

이미지 생성 AI와 디지털세상의 이해

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1. 프롬프트를 이용한 이미지 생성 실제
2. 다양한 이미지 생성(증강) 방법들
3. AI 생성모델 직접 운영 (Diffusion 설치)
4. AI 사용 일상화 시대와 디지털 세상의 이해
5. 기술 폭발과 미래사회

Part 1

프롬프트를 이용한
이미지 생성 실제



1. 실세계에서의 AI 생성 이미지 활용 (Fashion & Design)



#1

@satoshisakai_

Number of likes 2636

Prompt

- a model is walking in a Paris city wearing a new-wave kimono created by Hokusai Katsushika --v 5

- a woman sits on a stool in a dark bar wearing a new-wave kimono created by Hokusai Katsushika --v 5

Award-winning tweets →



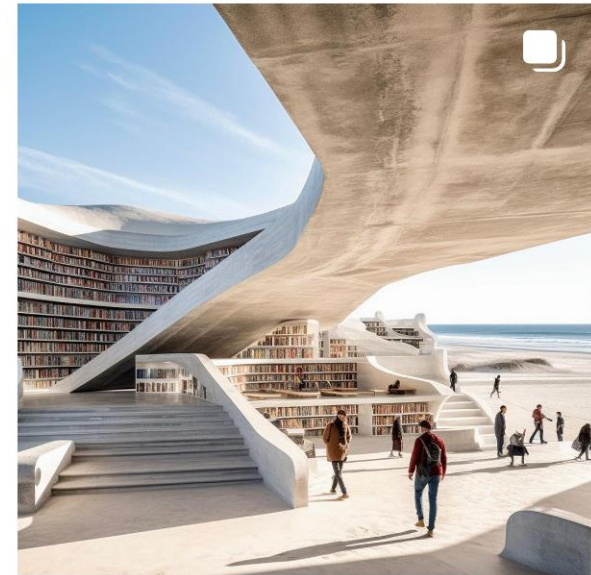
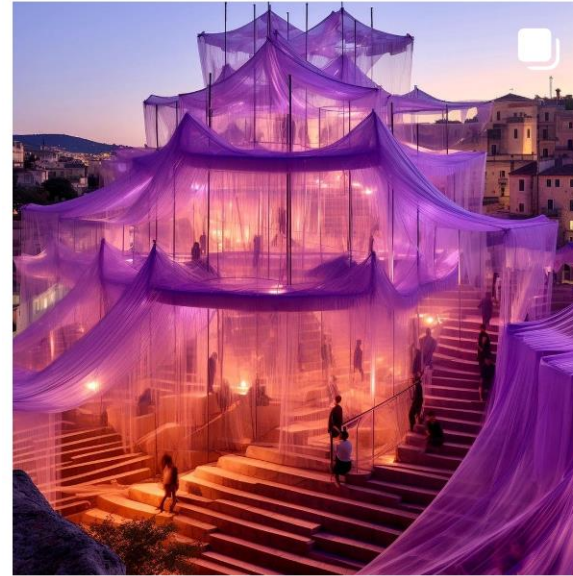
#2

@OBAKENinarou

Number of likes 213

Prompt

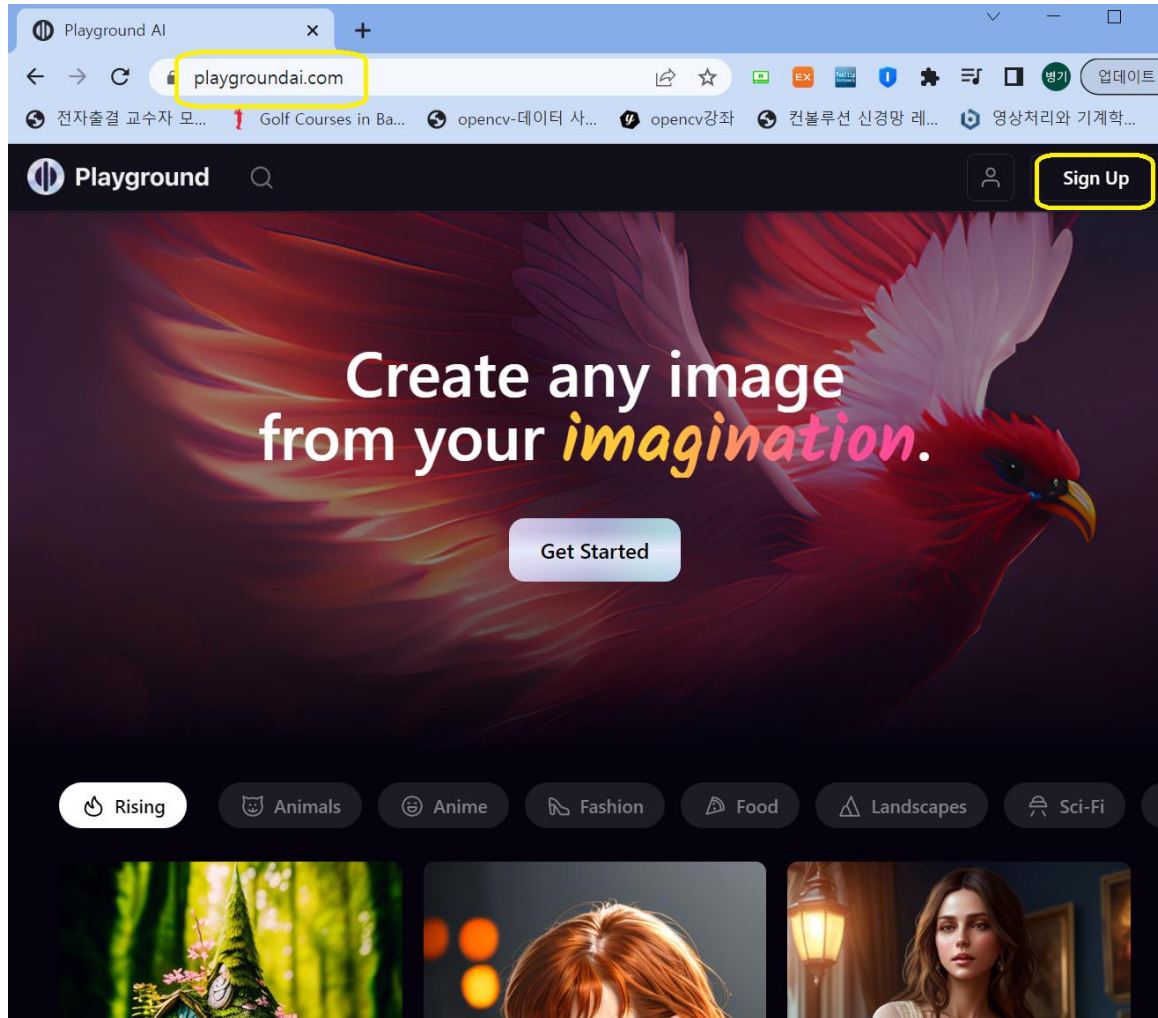
<<https://s.mj.run/QEIdm87pM0c>>
1980, two Japanese womens editorial fashion photo portrait of a colorful avant garde fashion in origami style, model,hug:fashion shoot :standing with a backdrop of the multiverse, artistic pose, rabbit ultra haute couture,in colorful background, editorial, clo3d, 8k, hyper quality,highly detailed photo shoot, High quality, ultra realistic detailed --chaos 30 --v 5



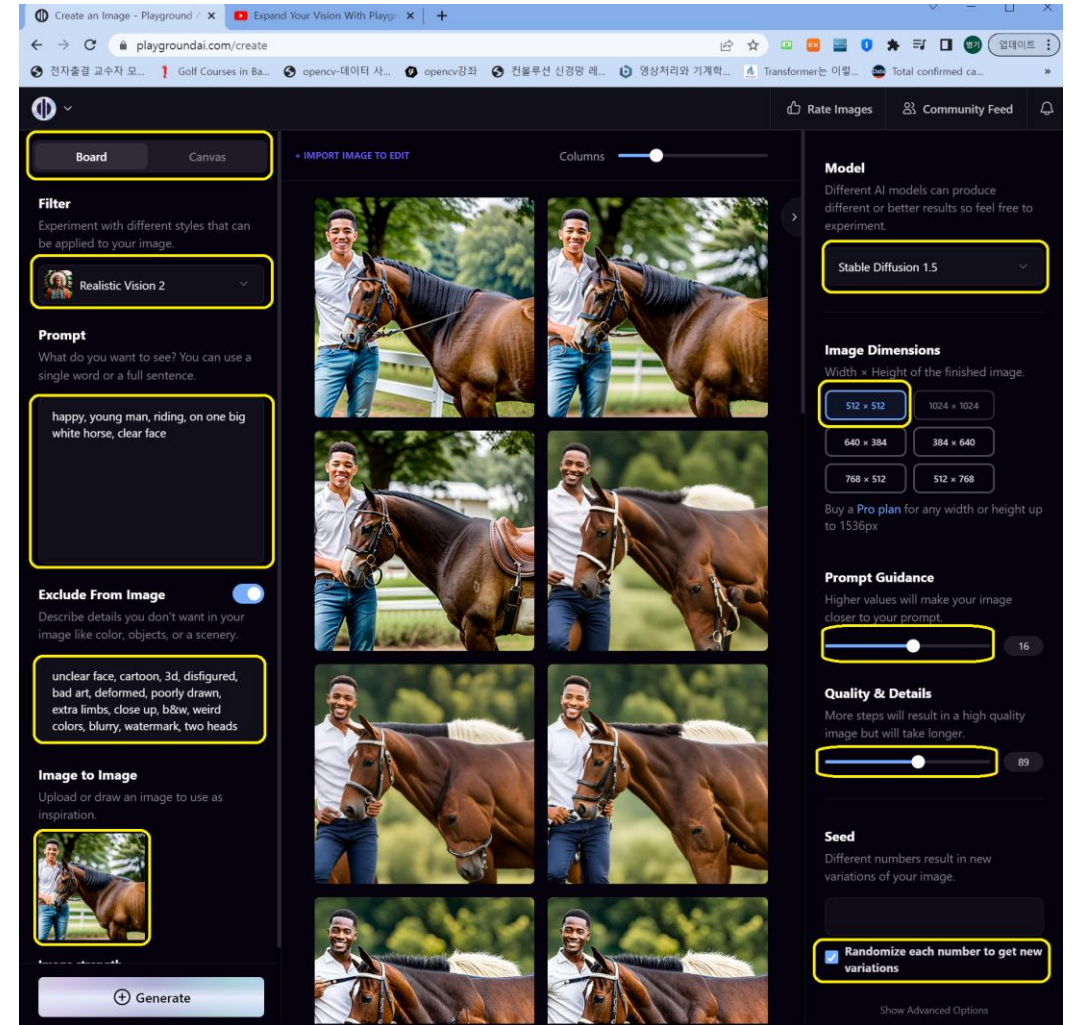
<https://fashionchallenge.ai> AI Fashion Challenge

<https://www.instagram.com/shael.ai/>

2. Playground AI를 이용한 이미지 생성 실습

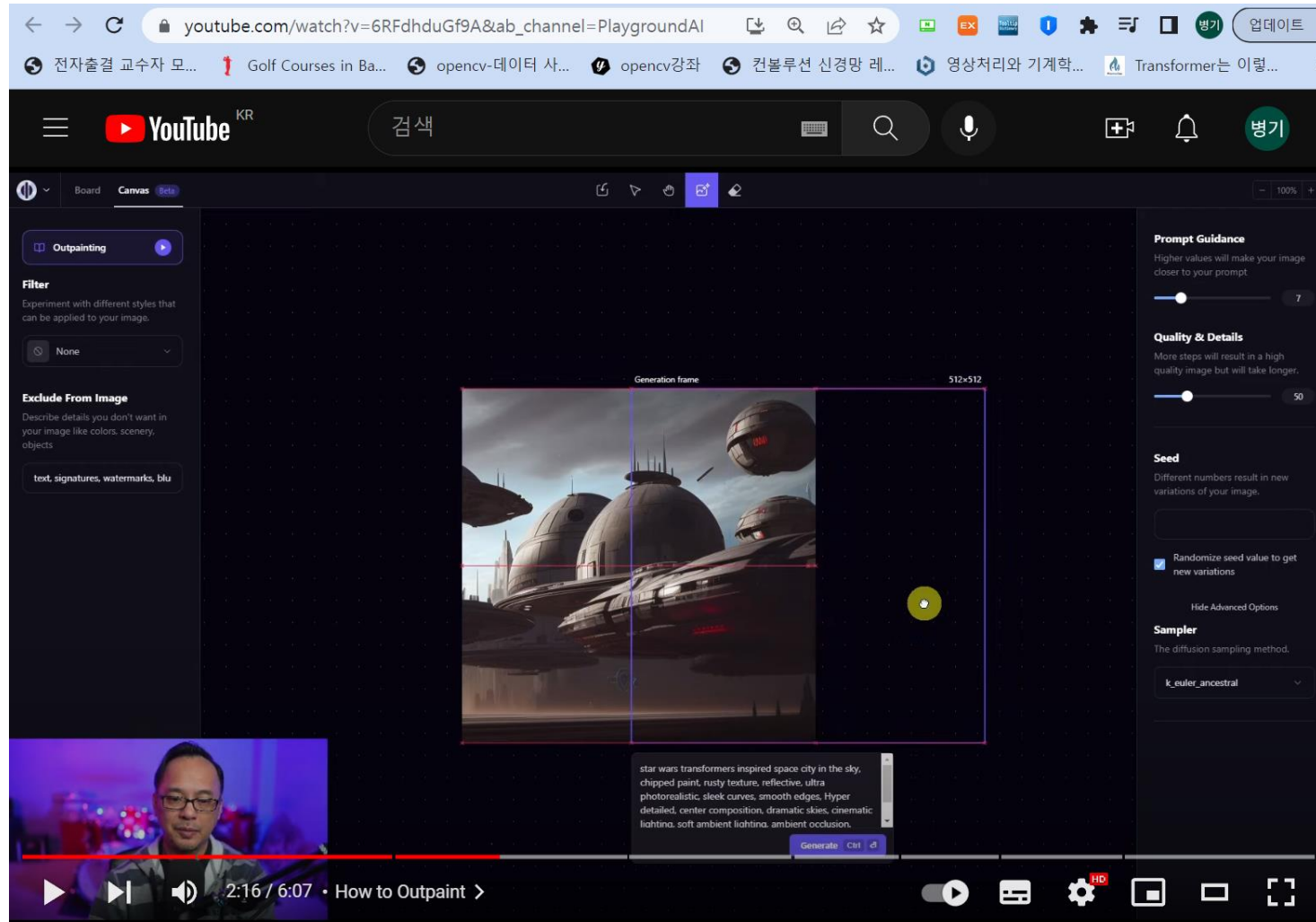


Playgroundai.com 접속 및 가입



이미지 생성 및 환경 설정

2. Playground AI를 이용한 이미지 생성 실습 (계속)

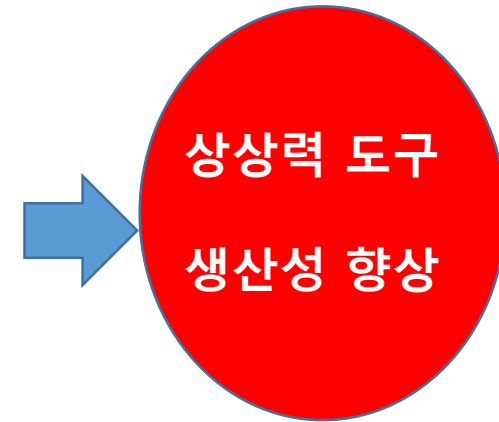


Expand Your Vision With Playground AI's New Canvas (Beta)

https://www.youtube.com/watch?v=6RFdhduGf9A&ab_channel=PlaygroundAI

3. 이미지 생성 AI의 대표적 활용 분야

Content Marketers	- 디자이너에게 아이디어를 쉽게 설명/전달 - 그림으로 독자에게 보다 쉽게 주목을 집중 시킴
Graphic Designers (logo/website)	- 그래픽 초안 작성 - 그래픽 작업 시 초기 영감 자료의 생성
Product Designers	- 다양한 (새로운)제품 디자인 생성 - 새로운 제품 디자인 생성의 밑그림
Architects/Decorators	- 기능적 요소 보다는 심미적 요소 차원에서 아이디어 제공 - Mood와 분위기 생성 - 데코레이션 대상의 색상, 모양 등에 영감
(Cartoon) Writers	- 상상력의 풍부화 - 만화화 작업의 효율화
AI (Training) Data Engineer	- 다양한 학습 데이터 증강



4. 대표적 이미지 생성용 AI 비교

	장점	단점	가격정책	프롬프트 길이(추천)
Midjourney	-생성 결과물 품질 우수 (colorful, vivid, detailed design) -커뮤니티 큼 -결과물 상용화 가능	-디스코드 통해 사용 -프롬프트와 결과물 공개 -유료화 (No Trial)	- \$10/month ~	60단어 이내
Dall.E 2	-사용이 쉬움 -API 제공	-결과물 퀄리티 -Photorealistic 낮음	- 115 credits/\$15 - \$0.016/img (api)	
DreamStudio (Stable Diffusion)	-보다Realistic 이미지 생성 -Open Source -API 제공 -Custom Data Training	-Learning Curve -사용 편의성	- 1,000 credits/\$10	380글자 이하
Leonardo AI	-Minimalistic, Clean, modern Design -자신의 모델 Training 가능 -인터페이스가 보다 직관적	 이하 생략		

5. 이미지 생성용 AI (Art) 프롬프트의 일반적인 구조

A. Content

subject	A Cat
action	looking up the sky
state	fearfully

B. Image Mood

on a nostalgic coffee table

C. Art Form, Style & Artist Reference

Photography

- Framing, lighting condition, camera type/lens , brand, specification

(Oil) Painting, watercolor

- Art Movement (impressionism, Fauvism), Artist Name (Cezanne, Gogh)

Illustration

- pencil drawing, charcoal sketch, cartoon, poster

Digital Art, Film Still, Sculpture, Collage, Street Art, Textile Art, Ceramic Art, Lithography

AI (Art) 프롬프트의 일반적인 구조(계속)

D. 부가적 설정

Framing: wide shot, point-of-view, dutch angle, * background

Lighting: soft light, hard light, dramatic lighting, morning, sunset, golden hour

Color Scheme: purple and green color scheme

Level of Detail and Realism: 4k, 8k, unreal engine, realistic, unrealistic

E. AI 모델별 특수 파라미터

Midjourney: (ex) --no buildings, --chaos 80, --ar 16:9

Stable Diffusion: generation steps, initial seed, negative prompt, prompt strength

6. AI Art 프롬프트 작업의 속성

Prompt engineers can be fiercely protective of these word jumbles, seeing them as the keys to unlock AI's most valuable prizes. The winner of a Colorado State Fair arts competition last year, who used Midjourney to beat out other artists, has refused to share his prompt, saying he spent **80 hours** perfecting it over **900 iterations** — though he did share a few sample words, such as "lavish" and "opulent."

.....

Stokes calls prompt engineers "multidisciplinary super-creators" and said there is a clear "skill bar" between experienced engineers and amateurs. The best creations, he said, rely on **humans' specialized knowledge** from **fields such as art history and graphic design**: "captured on 35mm film"; "Persian ... architecture in

.....

Steinert-Threlkeld, of the University of Washington, compared **prompt engineers** to the **"search specialists"** in the **early days of Google** who advertised secret techniques to find the perfect results — and who, as time passed and public adoption increased, became almost entirely obsolete. Isfahan"; "in the style of Henri de Toulouse-Lautrec."

<https://www.washingtonpost.com/technology/2023/02/25/prompt-engineers-techs-next-big-job/>

- Prompt Engineering : 프롬프트 입력 의도와 출력결과의 정렬(Alignment)
 - "The hottest new programming language is English," by Andrej Karpathy
 - 학습데이터와 모델(변경)에 의존적, 확률적
 - AI 기술 발전에 따라 Prompt Engineering 가치의 변화(축소) 가능성이 큼
- 반복적 작업
 - 학습언어에 의존적
 - Model/Data에 의존적
 - 가치 지속성에 의문

Part 2

다양한 이미지 생성(증강) 방법들



1. 실제 그림으로부터 프롬프트 역생성 (Reverse Engineering)

CLIP Interrogator - a Hugging Face Space

huggingface.co/spaces/pharma/CLIP-Interrogator

Hugging Face Search models, c Models Datasets Spaces Docs Solutions Pricing

Hugging Face is way more fun with friends and colleagues! Join an organization Dismiss this message

Spaces: pharma / CLIP-Interrogator like 1.83k Running on A10G

App Files Community 503

CLIP Interrogator

Want to figure out what a good prompt might be to create new images like an existing one?
The CLIP Interrogator is here to get you answers!

You can skip the queue by duplicating this space and upgrading to gpu in settings: Duplicate Space

Prompt Analyze

Image



CLIP Model

ViT-L (best for Stable Diffusion 1.*)

Mode

☒ best ☐ fast ☐ classic ☐ negative

제출하기

Output

a dirt road that has a bunch of trees on it, baobab trees, looking out at a pink ocean, towers, by Mary McEvoy, the world between death and life, ad image, bone plants, enormous trees, connectedness, long tails, hdt, many thick dark knotted branches, benoit b

<https://huggingface.co/spaces/pharma/CLIP-Interrogator>

2. 타인의 그림으로부터 프롬프트 Copy

promptbase.com/prompt/world-travelers-mixed-media-indigo-art

PromptBase

Search Prompts

Marketplace Generate Hire Login

AI Models Art & Illustrations Logos & Icons Graphics & Design Productivity & Writing Marketing & Business Photography Games & 3D

Midjourney

World Traveler Mixed Media Indigo Art

20 words Tested Tips HQ Images V5

647 @chiavenna No reviews yet 31 10

Generates a huge variety of stunning experimental mixed media indigo art. This is a very versatile prompt and any subjects/attire/scenes can be used :). All prompts for the example images are included with your purchase. If you have any questions or would like a custom prompt made just for you please don't hesitate to send me a message.

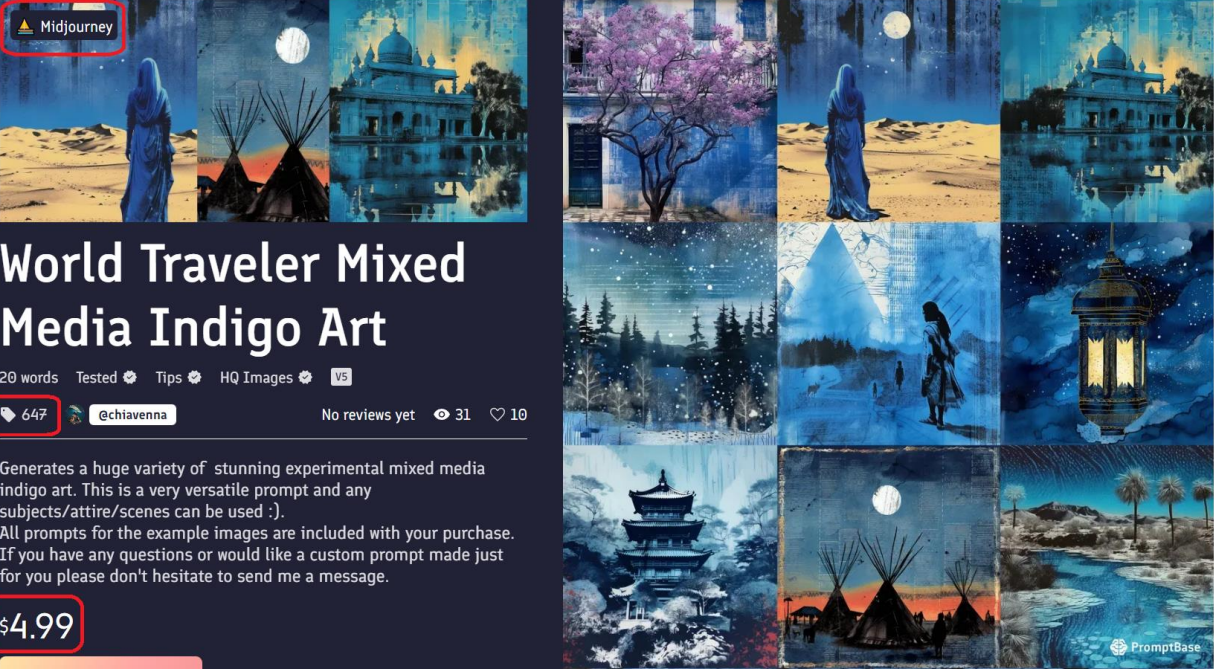
\$4.99

Get Prompt

After purchasing, you will gain access to the prompt file, which you can use with Midjourney. You must already have access to Midjourney to use this prompt.

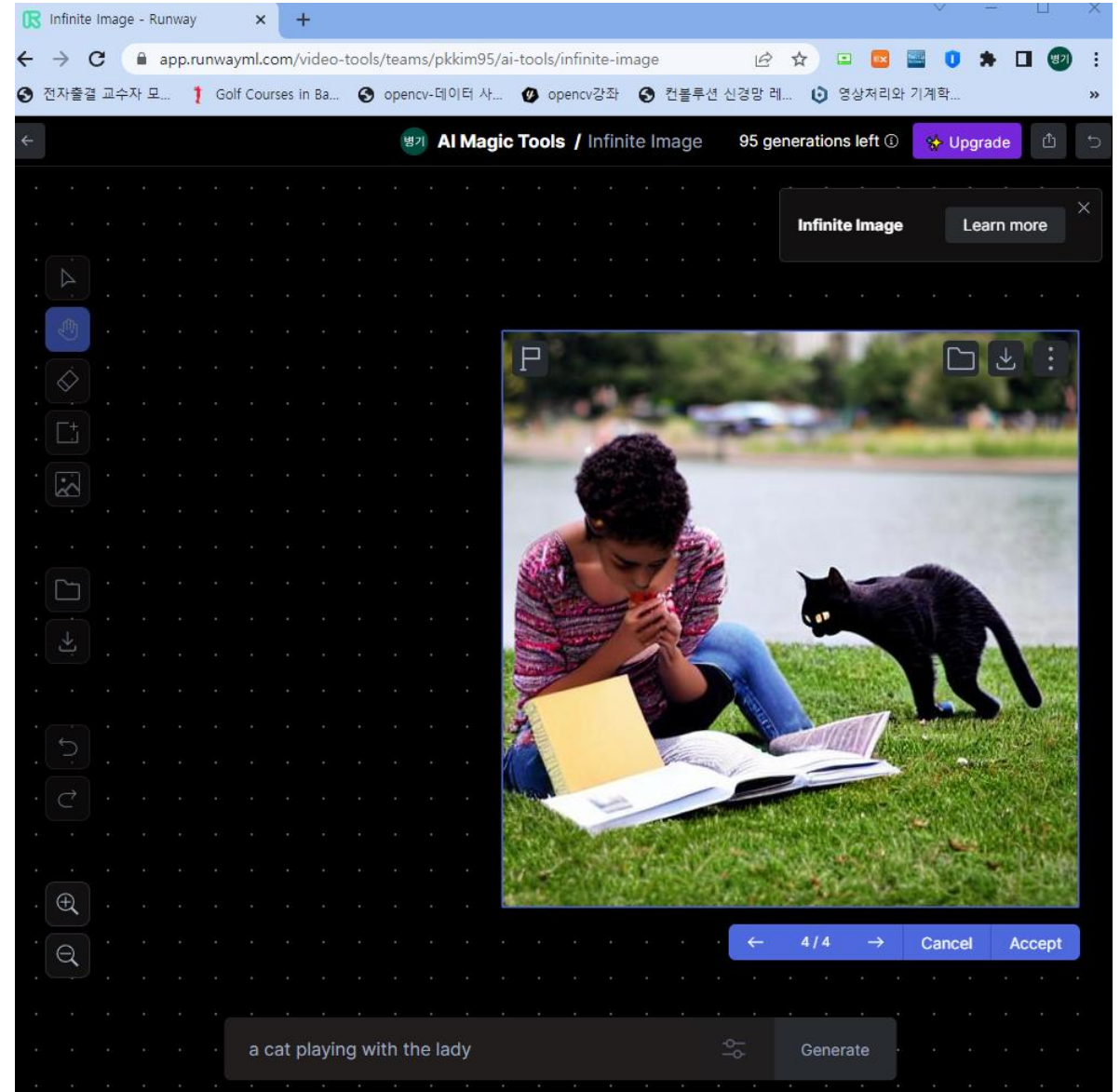
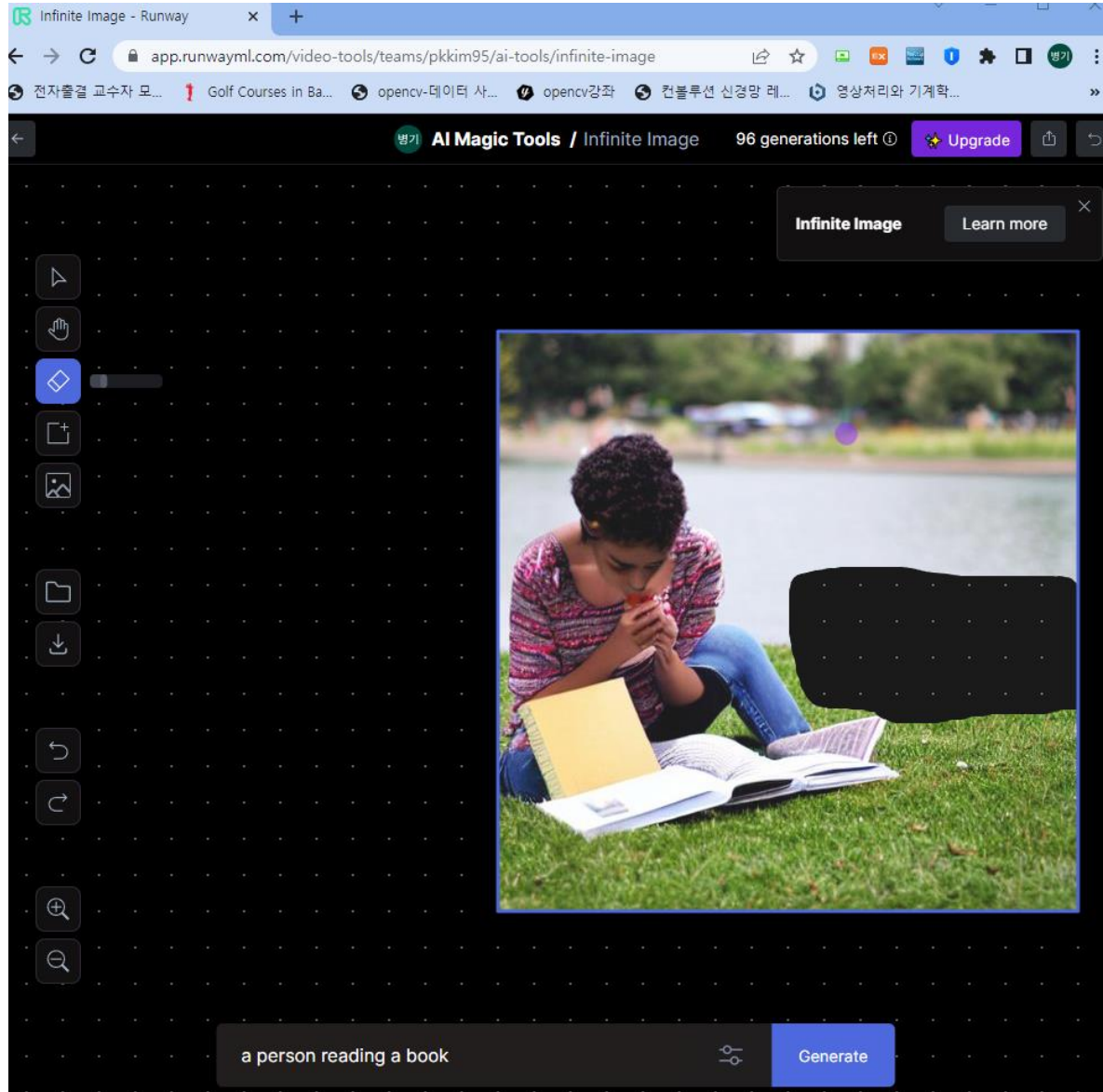
By purchasing this prompt, you agree to our [terms of service](#).

6 hours ago

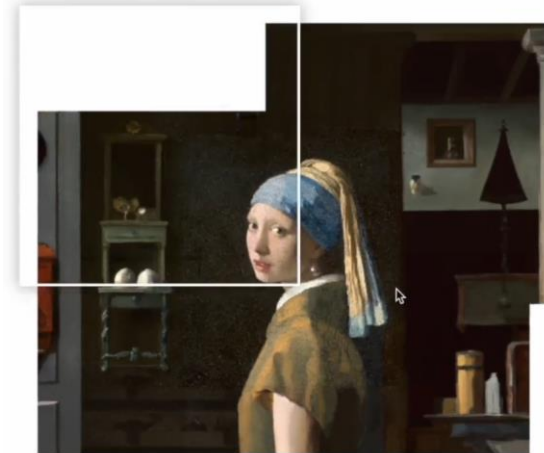
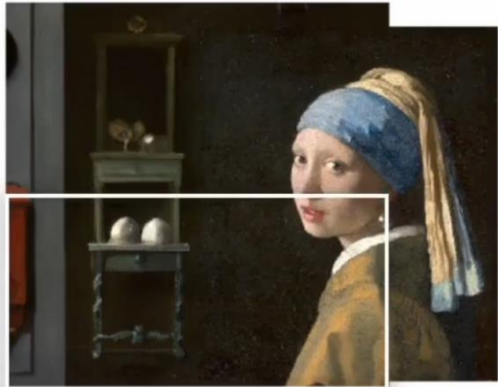


<https://promptbase.com/prompt/world-travelers-mixed-media-indigo-art>

3. 이미지 증강 (Image-to-Image, inpainting)



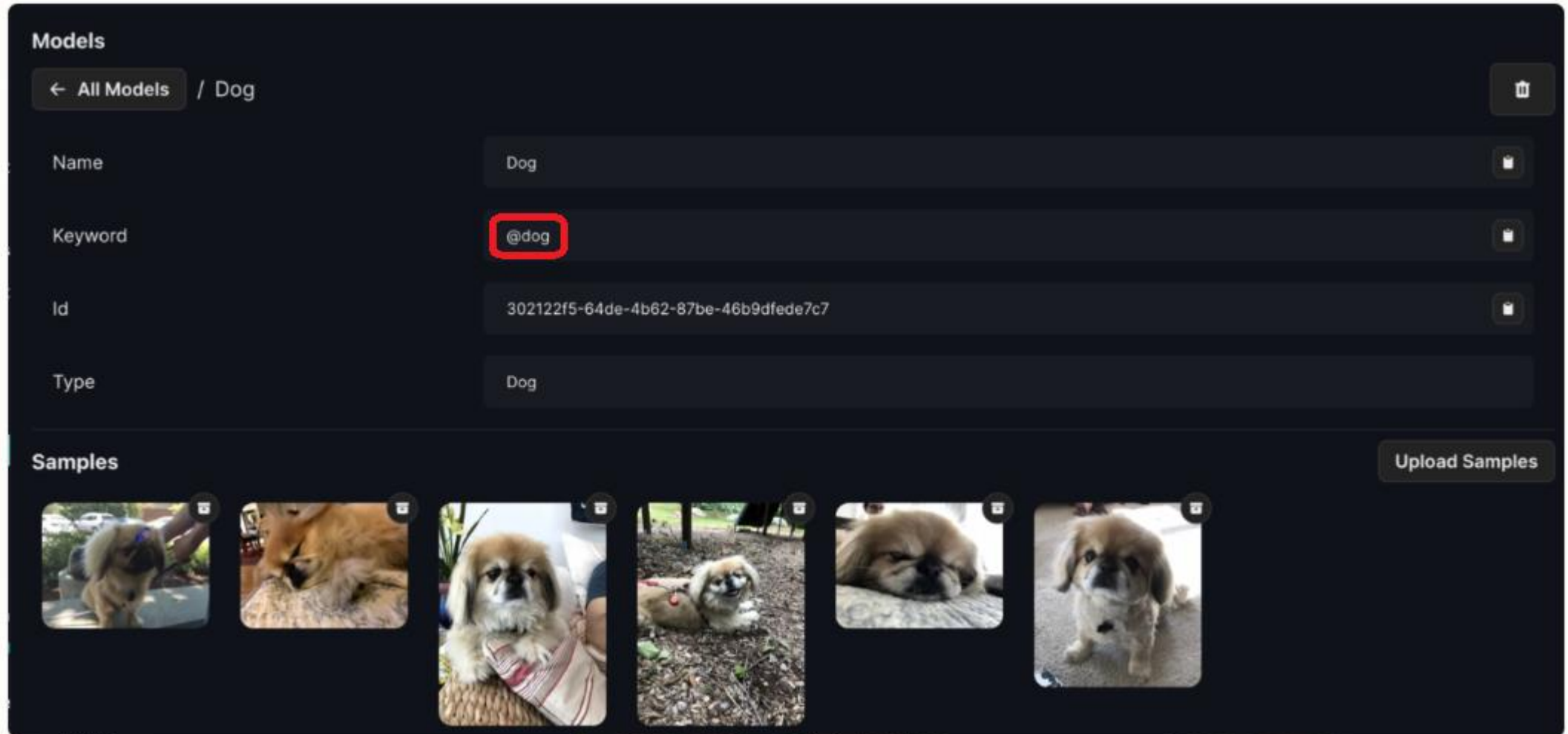
3. 이미지 증강 (Image-to-Image, outpainting)



Original: *Girl with a Pearl Earring* by Johannes Vermeer. Outpainting: August Kamp × DALL·E

4. 자신의 특정 이미지 모델 Training (1/2)

Step1. 특정 사진 준비/업로드/키워드 설정 (leapai, LeonardoAI,)



The screenshot displays the Leap AI interface for creating a custom model. The 'Models' section shows a list of models, with 'Dog' selected. The 'Keyword' field is highlighted with a red box and contains the text '@dog'. Below the model details, the 'Samples' section shows a row of six dog images. An 'Upload Samples' button is visible in the top right corner of the Samples section.

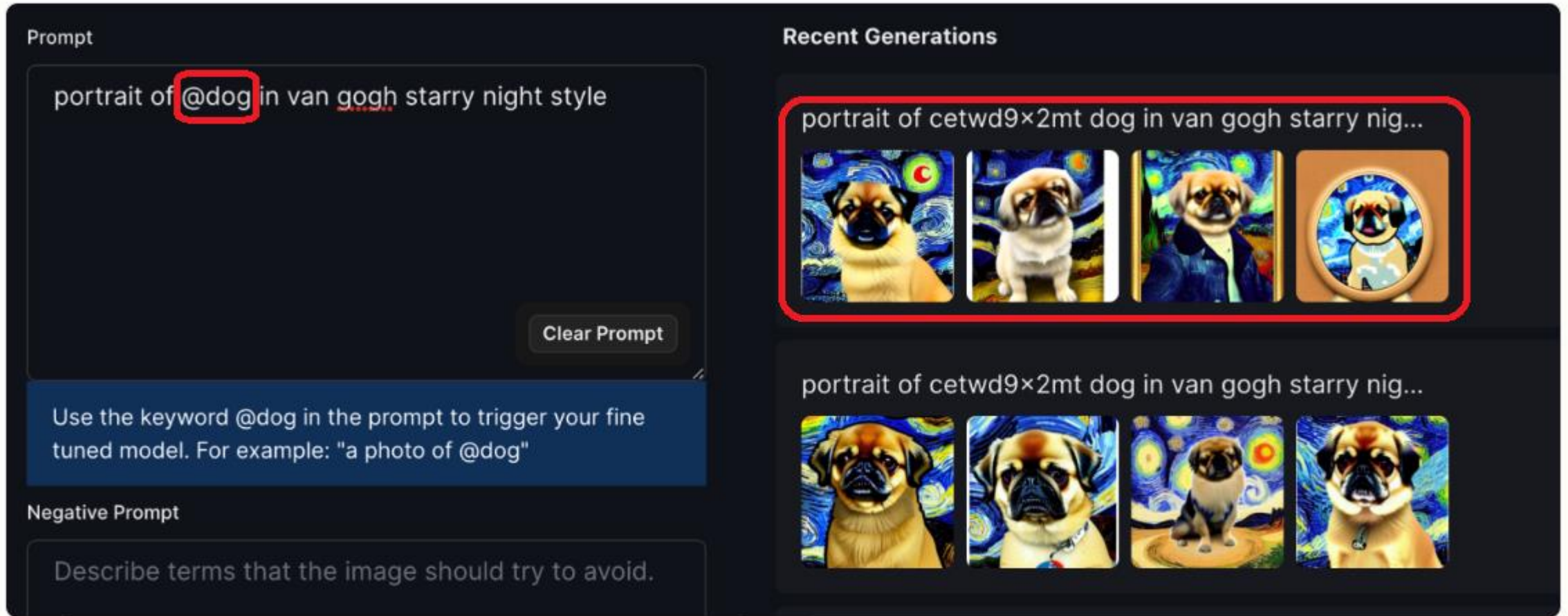
Models	
← All Models / Dog	
Name	Dog
Keyword	@dog
Id	302122f5-64de-4b62-87be-46b9dfede7c7
Type	Dog

Samples

Upload Samples

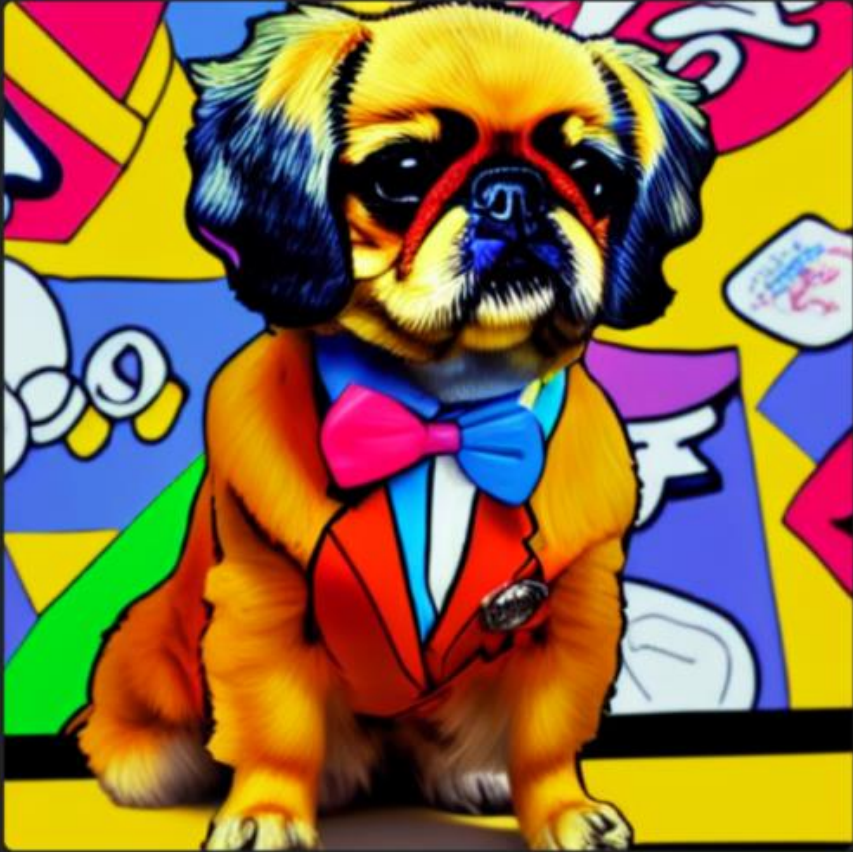
4. 자신의 특정 이미지 모델 Training (2/2)

Step2. 키워드 포함 프롬프트로 특정 아이템 포함 이미지 생성

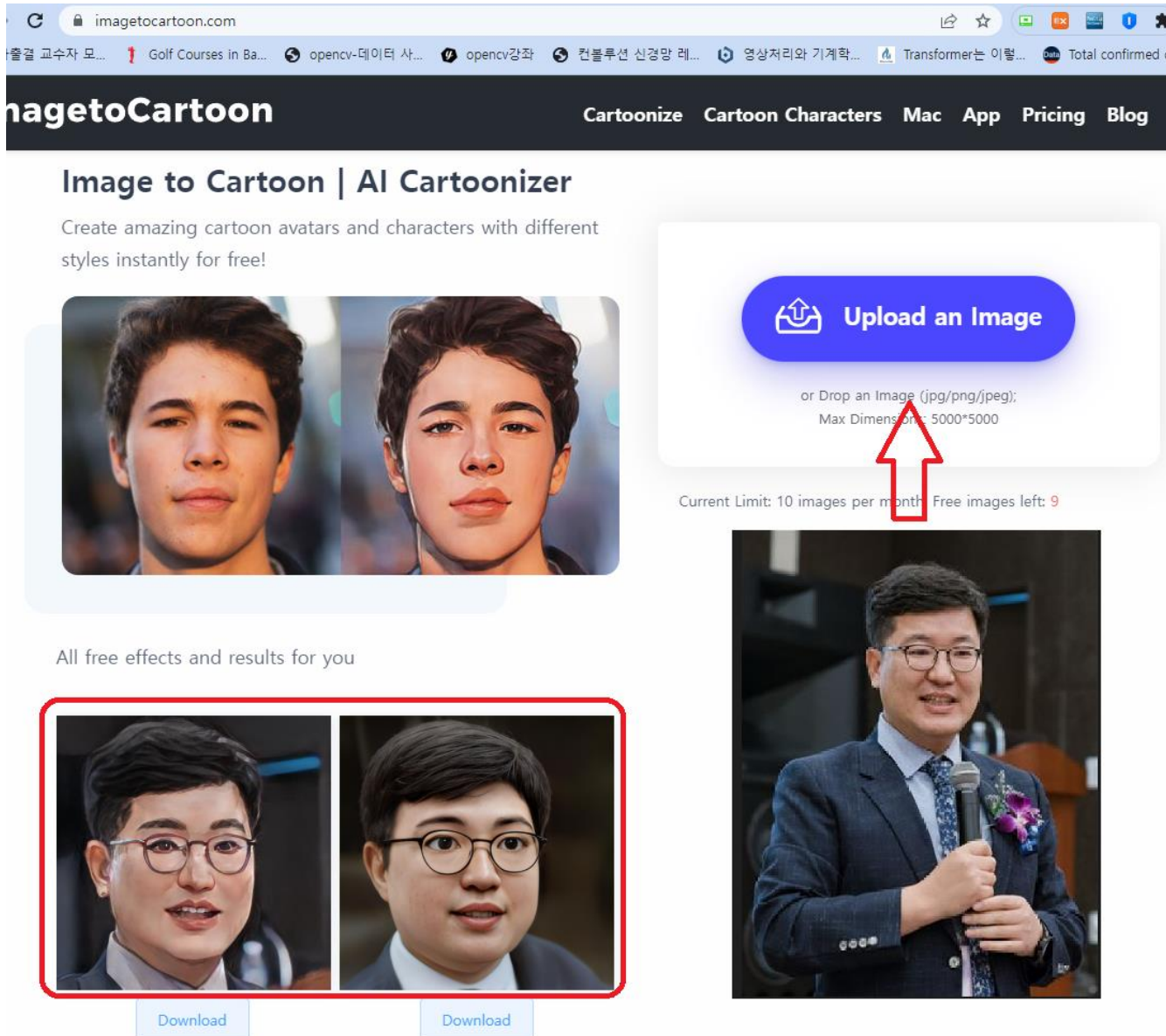


5. 생성 시모델 설정의 Fine-Tuning

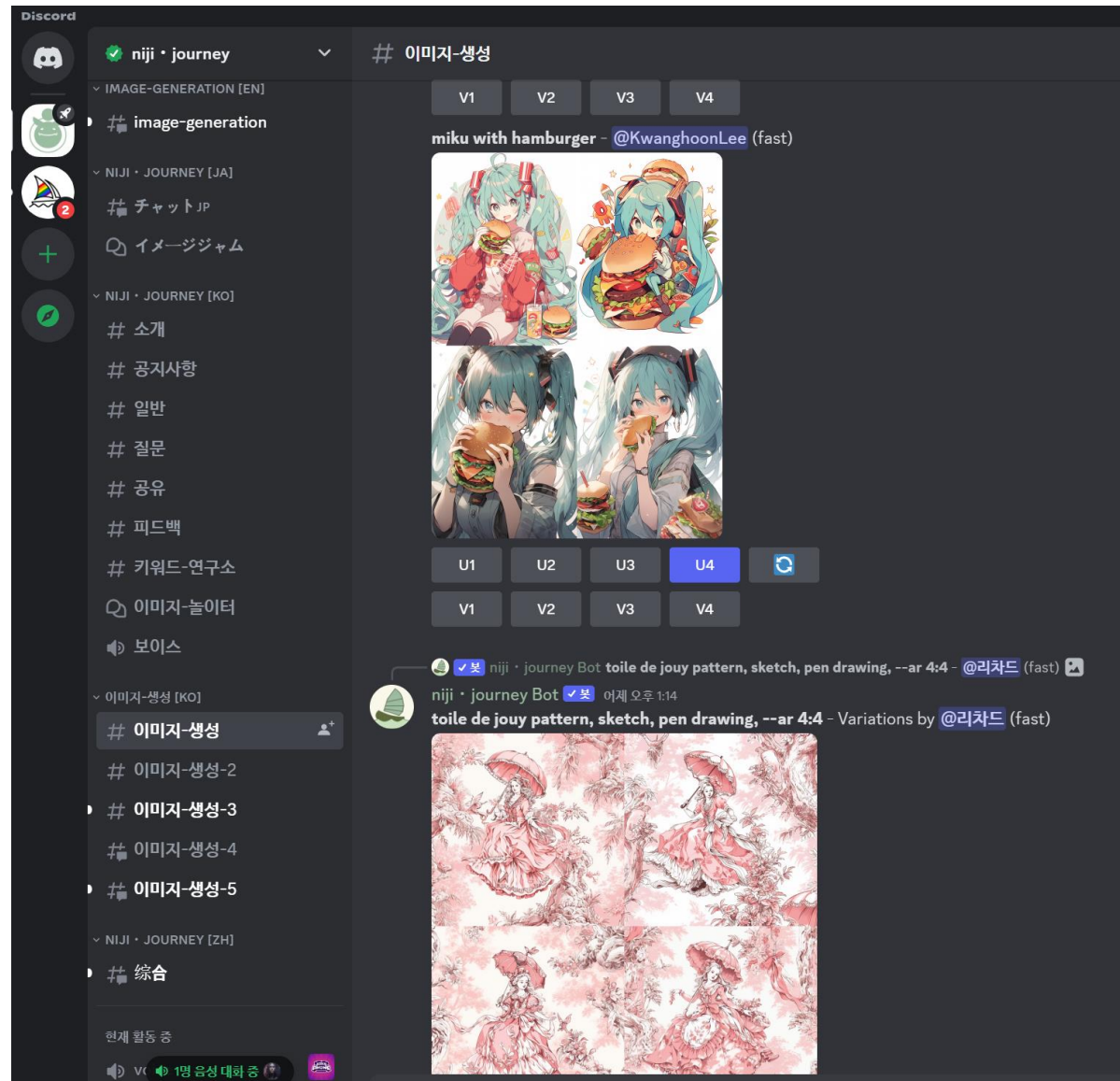
Model Id	302122f5-64de-4b62-87be-46b9
Prompt	8k portrait of <u>cetwd9x2mt dog</u> , pop art style, incredibly detailed faces, wearing a colorful men's
Negative Prompt	
Seed	2318827892
Steps	30
Height	512
Width	512
Upscale Option	x1
Prompt Strength	7



6. 특정 이미지 생성용 AI모델의 사용(ex: Cartoon)

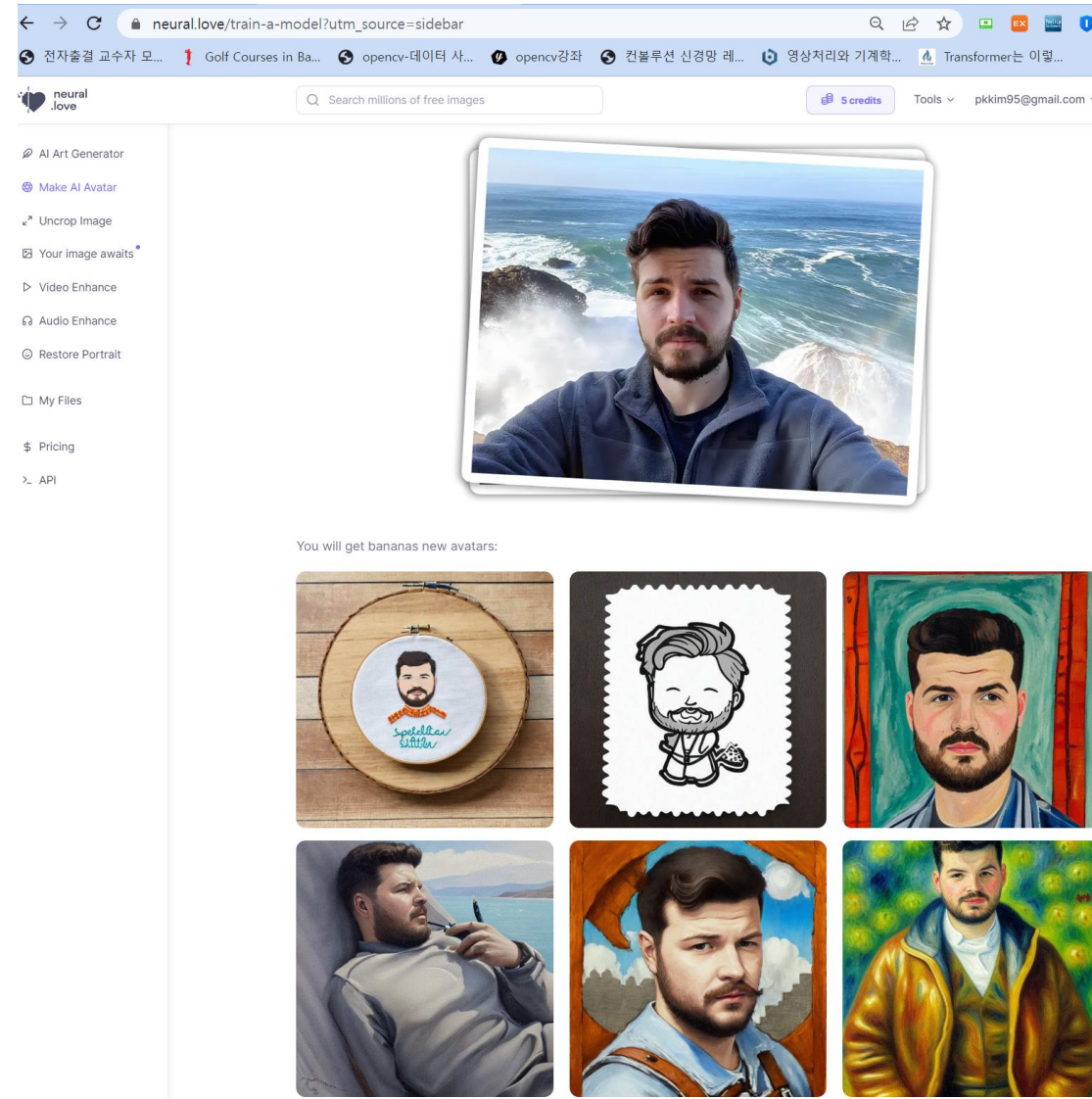


6. 특정 이미지 생성용 AI모델의 사용(ex: Animation Image)



<https://nijijourney.com/ko/>

6. 특정 이미지 생성용 AI모델의 사용(ex: Avatar)



7. 이미지 편집용 AI Tools / Open-Source 의 사용

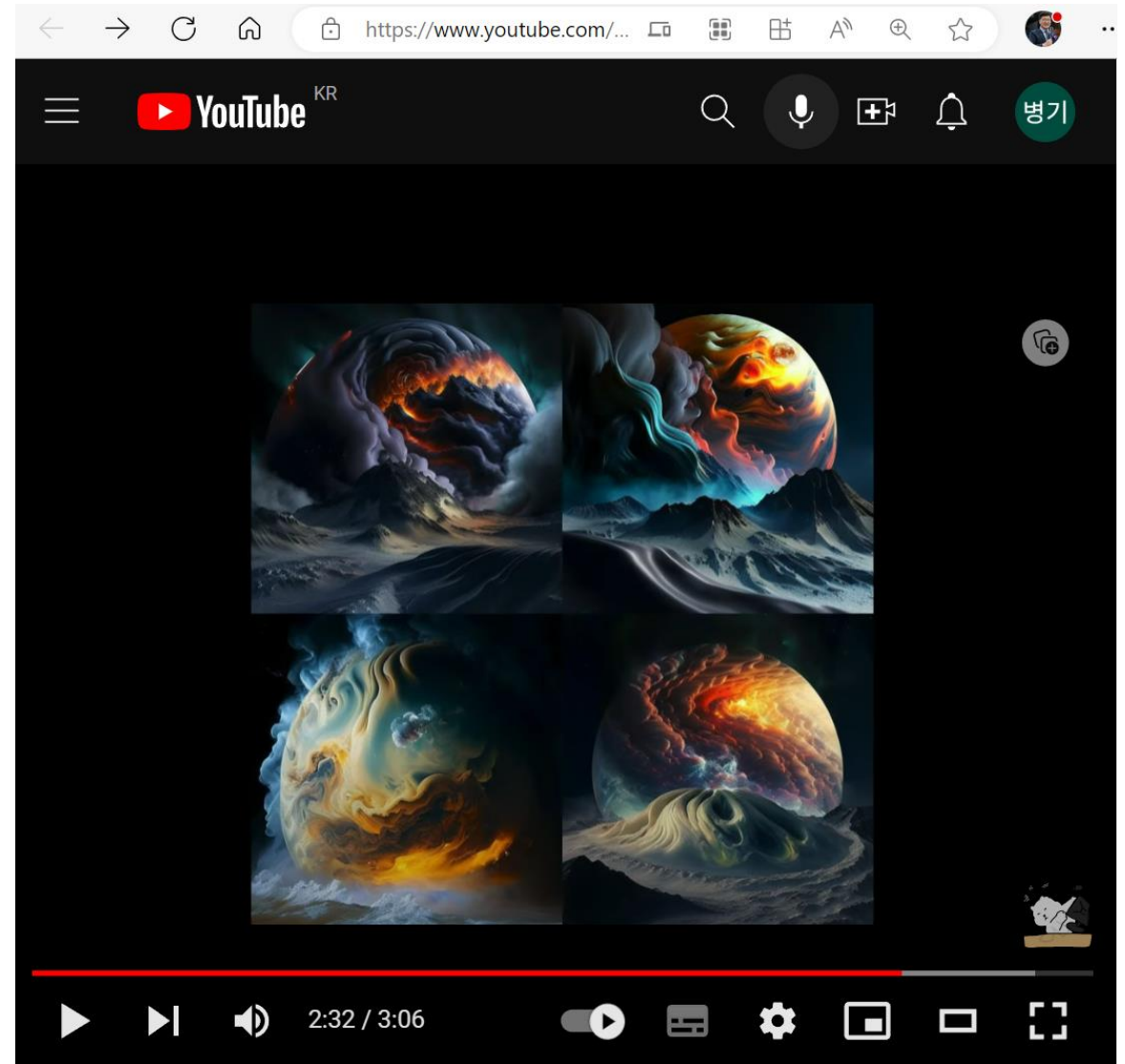
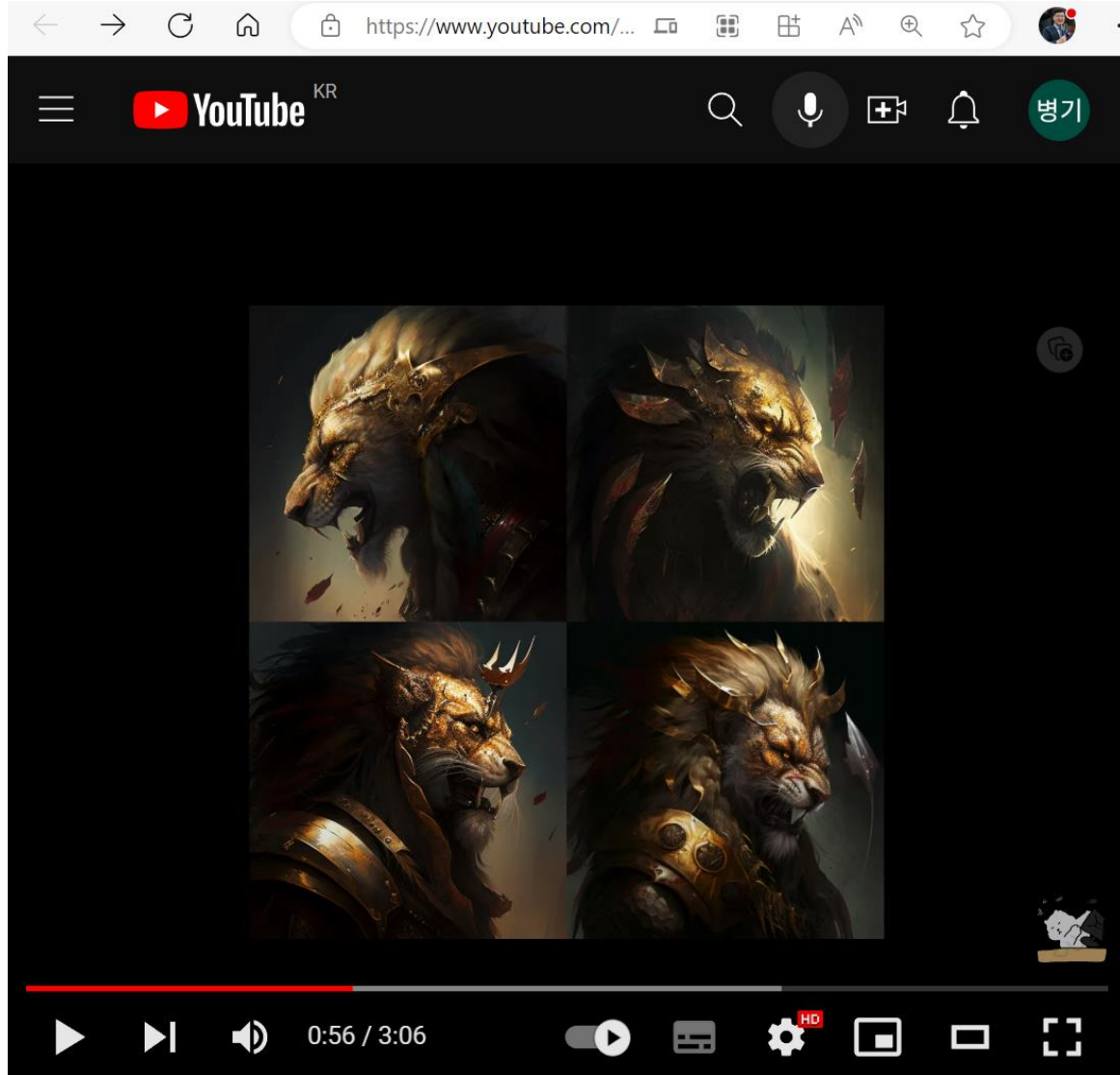
Canva/Photoshop의 Magic Eraser



Lama-cleaner (<https://github.com/Sanster/lama-cleaner>)



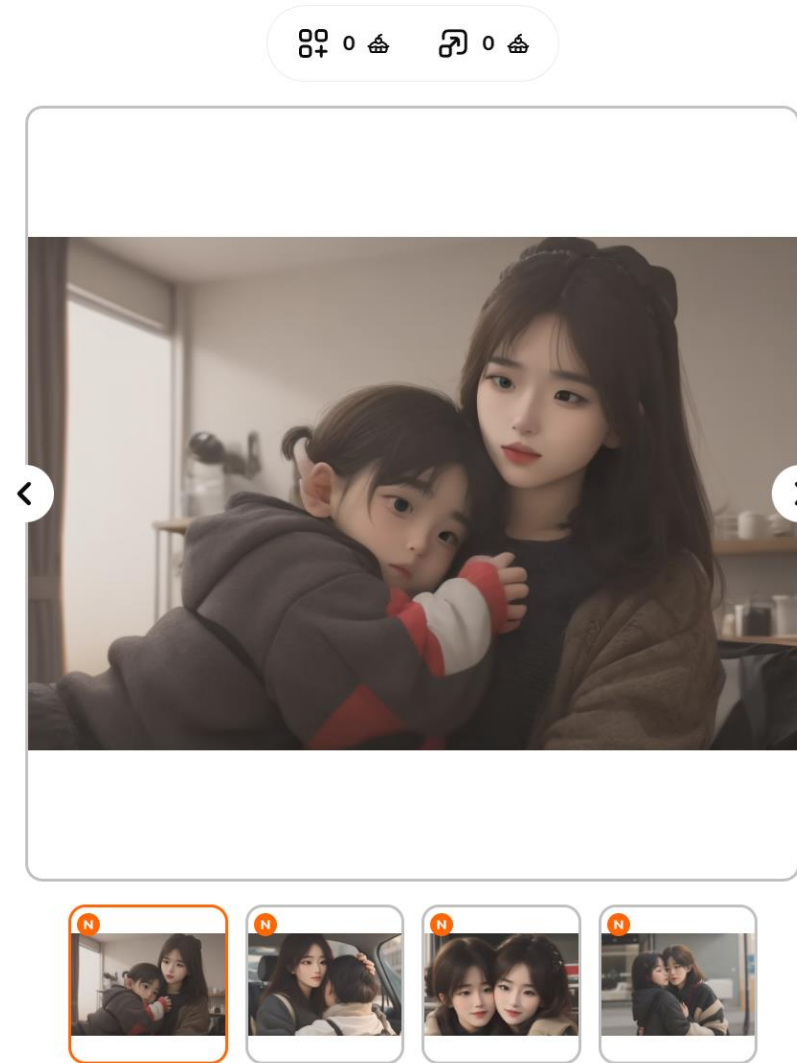
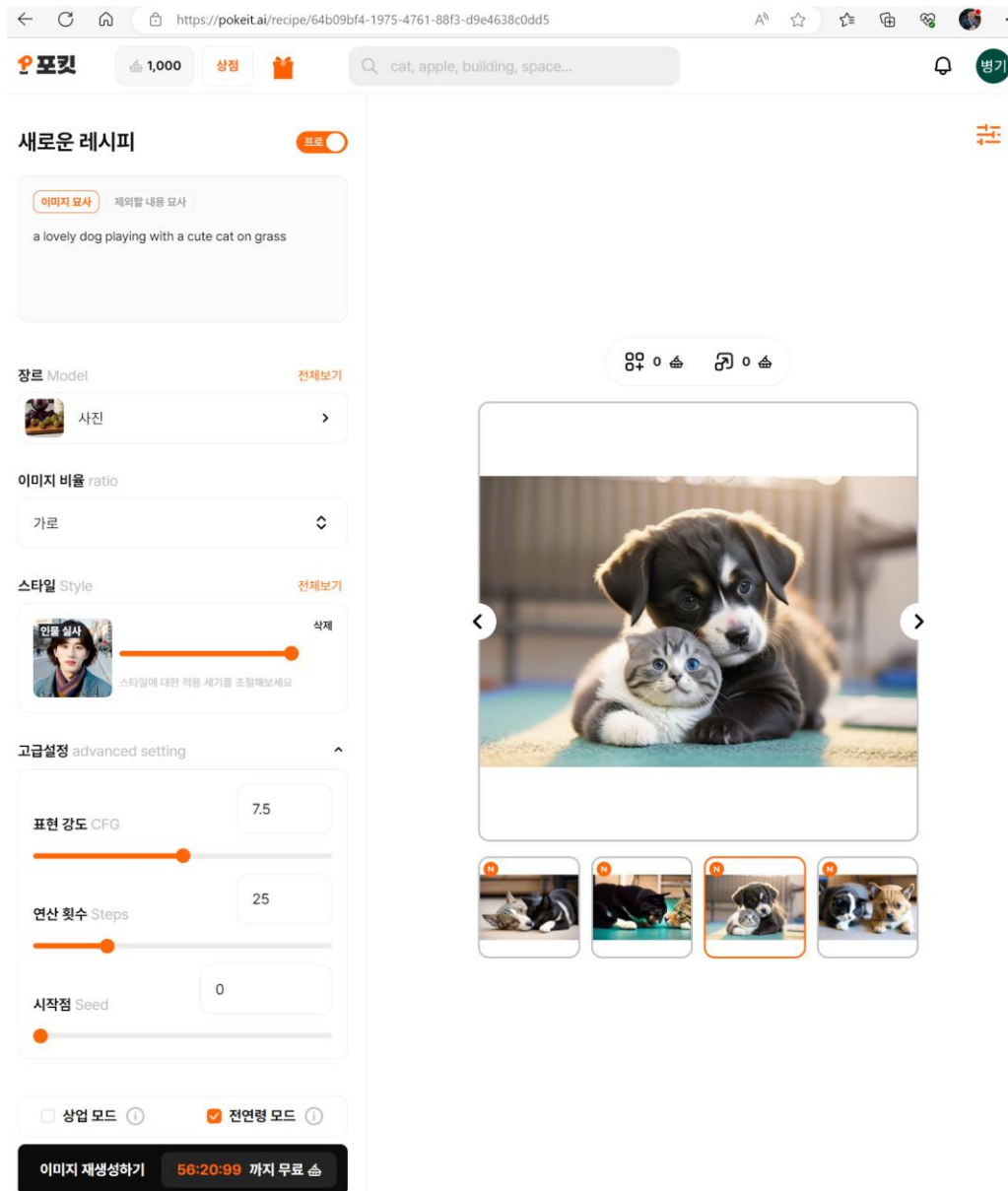
8. chatGPT와 같은 언어생성 모델의 사용 (prompt generation)



9. chatGPT와 같은 언어생성 모델의 활용 (midjourney Prompt 구조)

Subject: Cat, mountain, beach	Theme: Adventure, nature, family
Adjective: Vibrant, moody, romantic	Symbolism: Tree of life, heart, infinity sign
Setting: Urban, rural, futuristic	Action: Dancing, running, flying
Art style: Abstract, impressionistic, photorealistic	Sound: Music, silence, nature sounds
Art type: Portrait, landscape, still life	Shape: Circular, angular, organic
Color scheme: Monochromatic, pastel, warm and cozy	Contrast: Light and dark, soft and hard, warm and cool
Mood: Calm, mysterious, cheerful	Focal point: Object, person, scene
Emotion: Love, anger, nostalgia	Detail: Fine, medium, coarse
Composition: Symmetrical, asymmetrical, diagonal	Movement: Dynamic, static, chaotic
Perspective: Bird's-eye view, worm's-eye view, point-of-view	Depth: Shallow, deep, infinite
Time of day: Sunrise, afternoon, dusk	Fantasy elements: Dragons, unicorns, mermaids
Lighting: Soft, dramatic, backlit	Realism: Photorealistic, abstracted, surreal
Texture: Smooth, rough, glossy	Scale: Life-size, miniature, colossal
Medium: Oil paint, watercolor, charcoal	Proportion: Human, animal, object
Genre: Sci-fi, horror, comedy	Repetition: Pattern, series, sequence.

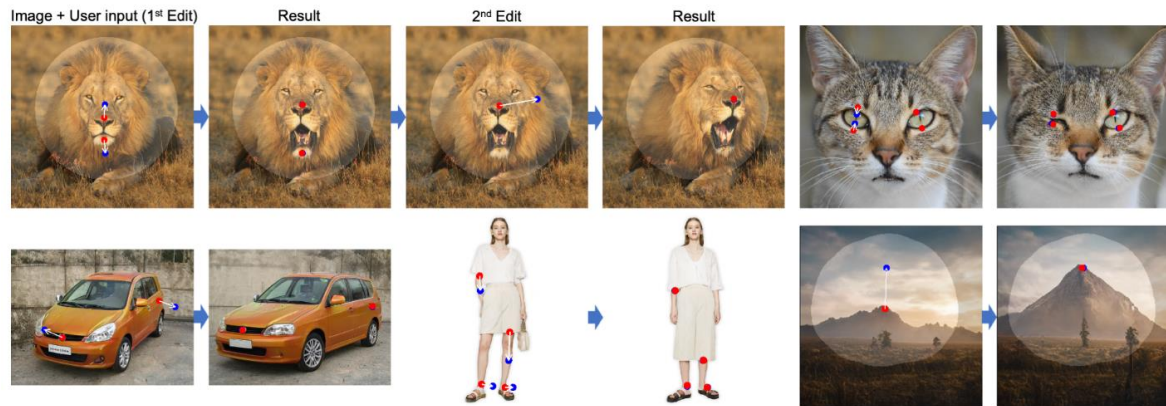
9. 계속 발전하는 새로운 이미지생성 AI의 탐색/활용



A Korean soldier meeting his mother in his army service

[Pokeit - AI 이미지 생성 레시피 공유 플랫폼](https://pokeit.ai)

10. Interactive AI 툴과 Much More.....



Abstract

Synthesizing visual content that meets users' needs often requires flexible and precise controllability of the pose, shape, expression, and layout of the generated objects. Existing approaches gain controllability of generative adversarial networks (GANs) via manually annotated training data or a prior 3D model, which often lack flexibility, precision, and generality. In this work, we study a powerful yet much less explored way of controlling GANs, that is, to "drag" any points of the image to precisely reach target points in a user-interactive manner, as shown in Fig.1. To achieve this, we propose DragGAN, which consists of two main components including: 1) a feature-based motion supervision that drives the handle point to move towards the target position, and 2) a new point tracking approach that leverages the discriminative GAN features to keep localizing the position of the handle points. Through DragGAN, anyone can deform an image with precise control over where pixels go, thus manipulating the pose, shape, expression, and layout of diverse categories such as animals, cars, humans, landscapes, etc. As these manipulations are performed on the learned generative image manifold of a GAN, they tend to produce

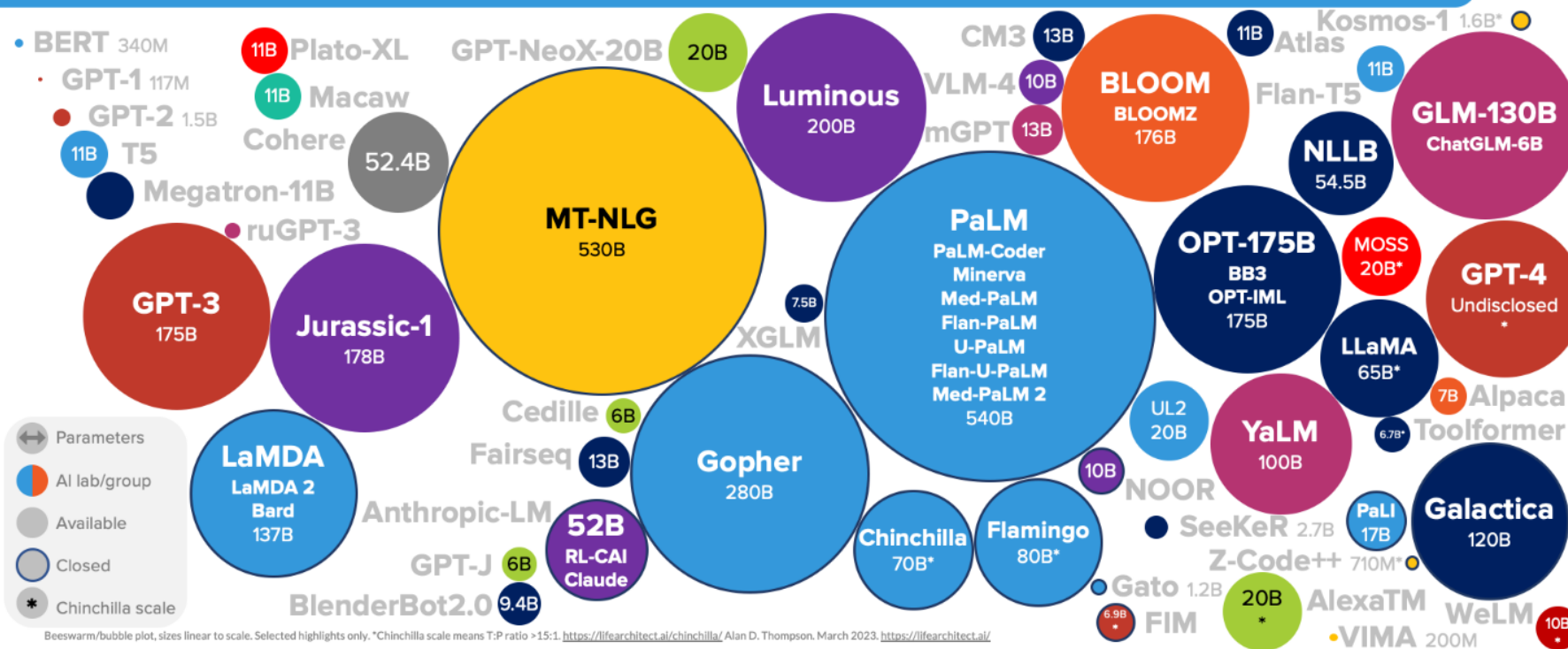
<https://github.com/XingangPan/DragGAN>

<https://vcai.mpi-inf.mpg.de/projects/DragGAN/>

새로운 (생성)모델은 날마다...

2023년 3월기준 대규모 AI 언어모델들

LANGUAGE MODEL SIZES TO MAR/2023



Beeswarm/bubble plot, sizes linear to scale. Selected highlights only. *Chinchilla scale means T:P ratio >15:1. <https://lilearchitect.ai/chinchilla/> Alan D. Thompson, March 2023. <https://lilearchitect.ai/>



LifeArchitect.ai/models

Part 3

AI 생성모델 직접 운영 (Stable Diffusion 설치)



1. 개인 PC에 stable Diffusion 구축 방법

A. 기본환경 및 절차

GPU (메모리 4G 이상), 디스크 (5G 이상)

Python, git S/W 설치

소스(github.com/stable-diffusion-webui) 다운로드/ 설치

웹브라우저에서 <http://127.0.0.1:7860/> 접속하여 실행

B. 특징

비용에 관계없이 이미지 생성

github.com/AUTOMATIC1111/stable-diffusion-webui

Features

Detailed feature showcase with images:

- Original txt2img and img2img modes
- One click install and run script (but you still must install python and git)
- Outpainting
- Inpainting
- Color Sketch
- Prompt Matrix
- Stable Diffusion Upscale
- Attention, specify parts of text that the model should pay more attention to
 - a man in a ((tuxedo)) - will pay more attention to tuxedo

```

관리자: 명령 프롬프트 - webui-user.bat
D:\mypyprojects\stable-diffusion-webui>webui-user.bat
Creating venv in directory D:\mypyprojects\stable-diffusion-webui\venv using python "C:\Users\wpkkin\AppData\Local\Programs\Python\Python310\python.exe"
venv "D:\mypyprojects\stable-diffusion-webui\venv\Scripts\Python.exe"
Python 3.10.6 (tags/v3.10.6:9c7b4bd, Aug 1 2022, 21:53:49) [MSC v.1932 64 bit (AMD64)]
Version: vl.3.2
Commit hash: baf6946e06249c5af9851c60171692c44ef633e0
Installing torch and torchvision
Looking in indexes: https://pypi.org/simple, https://download.pytorch.org/whl/cu118
Collecting torch==2.0.1
  Downloading https://download.pytorch.org/whl/cu118/torch-2.0.1%2Bcu118-cp310-cp310-win_amd64.whl (2619.1 MB)
    2.6/2.6 GB 1.5 MB/s eta 0:00:00
Collecting torchvision==0.15.2
  Downloading https://download.pytorch.org/whl/cu118/torchvision-0.15.2%2Bcu118-cp310-cp310-win_amd64.whl (4.9 MB)
    4.9/4.9 MB 11.3 MB/s eta 0:00:00
Collecting networkx
  Downloading networkx-3.1-py3-none-any.whl (2.1 MB)
    2.1/2.1 MB 9.4 MB/s eta 0:00:00
Collecting jinja2
  Downloading https://download.pytorch.org/whl/Jinja2-3.1.2-py3-none-any.whl (133 kB)
    133.1/133.1 kB 8.2 MB/s eta 0:00:00
Collecting filelock
  Downloading filelock-3.12.2-py3-none-any.whl (10 kB)
Collecting typing_extensions
  Downloading typing_extensions-4.6.3-py3-none-any.whl (31 kB)
Collecting sympy
  Downloading sympy-1.12-py3-none-any.whl (5.7 MB)
    5.7/5.7 MB 8.5 MB/s eta 0:00:00
Collecting requests
  Downloading requests-2.31.0-py3-none-any.whl (62 kB)
    62.6/62.6 kB 3.3 MB/s eta 0:00:00
Collecting pillow<8.3.*>=5.3.0
  Downloading Pillow-9.5.0-cp310-cp310-win_amd64.whl (2.5 MB)
    2.5/2.5 MB 9.4 MB/s eta 0:00:00
Collecting numpy
  Downloading numpy-1.25.0-cp310-cp310-win_amd64.whl (15.0 MB)
    15.0/15.0 MB 9.0 MB/s eta 0:00:00
Collecting MarkupSafe>=2.0
  Downloading MarkupSafe-2.1.3-cp310-cp310-win_amd64.whl (17 kB)
Collecting certifi>=2017.4.17
  Downloading certifi-2023.5.7-py3-none-any.whl (156 kB)
    157.0/157.0 kB 9.2 MB/s eta 0:00:00
Collecting idna<4,>=2.5
  Downloading https://download.pytorch.org/whl/idna-3.4-py3-none-any.whl (61 kB)
    61.5/61.5 kB 3.2 MB/s eta 0:00:00
Collecting urllib3<3,>=1.21.1
  Downloading urllib3-2.0.3-py3-none-any.whl (123 kB)
    123.6/123.6 kB 7.1 MB/s eta 0:00:00
Collecting charset-normalizer<4,>=2
  Downloading charset-normalizer-3.1.0-cp310-cp310-win_amd64.whl (97 kB)
    97.1/97.1 kB ? eta 0:00:00
Collecting mmhath>=0.19
  Using cached mmhath-1.3.0-py3-none-any.whl (536 kB)
Installing collected packages: mmhath, urllib3, typing_extensions, sympy, pillow, numpy, networkx, MarkupSafe, idna, fil
elock, charset-normalizer, certifi, requests, Jinja2, torch, torchvision
Successfully installed MarkupSafe-2.1.3 certifi-2023.5.7 charset-normalizer-3.1.0 filelock-3.12.2 idna-3.4 Jinja2-3.1.2
mmhath-1.3.0 networkx-3.1 numpy-1.25.0 pillow-9.5.0 requests-2.31.0 sympy-1.12 torch-2.0.1+cu118 torchvision-0.15.2+cu11
8 typing_extensions-4.6.3 urllib3-2.0.3

[notice] A new release of pip available: 22.2.1 -> 23.1.2
[notice] To update, run: D:\mypyprojects\stable-diffusion-webui\venv\Scripts\python.exe -m pip install --upgrade pip
Installing gpgan
Installing clip
Installing open_clip
Cloning Stable Diffusion into D:\mypyprojects\stable-diffusion-webui\repositories\stable-diffusion-stability-ai...
Cloning Laming Transformers into D:\mypyprojects\stable-diffusion-webui\repositories\Laming-transformers...
Cloning K-diffusion into D:\mypyprojects\stable-diffusion-webui\repositories\K-diffusion...
Cloning CodeFormer into D:\mypyprojects\stable-diffusion-webui\repositories\CodeFormer...
Cloning BLIP into D:\mypyprojects\stable-diffusion-webui\repositories\BLIP...
Installing requirements for CodeFormer
Installing requirements
Launching Web UI with arguments:
No module xformers. Proceeding without it.
Downloading: "https://huggingface.co/runwayml/stable-diffusion-v1-5/resolve/main/v1-5-pruned-emaonly.safetensors" to D:\m
ypyprojects\stable-diffusion-webui\models\Stable-diffusion\v1-5-pruned-emaonly.safetensors
63% |██████████| 2.52G/3.97G [03:55<02:12, 11.8MB/s]

```


2. 개인 PC에 stable Diffusion 실행 방법

← → ↺ 127.0.0.1:7860

전자출결 교수자 모... Golf Courses in Ba... opencv-데이터 사... opencv강좌 컨볼루션 신경망 레... 영상처리와 기계학... Transformer는 이렇... Total confirmed ca... 인터넷으로 공중파...

Stable Diffusion checkpoint

v1-5-pruned-emaonly.safetensors [6ce0161689] 🔄

txt2imgExtrasPNG InfoCheckpoint MergerTrainSettingsExtensions

A handsome man, riding on, a white horse, holding a cute cat, in his hand

19/75

small horse, standing person, many cats

8/75

Generate



Styles

× 🔄

Sampling method

Euler a

Sampling steps

75

☒ Restore faces ☐ Tiling ☐ Hires. fix

Width

1024

Height

1024

Batch count

1

Batch size

1

CFG Scale

20

Seed

-1

 ☐ Extra

Script

None







Save

Zip

Send to

Send to

Send to

A handsome man, riding on, a white horse, holding a cute cat, in his hand
Negative prompt: small horse, standing person, many cats
Steps: 75, Sampler: Euler a, CFG scale: 20, Seed: 3455799619, Face restoration: CodeFormer, Size: 1024x1024,
Model hash: 6ce0161689, Model: v1-5-pruned-emaonly, Version: v1.3.2
Time taken: 4m 16.67sTorch active/reserved: 6438/8466 MiB, Sys VRAM: 10590/11264 MiB (94.02%)

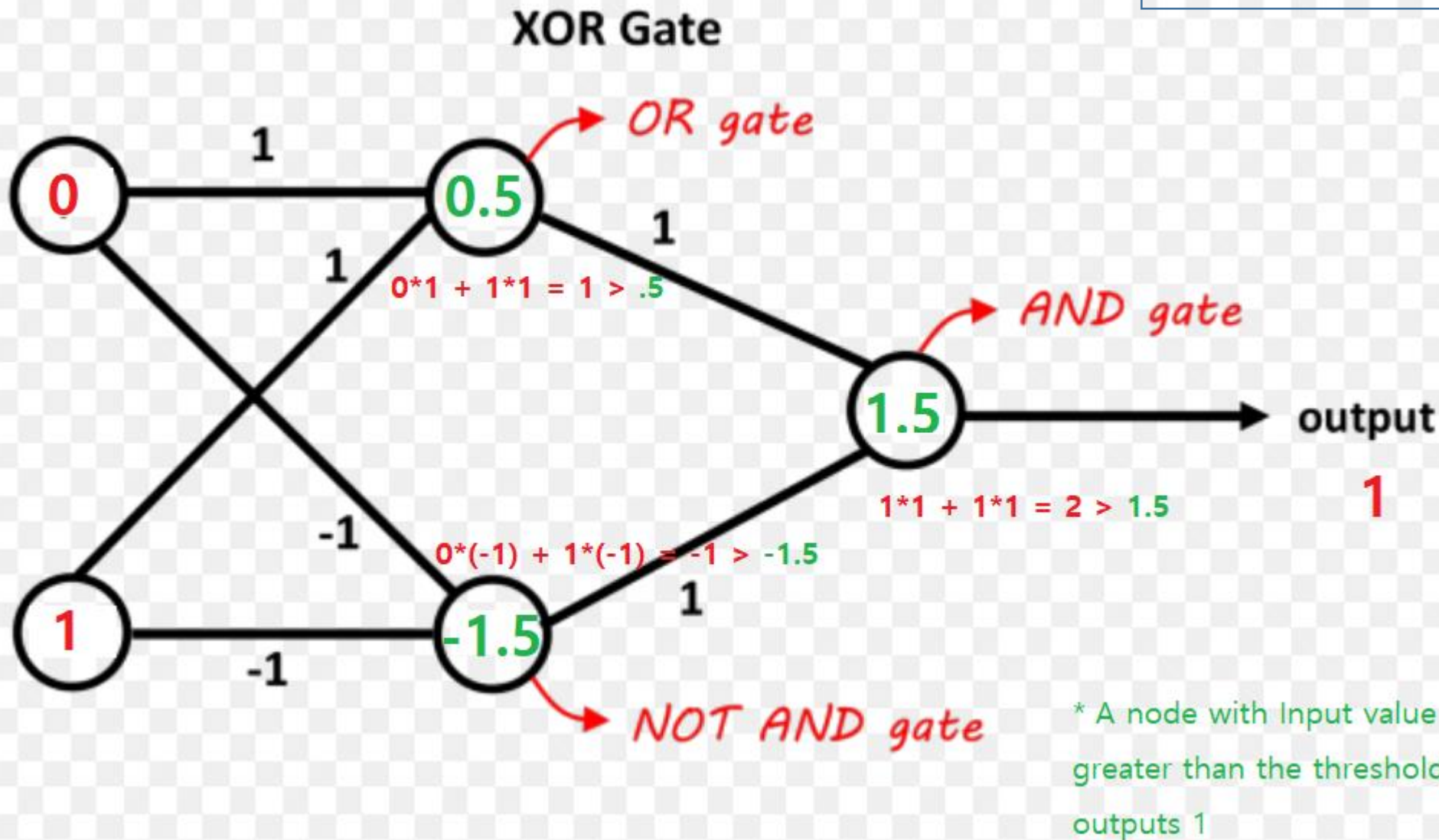
Part 4

AI 사용 일상화 시대와 디지털 세상의 이해



컴퓨팅을 이용한 문제해결에서 Parametric Approach(연결)의 개념

수많은 경우의 해가 존재!!!



[알고리즘]

(1)
If $x1 == x2$:
 result = 0
Else :
 result = 1

또는

(2)
If $x1 != x2$:
 result = 1
Else :
 result = 0

.....

1. GAN 생성자 모델의 원리

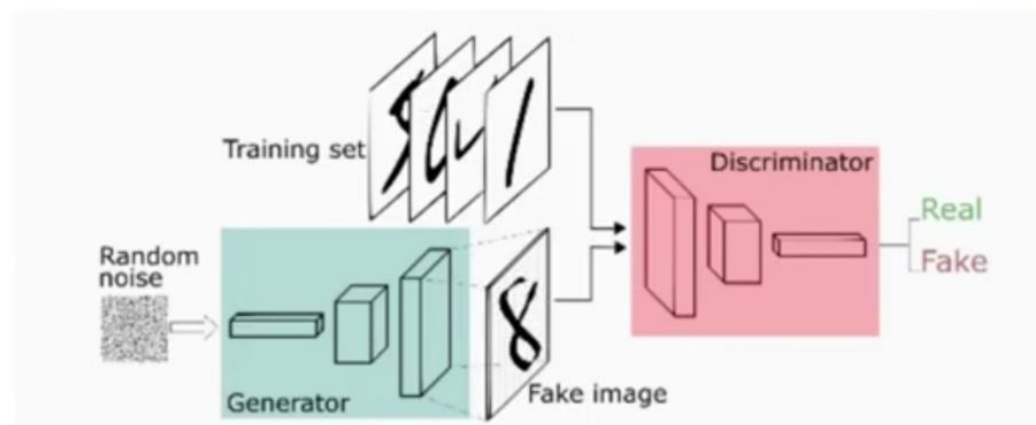
Components of GAN



Generator



POLICE
Discriminator

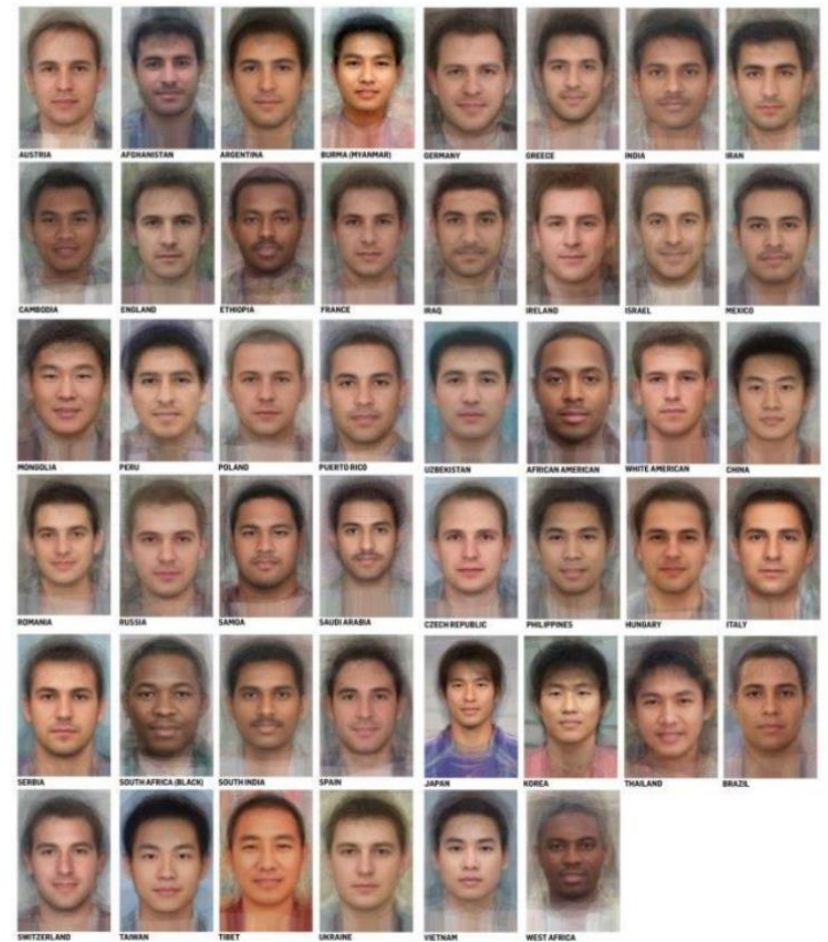
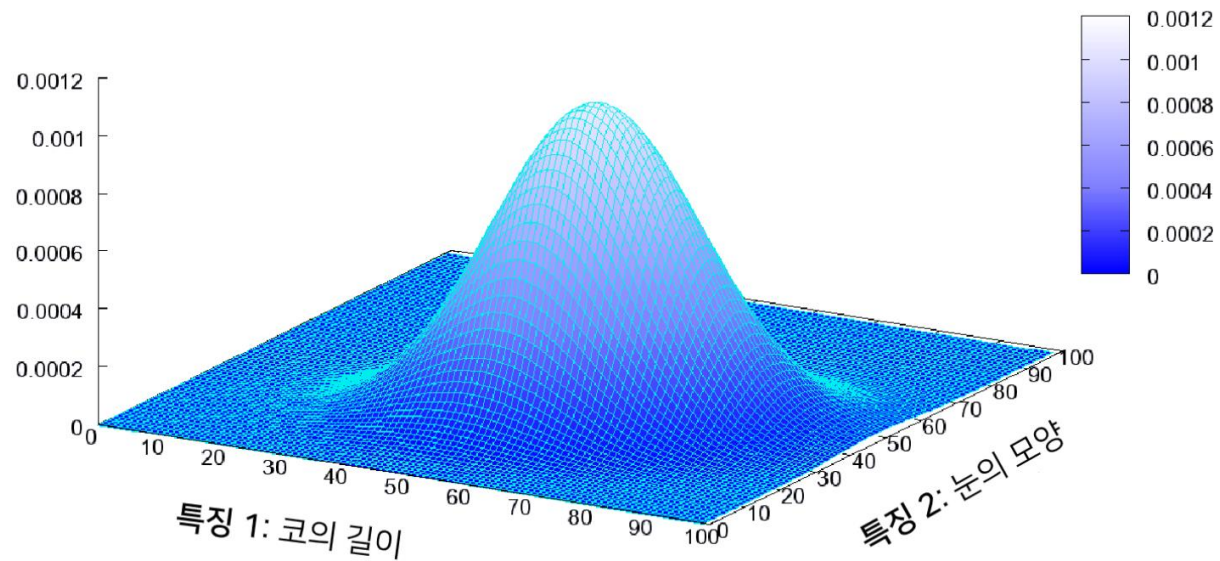


<https://www.analyticsvidhya.com/blog/2021/10/an-end-to-end-introduction-to-generative-adversarial-networksgans/>

1. GAN 생성자 모델의 원리 (계속)

이미지 데이터에 대한 확률분포

- 이미지 데이터는 다차원 특징 공간의 한 점으로 표현됩니다.
 - 이미지의 분포를 근사하는 모델을 학습할 수 있습니다.
- 사람의 얼굴에는 통계적인 평균치가 존재할 수 있습니다.
 - 모델은 이를 수치적으로 표현할 수 있게 됩니다.
- 다변수 확률분포(multivariate probability distribution) 예시는 다음과 같습니다.



1 GAN 생성자 모델의 원리 (계속)

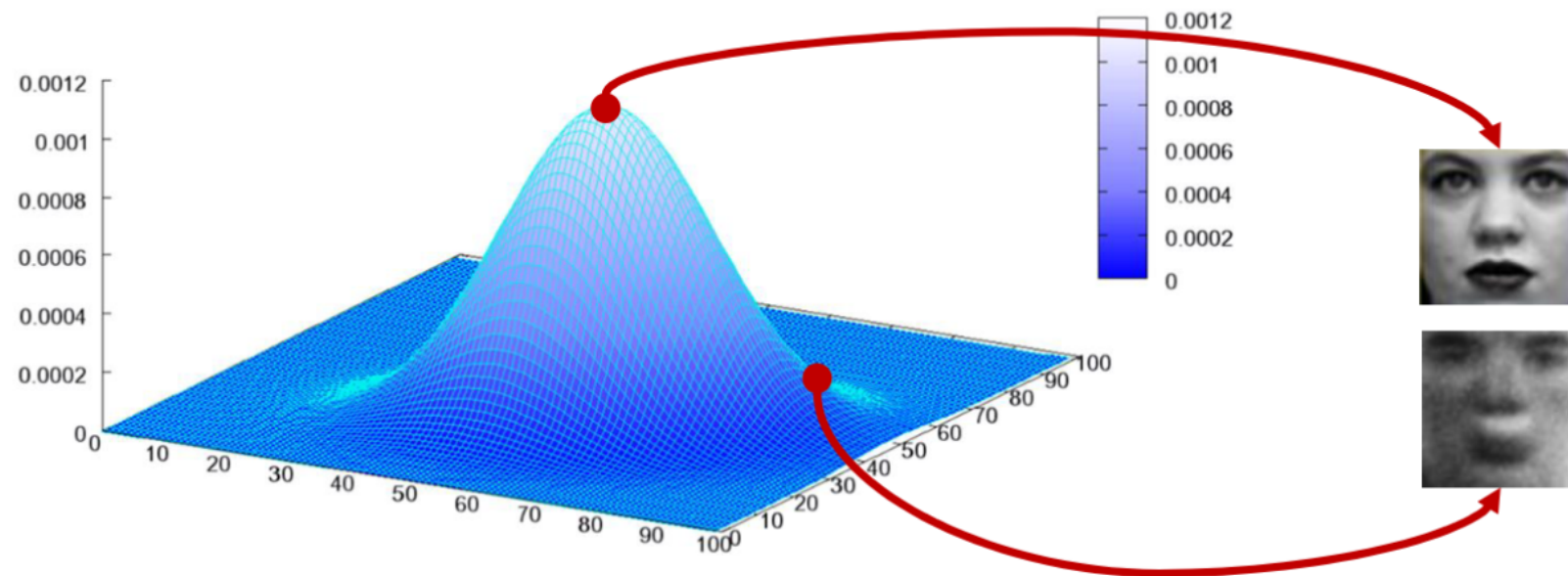
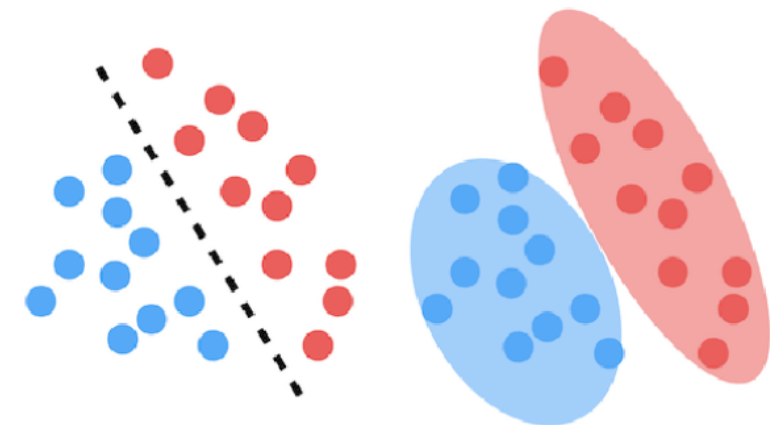
- 생성 모델은 실존하지 않지만 있을 법한 이미지를 생성할 수 있는 모델을 의미합니다.

Generative Model (produce) → An image that does not exist but is likely to exist

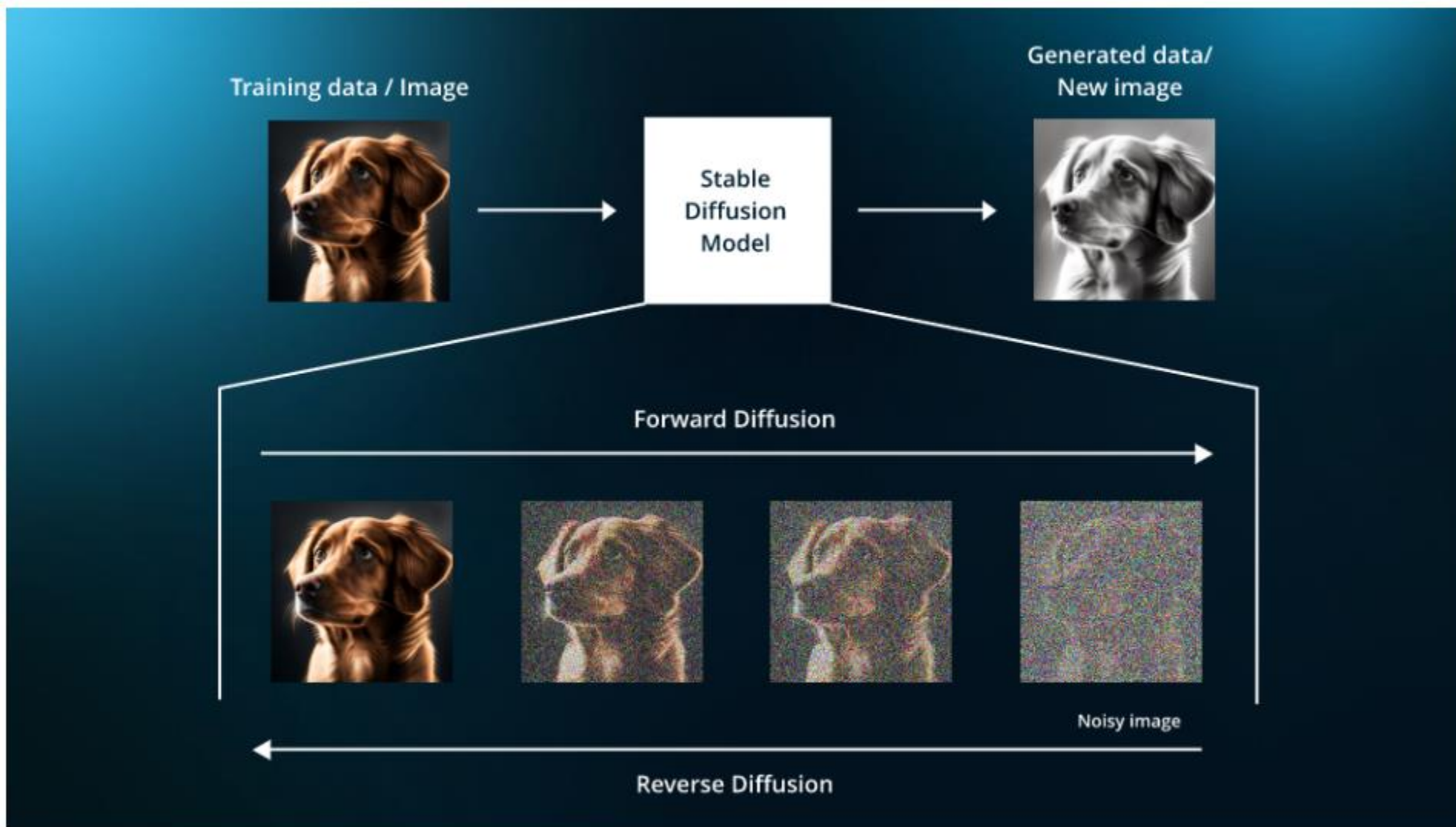
- A statistical model of the joint probability distribution
- An architecture to generate new data instances

Discriminative

Generative



2. Diffusion 생성자 모델의 원리



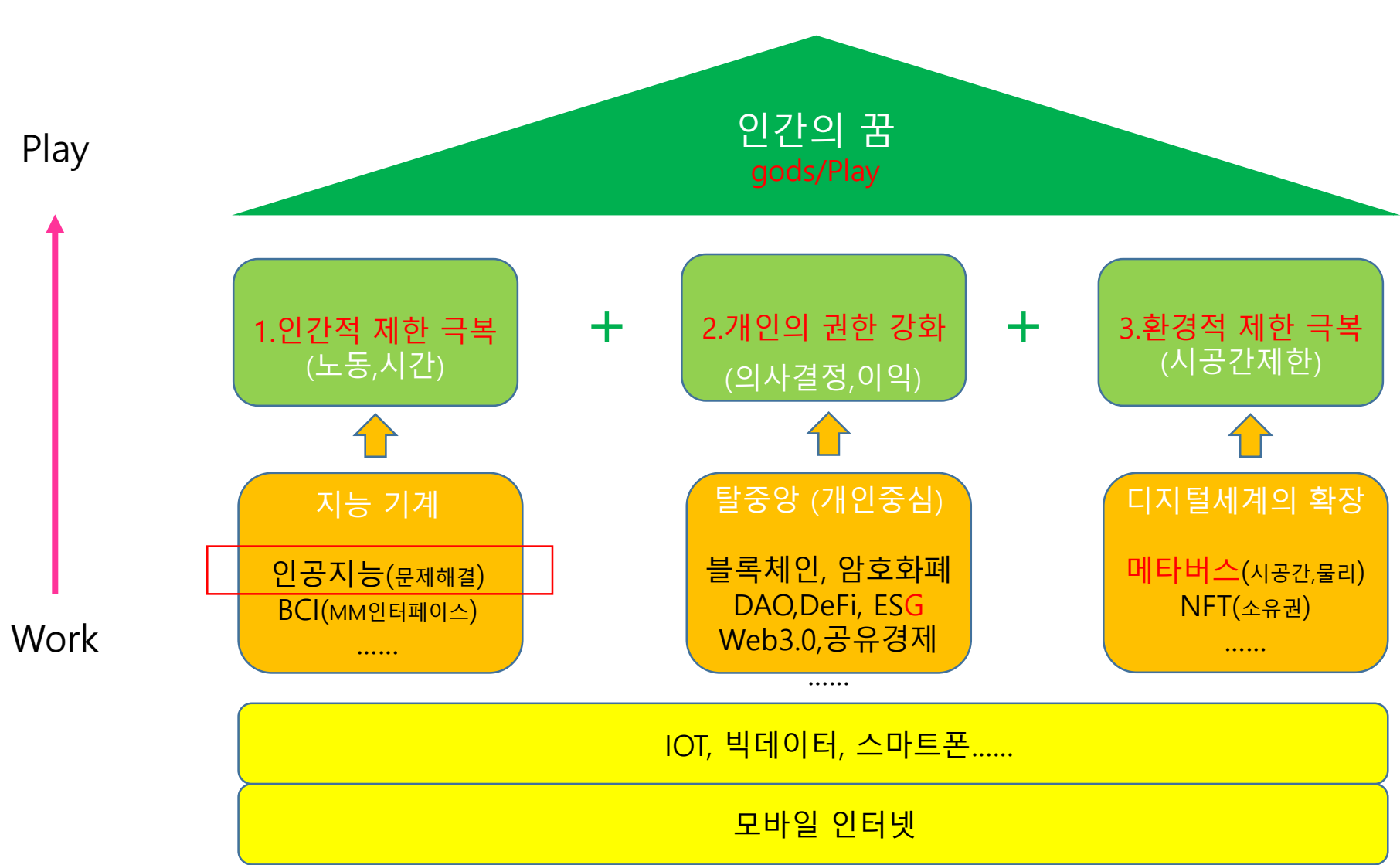
시가총액으로 보는 (디지털) 세상

2021.11.02 기준

순위	자산	시가총액	한화기준 (단위 : 조)	영문명	국가
1위	<u>금</u>	\$11,386 T	13,396	Gold	-
2위	마이크로소프트	\$2,472 T	2,908	Microsoft	미국
3위	애플	\$2,443 T	2,874	Apple	미국
4위	사우디 아람코	\$2,019 T	2,375	Saudi Aramco	사우디아라비아
5위	알파벳 (구글)	\$1,906 T	2,242	Alphabet (Google)	미국
6위	아마존	\$1,682 T	1,979	Amazon	미국
7위	은	\$1,346 T	1,584	Silver	-
8위	테슬라	\$1,213 T	1,427	Tesla	미국
9위	<u>비트코인</u>	\$1,190 T	1,400	Bitcoin	-
10위	메타 (페이스북)	\$917.92 B	1,080	Meta (Facebook)	미국
11위	버크셔해서웨이	\$648.05 B	762	Berkshire Hathaway	미국
12위	<u>엔비디아</u>	\$643.60 B	757	NVIDIA	미국

13위	텐센트	\$594.22 B	699	Tencent	중국
14위	TSMC	\$591.82 B	696	TSMC	대만
15위	<u>이더리움</u>	\$524.54 B	617	Ethereum	-
16위	JP모건 체이스	\$501.80 B	590	JPMorgan Chase	미국
17위	비자	\$463.78 B	546	Visa	미국
18위	알리바바	\$461.31 B	543	Alibaba	중국
19위	존슨 앤 존슨	\$429.16 B	505	Johnson & Johnson	미국
20위	유나이티드헬스	\$428.18 B	504	UnitedHealth	미국
21위	SPDR S&P 500 ETF 트러스트	\$422.21 B	497	SPDR S&P 500 ETF Trust	
22위	월마트	\$417.68 B	491	Walmart	미국
23위	<u>삼성전자</u>	\$409.09 B	481	Samsung	한국
24위	LVMH	\$400.59 B	471	LVMH	프랑스

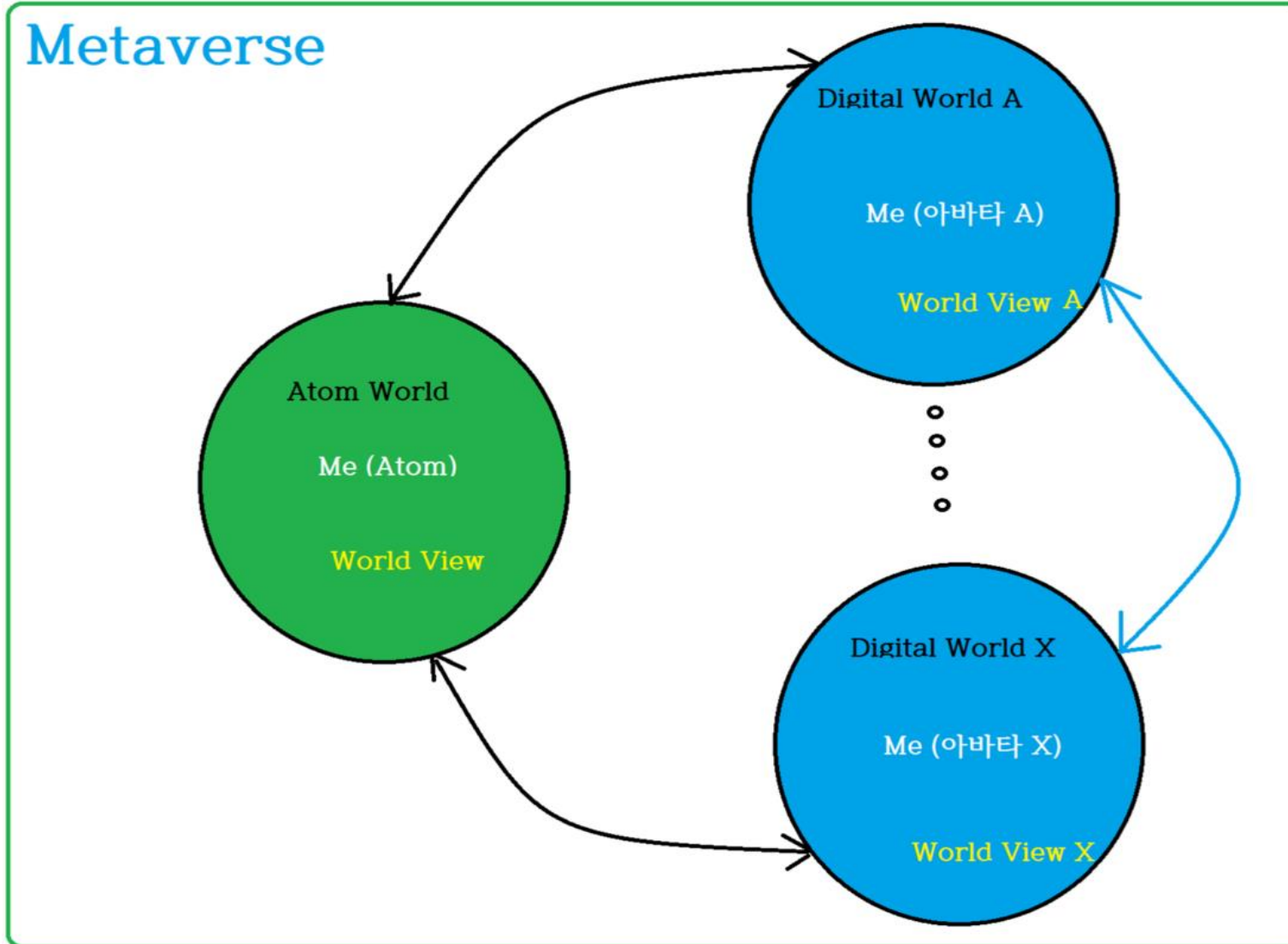
4차산업혁명 기술, AI, 메타버스, 그리고 인간의 꿈



이번 생은 틀렸으면
메타버스 생에서!!!

메타버스: 현실세계(나)와 디지털세계(아바타)의 연결

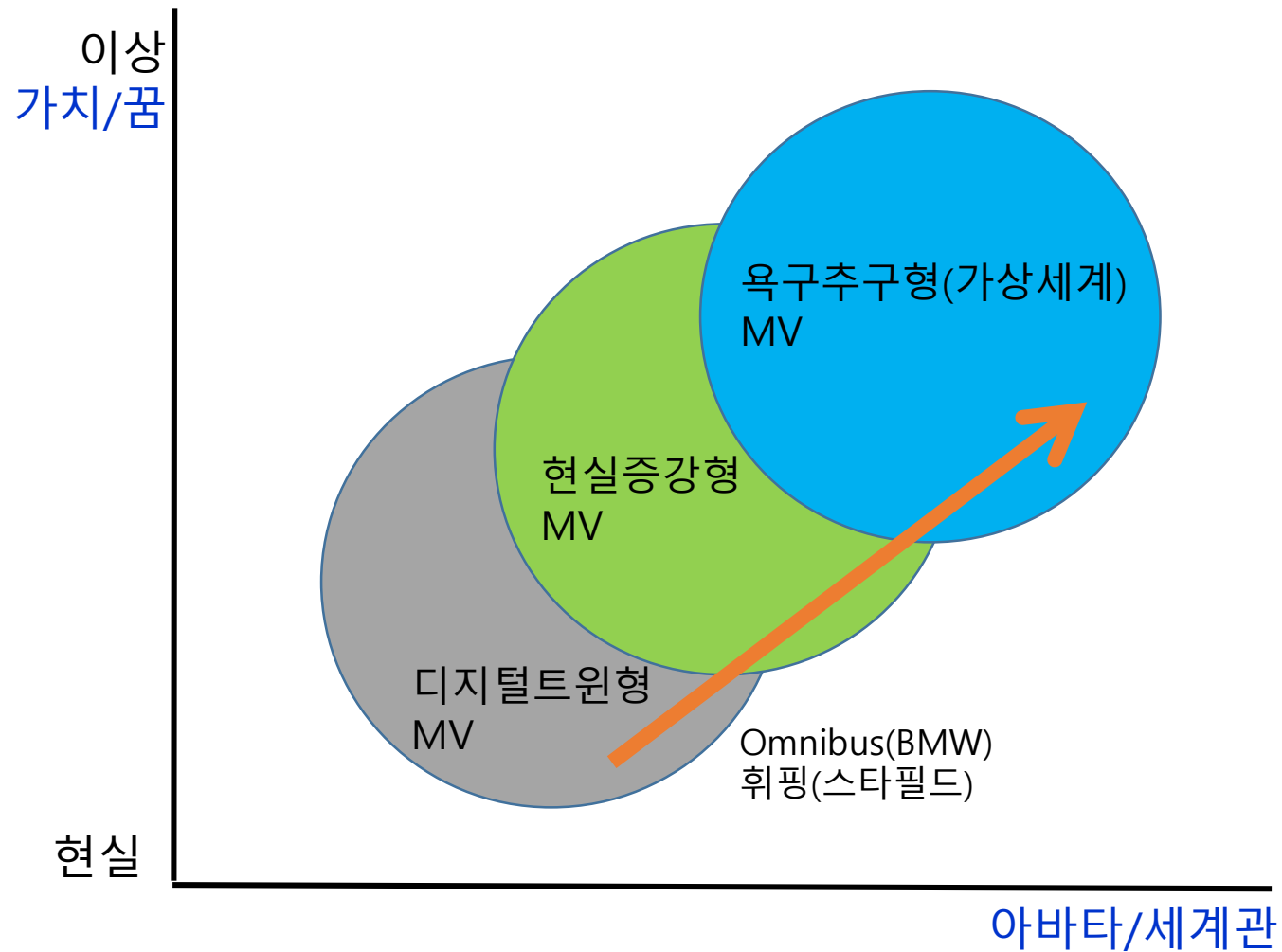
메타버스: Next Internet, 4.5차 산업혁명(현실세계(나)와 디지털세계(아바타)의 연결)



Analog
Vs.
Digital

Continuous
Vs.
Connected

메타버스: 세가지 유형과 성공적 필수요소



✓ 메타버스 필수요소

1. 세계관(가치/효과)
2. 인공지능+게임(재미)
3. 경제시스템(보상)
4. 블록체인,탈중앙(개인중심)

사건의 지평선과 Generative AI



AI가 인간의 전유물이었던 생성(Generation) 능력을 가지면서 AI의 영향력 속으로 급속히 들어가고 있다

분야별 특이점(Singularity) 출현과 특이점의 일상화

1. 인식 (Object Detection, Speech Recognition)
2. 자율주행
3. 이미지, 비디오 생성
4. 언어(문장) 생성 Chatbot
5. 문제 해결책 제시
6. 디지털 비서

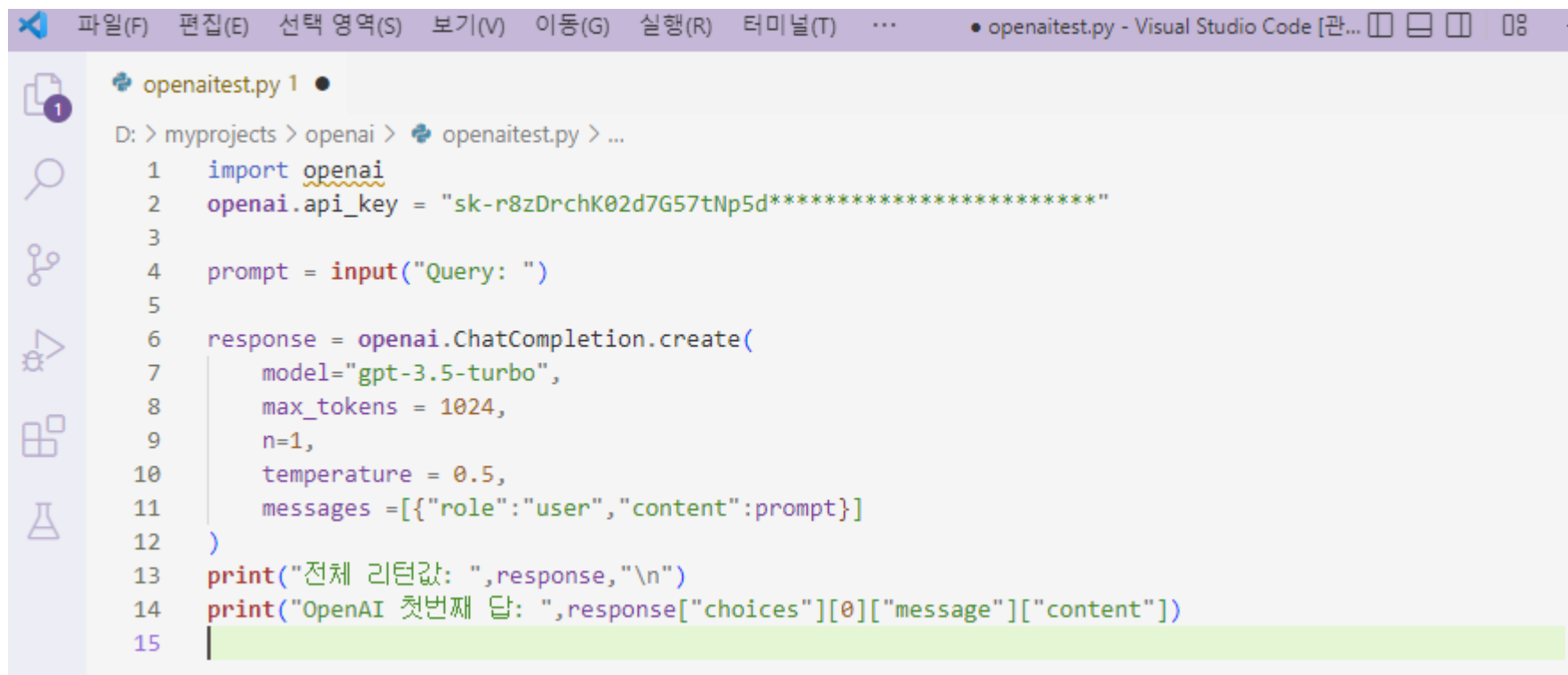
.....

[유의할 점]

- 부정적 현상을 보고, 예상과 속단은 금물 (ex)인터넷 출현시)
- (대규모,생성)AI는 문제해결을 위한 좋은 도구이다
- AI의 시의적절하고도 효율적인 적용

GPT 모델의 활용 예

Python 코드



```
openaitest.py 1
D: > myprojects > openai > openaitest.py > ...
1  import openai
2  openai.api_key = "sk-r8zDrchK02d7G57tNp5d*****"
3
4  prompt = input("Query: ")
5
6  response = openai.ChatCompletion.create(
7      model="gpt-3.5-turbo",
8      max_tokens = 1024,
9      n=1,
10     temperature = 0.5,
11     messages = [{"role": "user", "content": prompt}]
12 )
13 print("전체 리턴값: ", response, "\n")
14 print("OpenAI 첫번째 답: ", response["choices"][0]["message"]["content"])
15
```

Super Simple !!!

Whisper 음성인식의 활용 예

Python 코드와 실행

whispertest.py 1 ● recogvoice.py

D: > myprojects > openai > whispertest.py > ...

```
1  import openai
2  openai.api_key = "sk-r8zDrchK02d7G57tNp5dT3B1bkFJDe*****"
3
4  audio_file= open("test.wav", "rb")
5  response = openai.Audio.translate("whisper-1", audio_file)
6
7  print("전체 리턴값: ",response,"\n")
8  print("OpenAI 인식한 문장: ",response.text)
9  |
```

```
(openai) D:\myprojects\openai>python whispertest.py
전체 리턴값: {
  "text": "Hello, it's so nice to know you."
}

OpenAI 인식한 문장: Hello, it's so nice to know you.
```


DallE2 API 활용 예

Python 코드와 실행

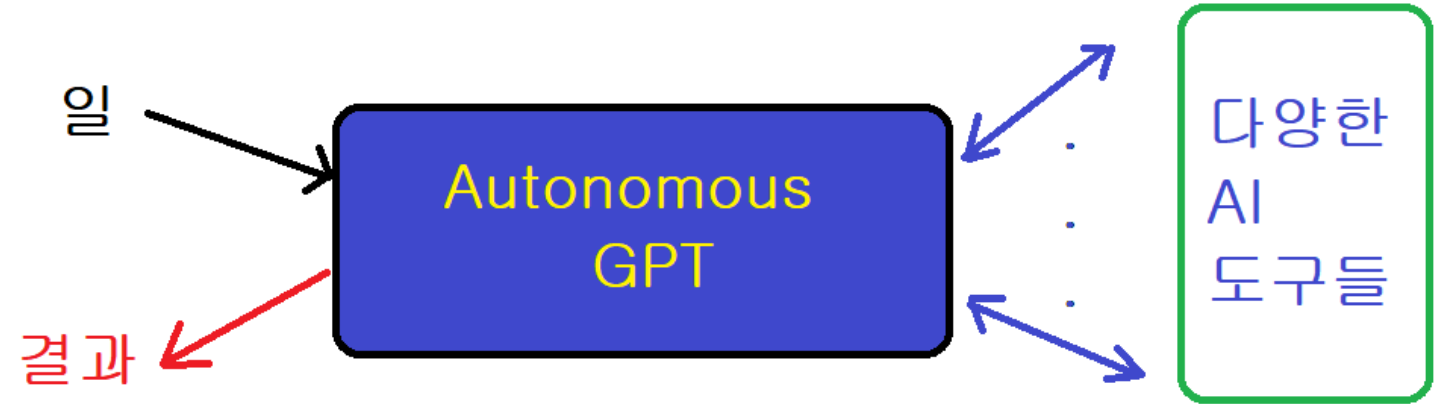
```
1 # create.py
2
3 import os
4
5 import openai
6
7 PROMPT = "An eco-friendly computer from the 90s in the style of vaporwave"
8
9 openai.api_key = os.getenv("OPENAI_API_KEY")
10
11 response = openai.Image.create(
12     prompt=PROMPT,
13     n=1,
14     size="256x256",
15 )
16
17 print(response["data"][0]["url"])
```

https://oaidalleapiprodscus.blob.core.windows.net/private/org-QANMxYn3BsMe_uAbRT8X3iiu3/user-xSuQTJ0IIVj3dHM4DPymXTg4/img-4AMS4wJJLFsu6CIQmGDppAeV.png?st=2022-11-10T12%3A22%3A46Z&se=2022-11-10T14%3A22%3A46Z&sp=r&sv=2021-08-06&sr=b&rscd=inline&rsct=image/png&skoid=6aaadede-4fb3-4698-a8f6-684d7786b067&sktid=a48cca56-e6da-484e-a814-9c849652bcb3&skt=2022-11-10T10%3A55%3A29Z&ske=2022-11-11T10%3A55%3A29Z&sks=b&skv=2021-08-06&sig=xJW_imMiA1/nGmFMYKUTsJq7G1u4xSL652r/MrzTH0Nk%3D



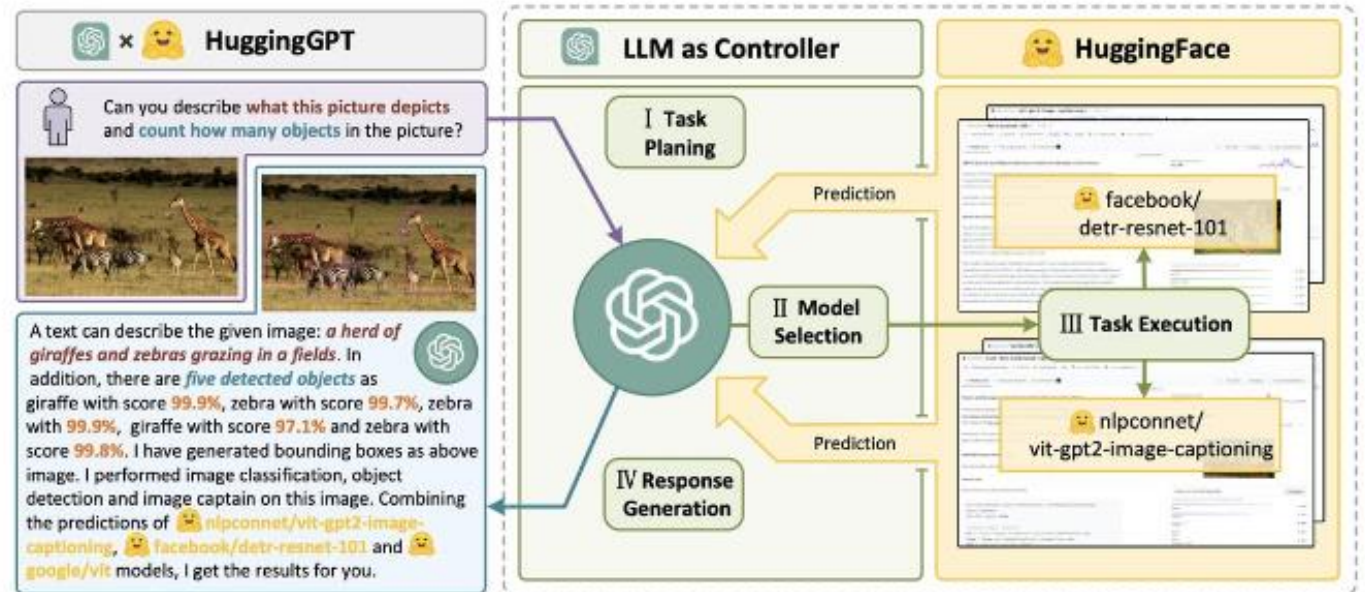
LLM의 발전 (Automatic Agent)

1. Autonomous Agents : AutoGPT.....



chatGPT는 시작에 불과하다!

1. LLM Controller : HuggingGPT.....



LangChain 이용한 AI Agent의 예 (Python Code)

D:\wai\Langchain\Langchain\test3.py

```
1 import os
2 from langchain.llms import OpenAI
3 from langchain.agents import load_tools, initialize_agent, AgentType
4
5 os.environ["OPENAI_API_KEY"] = "sk-r8zDrchK02d7G57tNp5dT3[REDACTED]GBiMGwTDKGW4uQdFv"
6 os.environ["HUGGINGFACEHUB_API_TOKEN"] = "hf_mkvaVivwXwbs[REDACTED]RYhsguBJxJbAC"
7
8 llm = OpenAI(model_name="text-davinci-003")
9
10 tools = load_tools(["wikipedia", "llm-math"], llm=llm)
11 agent = initialize_agent(tools, llm, verbose=True,
12                         agent=AgentType.ZERO_SHOT_REACT_DESCRIPTION)
13
14 agent.run("""What's the top 3 expensive cars worldwide in 2023 and calculate
15           price differences of each car from 2022""")
```


LangChain 이용한 AI Agent의 예 (실행결과)

```
(langchain) D:\ai\langchain>python langchaintest2.py
```

```
[1m> Entering new AgentExecutor chain...[0m
```

```
[32:1m[1:3m I need to find out the cars, and then calculate the price differences
```

```
Action: Wikipedia
```

```
Action Input: List of most expensive cars in 2023[0m
```

```
Observation: [36:1m[1:3m
```

```
Page: List of most expensive cars sold at auction
```

```
Summary: This is a list of the most expensive cars sold in public auto auctions through the traditional bidding process, that of those that attracted headline grabbing publicity, mainly for the high price their new owners have paid.
```

.....이하 생략.....

```
Page: List of most expensive films
```

```
Summary: Due to the secretive nature of Hollywood accounting, it is not clear which film is the most expensive film ever made.
```

.....이하 생략.....

```
Where budget estimates conflict, the productions are charted by lower-bound estimates.
```

```
Page: List of most expensive cities for expatriate employees
```

```
Summary: These are lists of the world's most expensive cities for expatriate employees (not residents), according to the Mercer, ECA International and Xpatulator.com cost-of-living surveys. Other surveys from online collaborat[0m
```

```
Thought:[32:1m[1:3m I now have a list of the most expensive cars and their prices in 2023
```

```
Action: Calculator
```

```
Action Input: 135 million euros - 142,769,250 / 48.4 million[0m
```

```
Observation: [33:1m[1:3mAnswer: 134999997.0502221[0m
```

```
Thought:[32:1m[1:3m I now know the difference in price between the most expensive cars in 2022 and 2023
```

```
Final Answer: The top three most expensive cars worldwide in 2023 and the price differences of each car from 2022 are the Mercedes-Benz 300 SLR Uhlenhaut Coupe (135 million euros - 142,769,250 = 134999997.0502221), the Ferrari 250 GTO (70 million - 48.4 million = 21.6 million), and the Rolls-Royce 10 hp Two-Seater (7.2 million - 4.8 million = 2.4 million).[0m
```

LangChain 이용한 AI Agent의 예

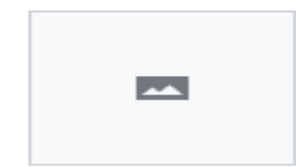
Search results

× Search

Advanced search: Sort by relevance × ▼

Search in: (Article) × ▼

The page "List of most expensive cars in 2023" does not exist. You can [create a draft and submit it for review](#), but consider checking the search results below to see whether the topic is already covered.

- 

List of most expensive cars sold at auction

This is a **list of the most expensive cars** sold in public auto auctions through the traditional bidding process, that of those that attracted headline...

143 KB (7,354 words) - 15:10, 11 May 2023
- 

List of most expensive films

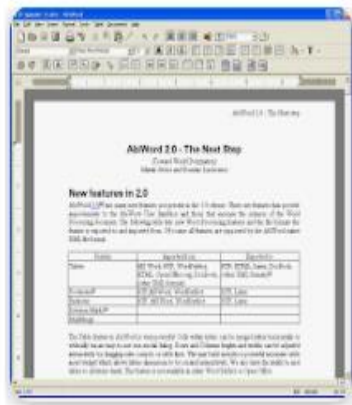
Due to the secretive nature of Hollywood accounting, it is not clear which film is the **most expensive** film ever made. Star Wars: The Force Awakens officially...

148 KB (9,272 words) - 01:48, 18 May 2023
- 

List of most expensive cities for expatriate employees

"These are the **most expensive** places to work abroad in 2022". CNBC. Retrieved 2023-01-09. "Turkmenistan's capital tops **list of most expensive** cities for expats"

사람을 위한 AI vs 인간 노동(기존의 가치)를 대체할 수 있는 AI



Human Centered

AI Controls

이미 시작된 직업세계에의 변화

TV and film writers are fighting to save their jobs from AI. They won't be the last



By Samantha Murphy Kelly, CNN Business

Updated 5:28 PM EDT, Thu May 4, 2023

"AI is already displacing human labor in many other areas of content creation—copywriting, journalism, SEO writing, and so on," he said. "The WGA is simply trying to get out-in-front of and to protect their members against ... 'technological unemployment.'"

<https://edition.cnn.com/2023/05/04/tech/writers-strike-ai/index.html>



Stephanie Elam/CNN

이미 시작된 실세계에의 변화

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‘Out-of-hand’ flood of ChatGPT-like A.I.-generated stories forces prominent science fiction magazine to stop accepting submissions

BY PRARTHANA PRAKASH

February 22, 2023 at 9:51 PM GMT-9

Updated February 23, 2023 at 12:46 PM GMT-9



<https://fortune.com/2023/02/22/flood-chatgpt-ai-generated-content-science-fiction-writing-clarkesworld-stops-submissions/>

이미 시작된 실세계에의 변화

TECHNOLOGY EXECUTIVE COUNCIL

How generative A.I. and ChatGPT will influence jobs at all professional levels

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A recent report by Goldman Sachs estimates that approximately 300 million global jobs could be exposed to automation, and one-fourth of all work could be replaced by generative artificial intelligence.

With chatbots now able to write content and create visuals, AI threatens to disrupt jobs like designers and software engineers, and take over a wide range of repetitive work tasks now handled by humans. But at a broader level, AI is emerging as a job influencer, with still-unknown implications from the highest executive roles down to call center operations.

<https://www.cnbc.com/2023/05/16/how-generative-ai-chatgpt-will-change-jobs-at-all-work-levels.html>

✓ 생성형 AI는 논리적, 창의적 직업을 막론하고 모든 직업과 활동에 거대한 영향을 미치고 있다

오늘날 시의 차별성과 이중성

생산성/경제성의 극대화

노동시간과 일로부터의 자유

혁신적 창의성 보조도구

문제해결력의 신장

거부할 수 없는 유혹

Winner-Takes-All 속성과 고성능

영향권의 광범위성과 격심한 격차

가치관과 삶/일의 방식 변화

기계에 의한 인간 고유능력의 대체

예정된 축복과 재앙

Part 5

기술 폭발과 미래 사회

Deep image reconstruction:
Artificial shapes



AI의 한계 ???

지능(NI)이란 무엇인가?

- Intelligence 어원 : intelligere(라틴어) = comprehend, perceive
- the capacity for *logic, understanding, self-awareness, learning, emotional knowledge, reasoning, planning, creativity, critical thinking*, and *problem-solving*. (출처:wikipedia)
- the ability to *perceive* or *infer* information, and to *retain(represent)* it as knowledge to be *applied* towards adaptive behaviors within an environment or context. (출처:wikipedia)
- A very general mental capability that, among other things, involves the ability to *reason, plan, solve problems, think abstractly, comprehend complex ideas, learn* quickly and learn from experience. (출처: Wall Street Journal, 1994)

▶ **인간(고등) 지능**: 환경(상황, 지식, 문제 등등)을 **이해/학습**하고, (해결/설명하거나 이용하기 좋게) 적절하게 **표현**하며, 문제를 **발견/해결**하는 **능력**. (김병기)

그렇게 하기 위하여 지능적인 생물은 **학습, 인식, 추론, 인지, 추상화, 계획, 비판적 사고, 창의적 사고, 상상, 소통, 자각** 등의 특징을 지니고, 그 능력의 정도는 개체마다 다르다.

다시, “창의성, 소통, 공유”

문제발견적 창의성 !!!



대규모 AI 일상화 시대, 교육에의 시사점

- 기존 가치체계와 판단방법에서 탈피하라 (직업의 세계, 필요역량, 가치, ...)
- 내가 가진(가질) 능력(전문성)이 AI보다 우월한가? (문제해결 능력보다 문제 발견 능력)
- AI와 사람간의 융합 능력을 길러라 (AI 활용 능력)
- 진화하는 AI기술에 민감하라 (현재 기술의 "일시적 활용능력" 보다는 "지소적인 적응력")
- AI의 가능성을 속단하거나 예단하지 마라 (AI의 양면성/발전가능성을 긍정적으로 활용)
- 인문학적 사고와 질문을 습관화 하라 (문제 발견적 창의력 개발의 원천)

대규모 AI 일상화 시대, 비즈니스 관점에서의 시사점

- 나의 BM이 대규모AI의 일상화에 안전한가?
 - ex) 외국어(언어) 관련 교육 비즈니스 (언어학습 전문가, Grammarly, Speak)
- AI X(Transformation)에 적극 투자하라.
 - 기존 비즈니스 모델에 AlaaS를 적극 도입하라
 - 경제성, 안정성, 효율성에서 단연코 유리
- 대규모 AI 서비스를 이용한 새로운 BM을 개발하라.
 - 비서/전문가 역할의 자동화
 - 기존에 없던/불가능하던 서비스가 가능
- 다른 AI서비스와의 차별화를 만들어라
 - 독점적인 데이터 (의료데이터...)
 - 최신 AI기술(모델)의 빠른 활용
- 진화하는 AI기술에 민감하고 최신기술을 적극 활용하라
 - CAIO의 필요성 증가
- AI의 한계를 속단하거나 예단하지 마라
 - AI의 가능성을 긍정적으로 생각하라
- 인문학적 사고를 습관화 하라
 - 문제 발견적 창의력을 길러라

Q & A