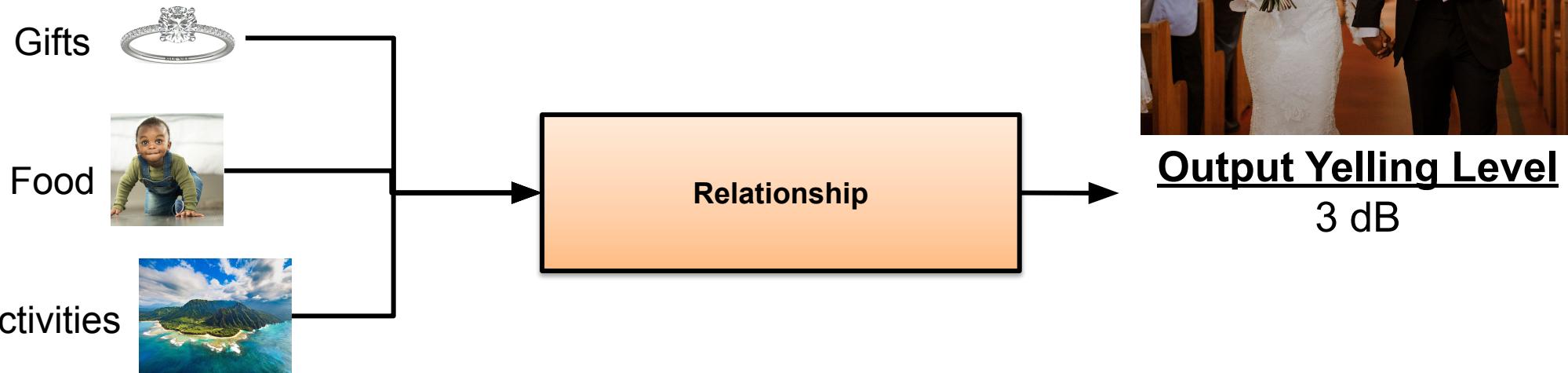
# The ID and the OOD



# Epoch 0 of Relationship



# Epoch 11 of Relationship



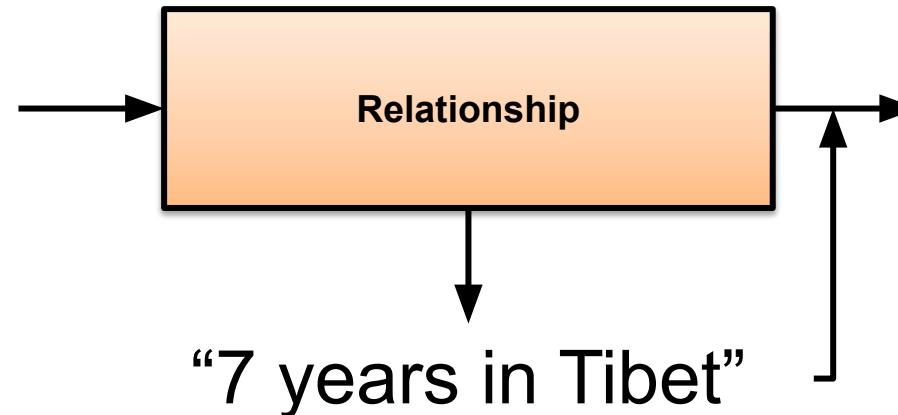
**Relationship model is overfit to the conditions that have reduced the output decibels.**

# No ability to generalize to OOD

Why don't you hold  
my hand in public?

Why does the body  
pillow get the bed?

Why is the picture of  
your dad's fishing  
buddy in front of  
mine?



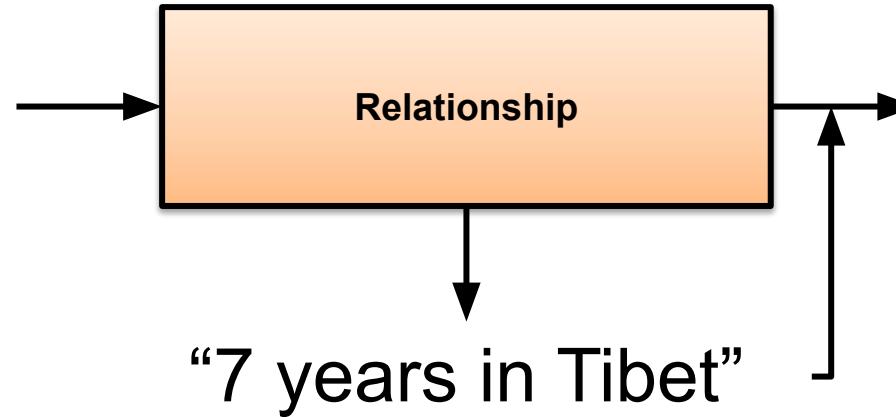
**Output Yelling Level**  
145 dB

# No ability to generalize to OOD

Why don't you hold my hand in public?

Why does the body pillow get the bed?

Why is the picture of your mom in front of mine?



**Output Yelling Level**  
145 dB

Model is untrained for these situations and cannot perform well, leading to a high loss value and poor performance.

# Image Coloring Models have same problem as your relationship!



**Solution is to have a variety of models that  
are experts at different scenarios!**

**Constantly be someone else all the time!**

# Demo

Let's come closer fix our  
relationships and our waifus  
together!

# Auto-Coloring

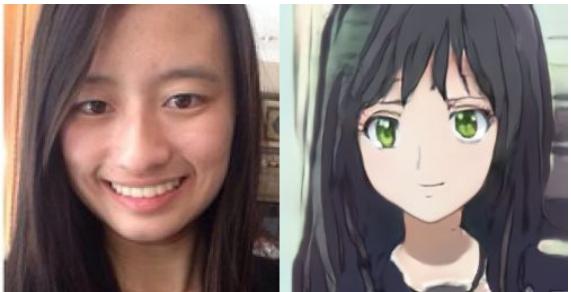
Freely available tools:

- [petalica-paint.pixiv.dev](https://petalica-paint.pixiv.dev)
- [github.com/kvfrans/deepcolor](https://github.com/kvfrans/deepcolor)
- [github.com/DwangoMediaVillage/Comicolorization](https://github.com/DwangoMediaVillage/Comicolorization)
- [github.com/blandocs/Tag2Pix](https://github.com/blandocs/Tag2Pix)

**Goal:** Convince you all that we are cool, smart, and handsome.



## Style Transfer



## Image Coloring Manga/Art



## Art Generation



The newest JoJo stand!

# Character Generation

Generate a drawing of an anime character, either completely randomly or with some details defined.



Random



Random



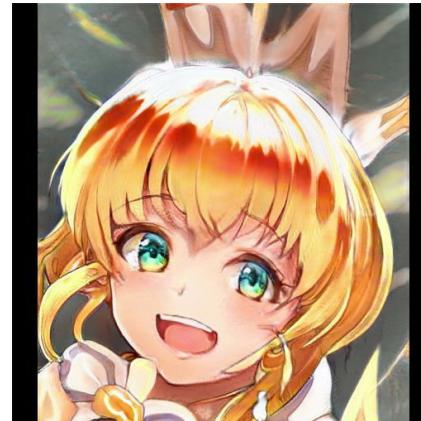
Pink eyes, Blue hair



Long hair, Glasses, No smile

# History

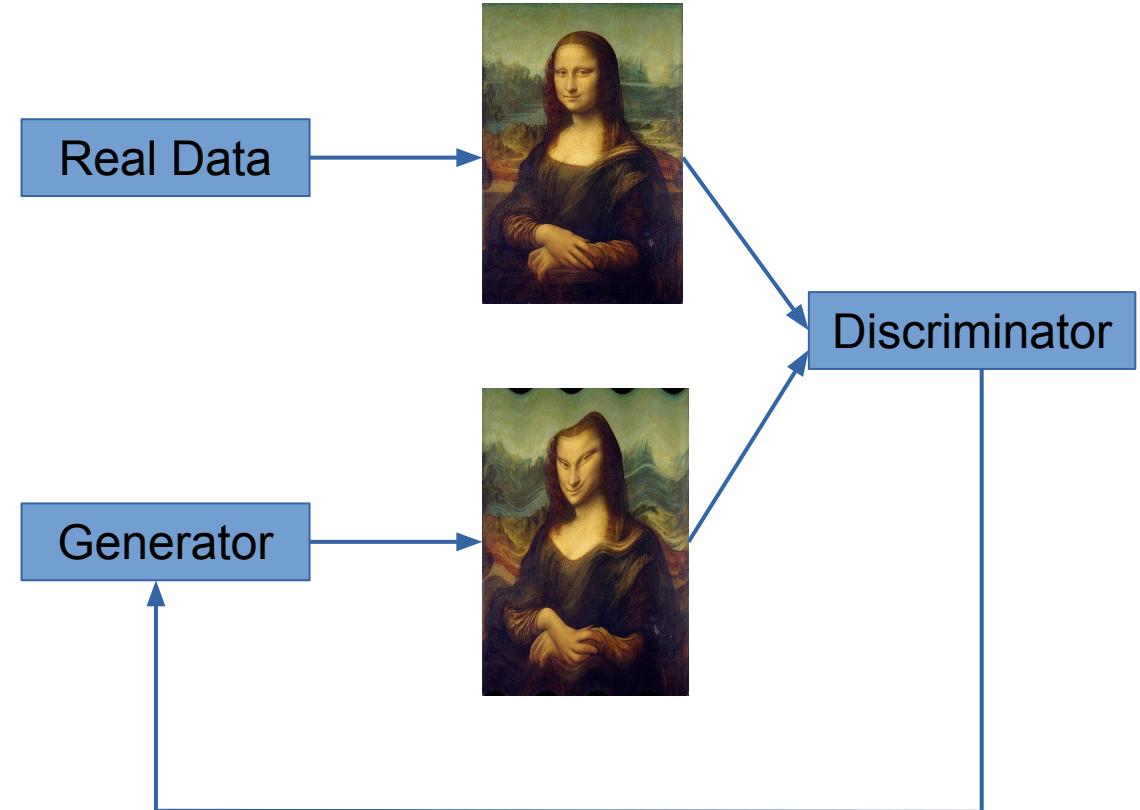
- StyleGAN was made available Feb 2019
- StyleGAN2 was made available Feb 2020



Images Generated by StyleGAN2

# Technical Details - GANs

- Discriminator vs. Generator
- Detective vs. Forger
- Eventually, generator learns to fool the discriminator, and has (hopefully) learned the distribution.



# History

- Issue with GANs/VAEs
  - Limited ability to specify attributes (latent tags)
- Diffusion Models are much easier to direct

# History

- Stable Diffusion was made available 22 Aug 2022
- Waifu Diffusion v1.3 weights were made available 6 Oct 2022



1girl, blue hair, green cap, long hair, pink eyes



1boy, silver hair, red eyes, earrings

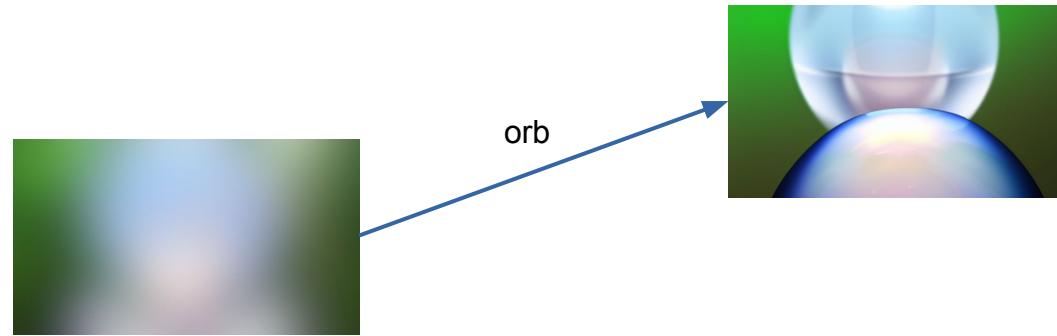
# Technical Details – Diffusion Models

- Undoes diffusion
- Key idea: everything looks the same if sufficiently blurred
- Begin with random noise, then progressively deblur it with help from the prompt



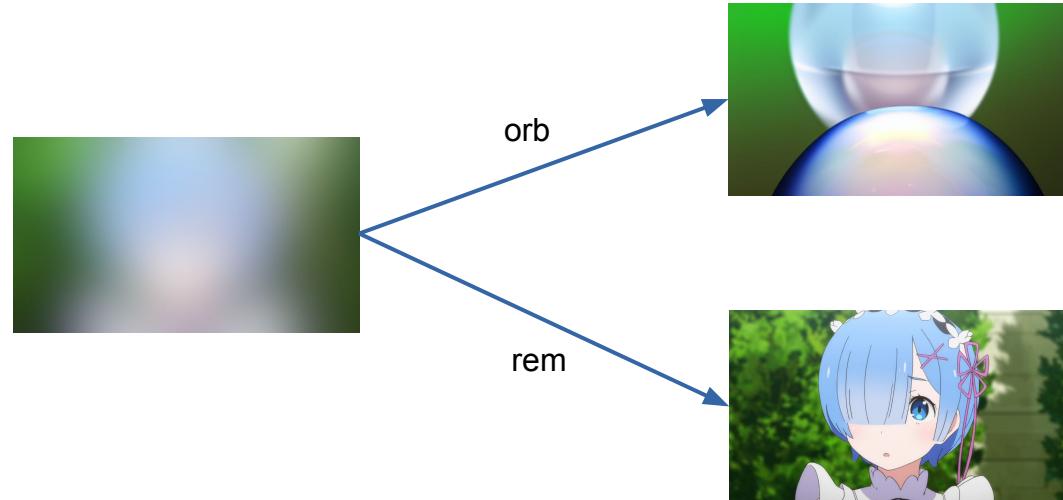
# Technical Details – Diffusion Models

- Undoes diffusion
- Key idea: everything looks the same if sufficiently blurred
- Begin with random noise, then progressively deblur it with help from the prompt



# Technical Details – Diffusion Models

- Undoes diffusion
- Key idea: everything looks the same if sufficiently blurred
- Begin with random noise, then progressively deblur it with help from the prompt



# Diffusion Models - Examples



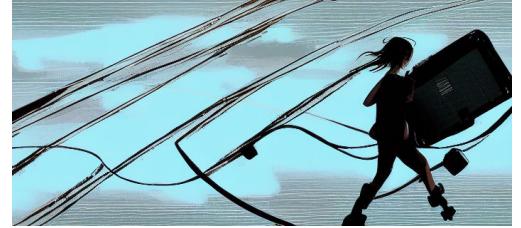
Girl with mint ice cream cone



A jojo-stand doing kung fu



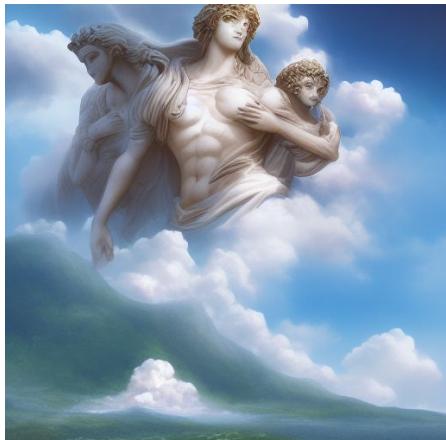
A witch in bnw



Silhouette of a girl stealing a TV



A large fire monster



Greek gods in clouds



A man on a whale in the sky

# Demo

You submitted requests, here they are!

# Character Generation

Freely available tools:

- [thisanimedoesnotexist.ai](https://thisanimedoesnotexist.ai)
- [make.girls.moe](https://make.girls.moe)
- [waifulabs.com](https://waifulabs.com)
- [www.thiswaifudoesnotexist.net](https://www.thiswaifudoesnotexist.net)

# Thank you all for listening!

Code at:

[github.com/kkokilep/Cant-Spell-Anime-Without-AI](https://github.com/kkokilep/Cant-Spell-Anime-Without-AI)

Contact us:

[maxxu@gatech.edu](mailto:maxxu@gatech.edu)