The #1 Strategy for Automating SEO using Linked Data

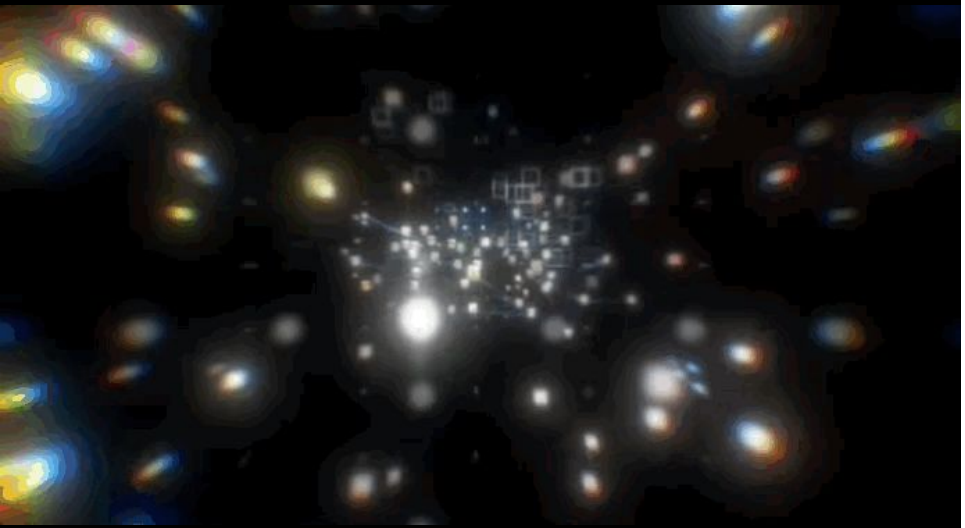
#KGConference

@cyberandy

THIS IS A FAKE PICASSO.

It has been generated using OpenAI's 256x256 unconditional **ImageNet diffusion model** together with CLIP that will bridge **text prompts** with **images**.

It can be considered “the father” of DALL·E 2.

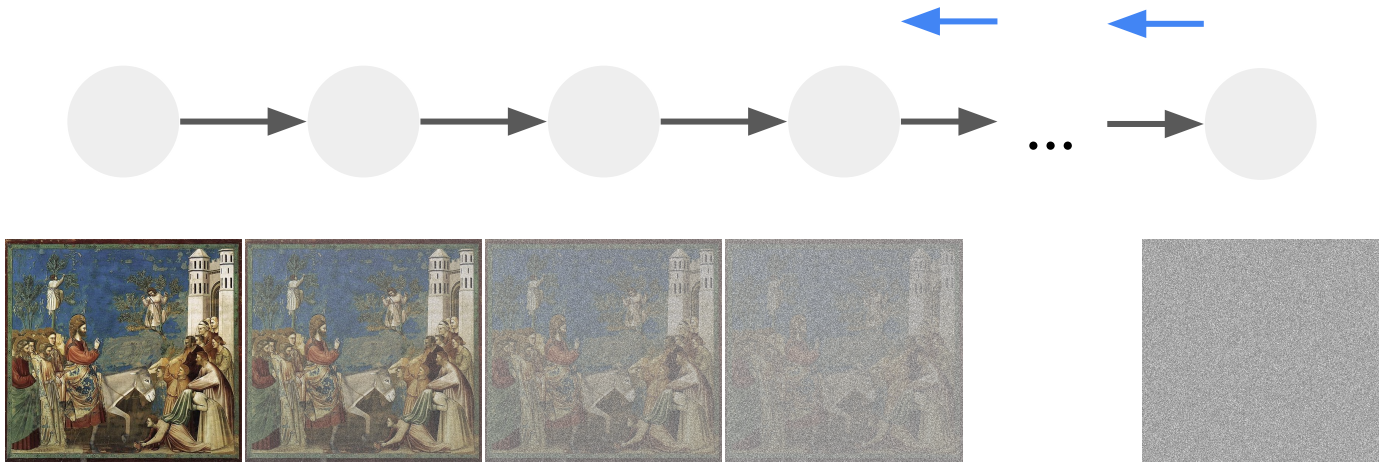


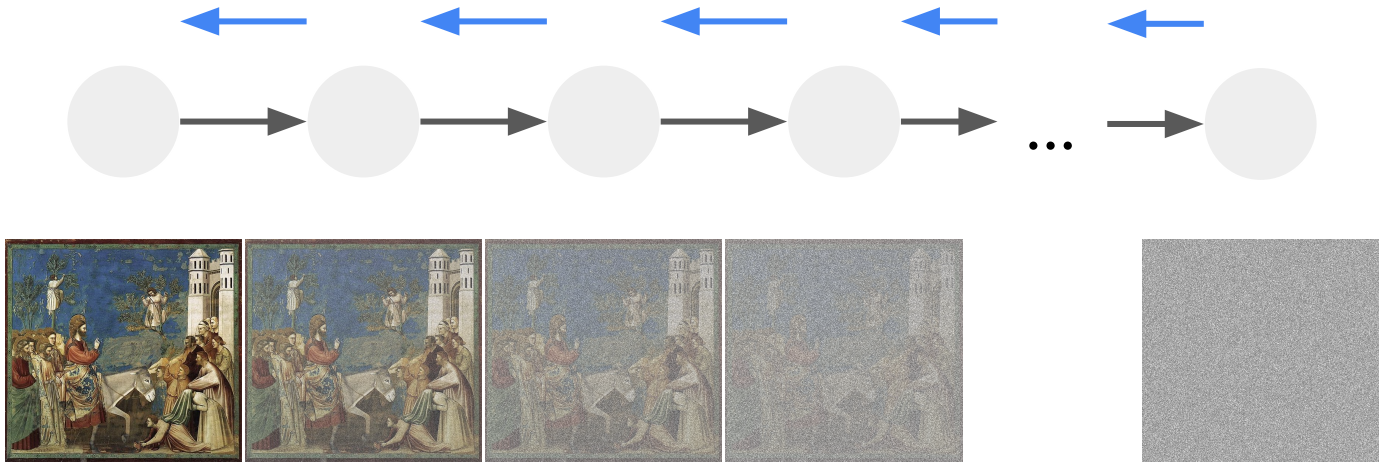
DALL·E 2

A NEW AI SYSTEM

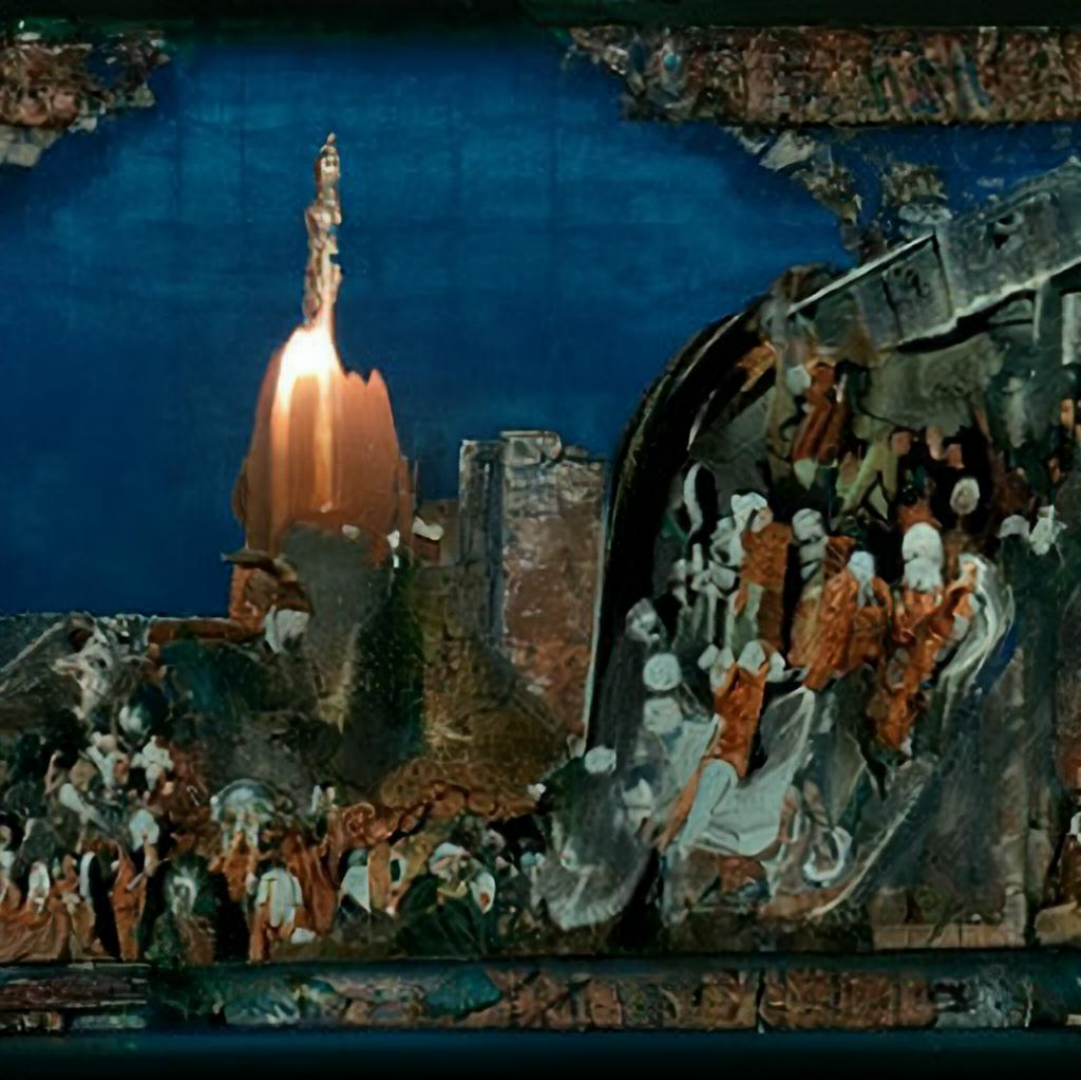
- Converts **text prompts into images**.
- Maintain **semantic consistency** in the images it creates.
- Can **generate multiple variations** of the same image.
- Can **edit an existing image**.

WHAT ARE DIFFUSION MODELS?



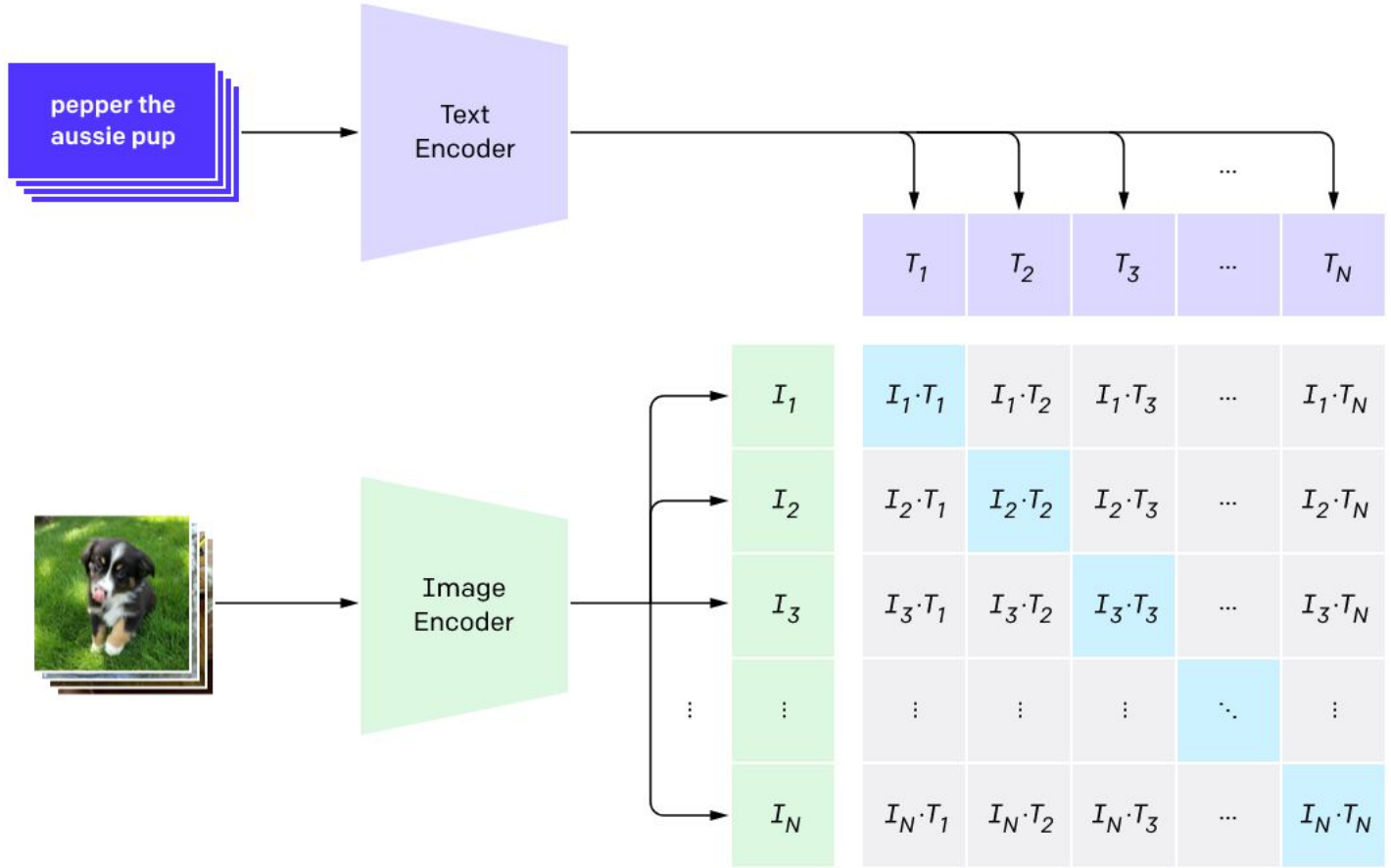


DIFFUSION MODELS ARE GENERATIVE MODELS THAT LEARN TO CREATE IMAGES BY GRADUALLY NOISING AND DENOISING THEIR TRAINING SAMPLES.

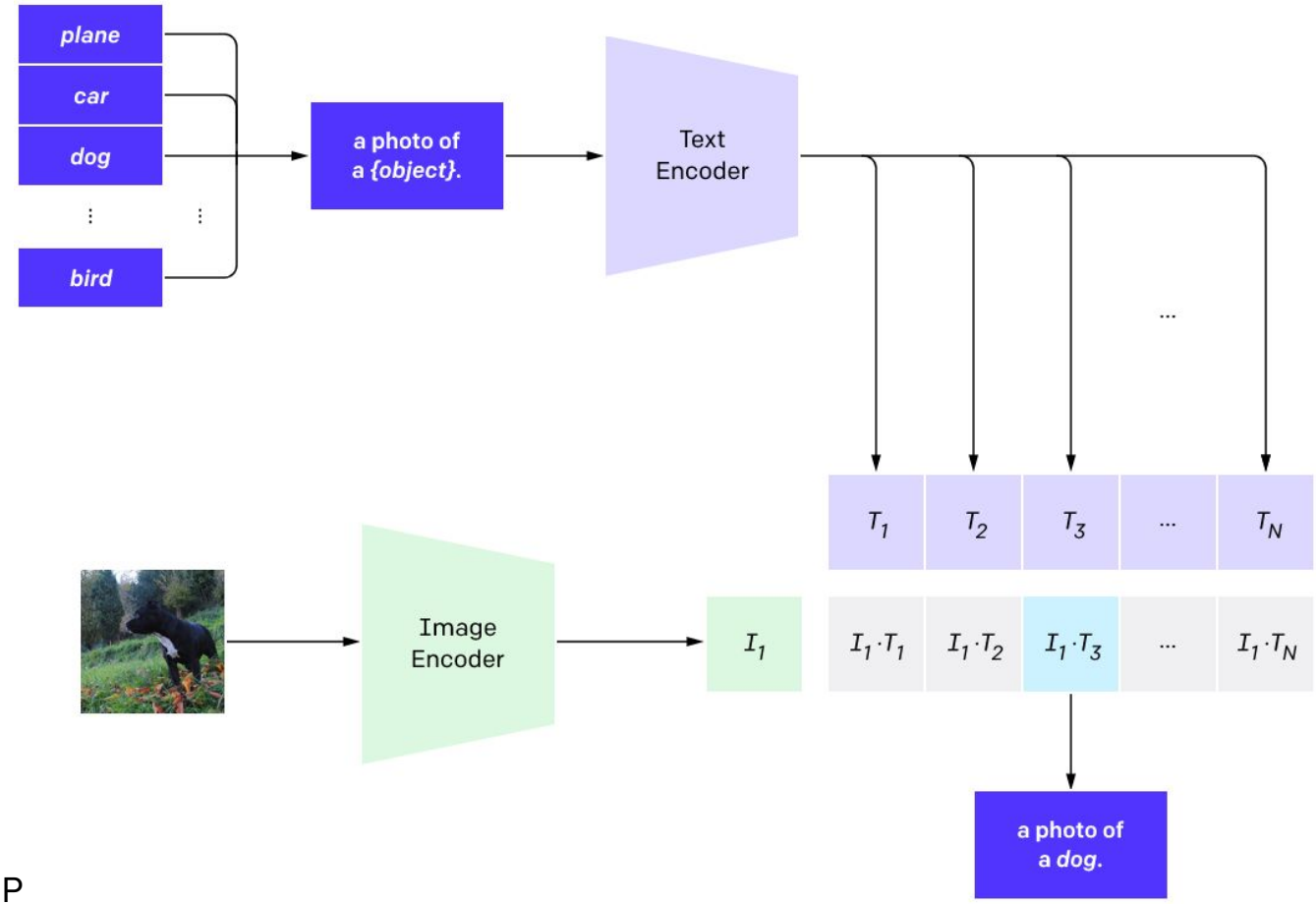


THE ENTRY INTO NEW YORK

a fake Giotto.

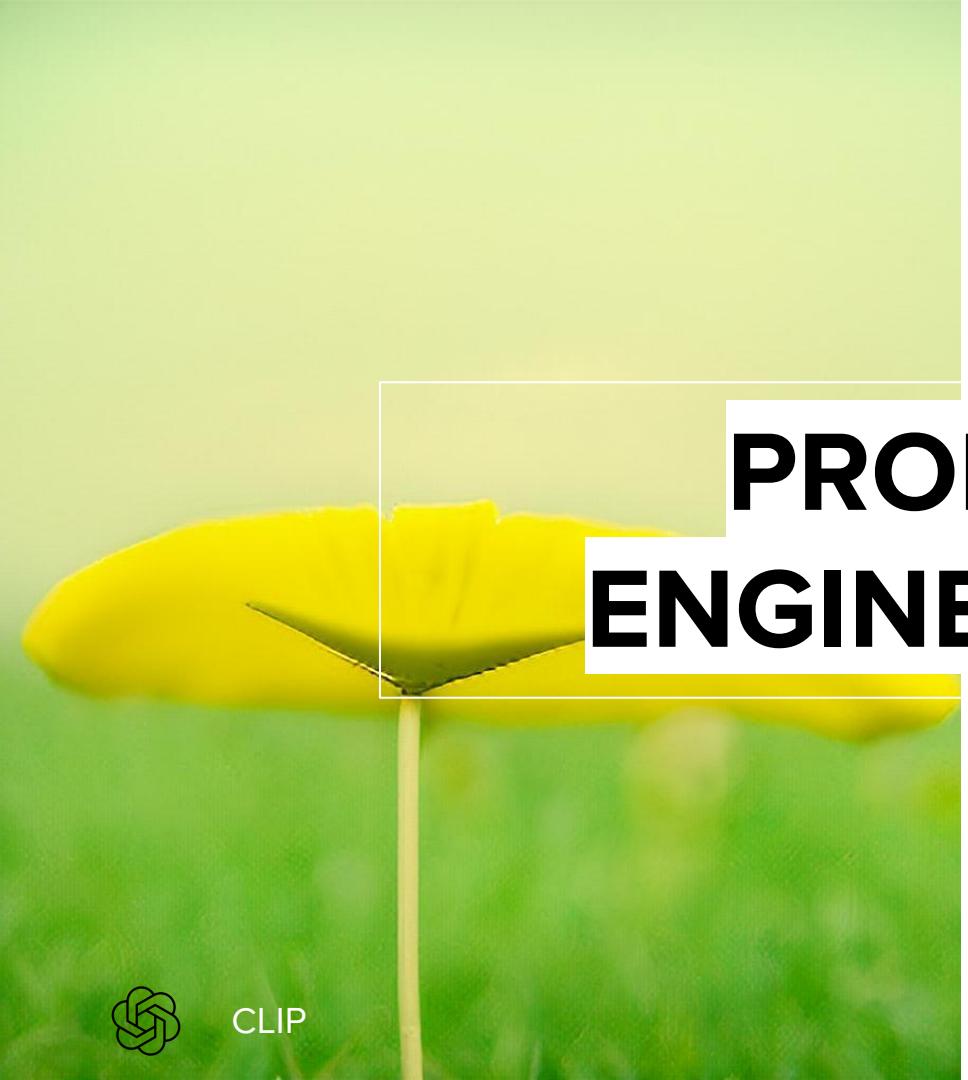

pepper the aussie pup
Text Encoder
Image Encoder
T_1 T_2 T_3 ... T_N
I_1 I_2 I_3 ⋮ I_N
$I_1 \cdot T_1$ $I_1 \cdot T_2$ $I_1 \cdot T_3$ ... $I_1 \cdot T_N$
$I_2 \cdot T_1$ $I_2 \cdot T_2$ $I_2 \cdot T_3$ ... $I_2 \cdot T_N$
$I_3 \cdot T_1$ $I_3 \cdot T_2$ $I_3 \cdot T_3$ ... $I_3 \cdot T_N$
$I_N \cdot T_1$ $I_N \cdot T_2$ $I_N \cdot T_3$ ... $I_N \cdot T_N$

CLIP


plane
car
dog
bird
a photo of a {object}.
Text Encoder
...
T_1 T_2 T_3 ... T_N
Image Encoder
I_1
$I_1 \cdot T_1$ $I_1 \cdot T_2$ $I_1 \cdot T_3$ ... $I_1 \cdot T_N$
a photo of a dog.

CLIP

+ **“A photorealistic image of a horse”** = CLIP 72.3%



PROMPT ENGINEERING

a fake Savinio.

CLIP

CLIP

CLIP IS DUMB

We can hack CLIP by using specific descriptors into the prompt that reference the style on specific websites (“DeviantArt”), or the type of images that we can see on a PS1 device.

Examples from kingdomakrillic.

text	cosine similarity to “a human being”
"a man"	0.927799
"a white man"	0.904146
"a woman"	0.903923
"a black man"	0.893208
"a white woman"	0.889220
"a black woman"	0.873916
"an Asian man"	0.860326
"an Asian woman"	0.830546

CLIP IS BIASED

We can expose the limits and the pitfalls of CLIP with a few basic examples.

Examples from Matthew McAteer.

CLIP

CLIP + DALL·E 2

IMAGE SEARCH

"A BUILDER"

CLIP IS FULL OF STEREOTYPES

The same applies to Google Image Search

More on CLIP + DALL·E 2 Risks and Limitations.

CLIP + DALL·E 2

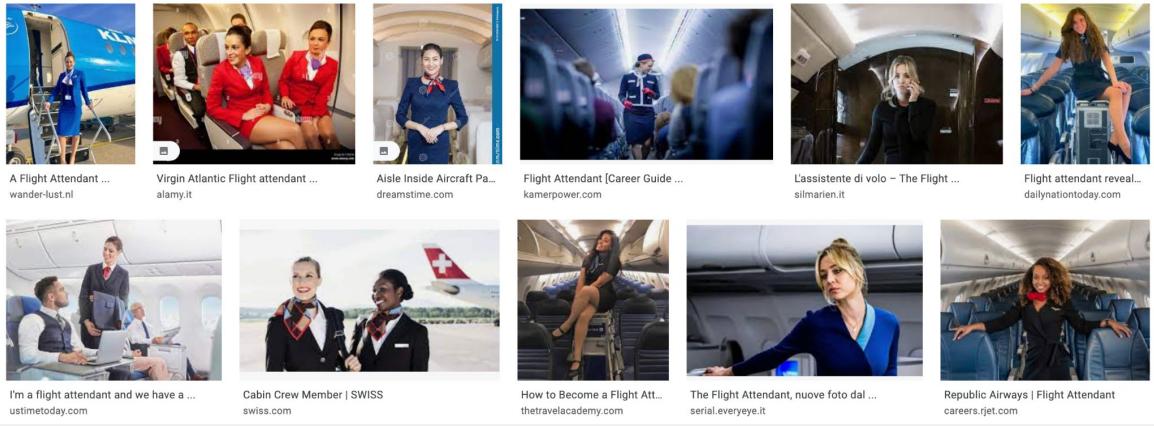


IMAGE SEARCH

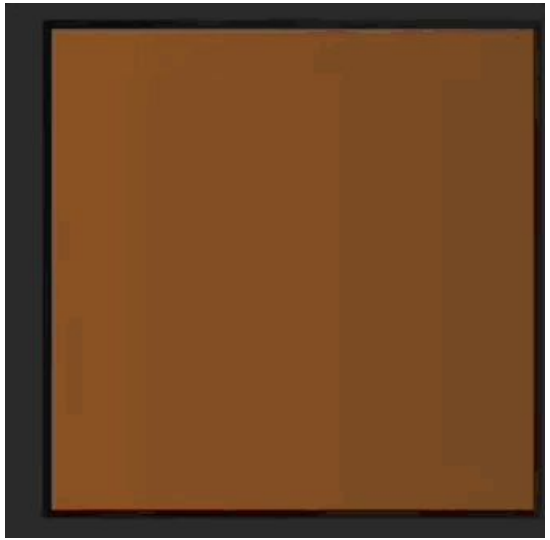
"A FLIGHT ATTENDANT"

CLIP IS FULL OF STEREOTYPES

The same applies to Google Image Search

More on CLIP + DALL·E 2 Risks and Limitations.

why do we need diffusion models if using GANs we can already...



...draw an illustration of a baby daikon radish in a tutu walking a dog 🧐??

DALL·E

WE WANT HI-FIDELITY AND REALISM

a fake Caravaggio.

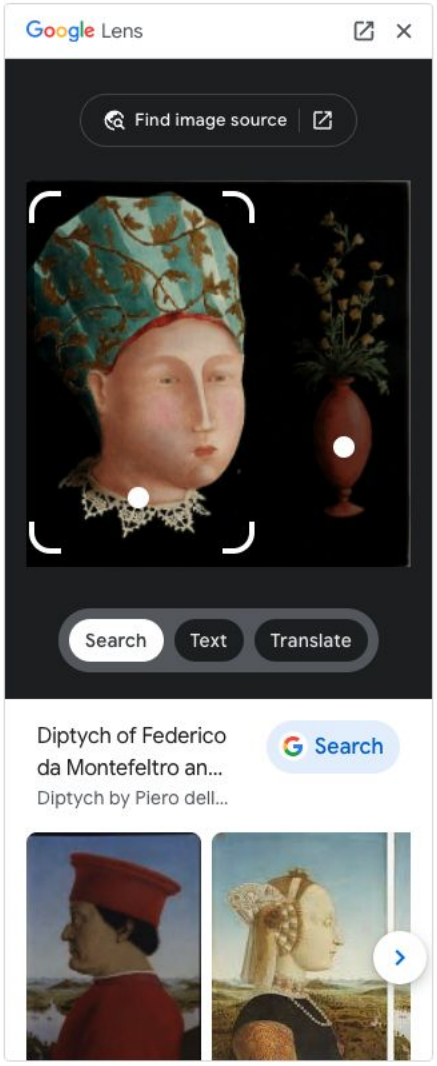
LESSONS LEARNED

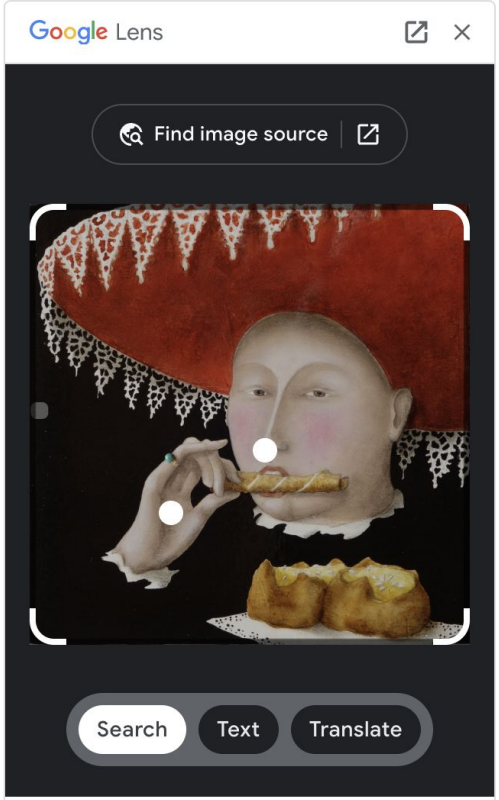
1. What an AI Systems **knows about art**?
2. How does it **sees our world**?
3. Does it violate **copyright**?
4. How **can I train it** on **previously unseen artworks**?
5. What is **prompt engineering**?
6. **Is this also SEO**?

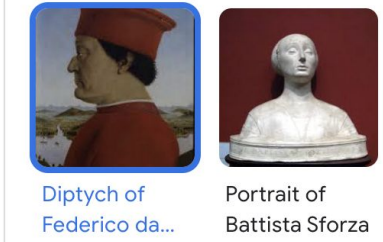
CLIP, HERE IS GIULIO RIGONI.

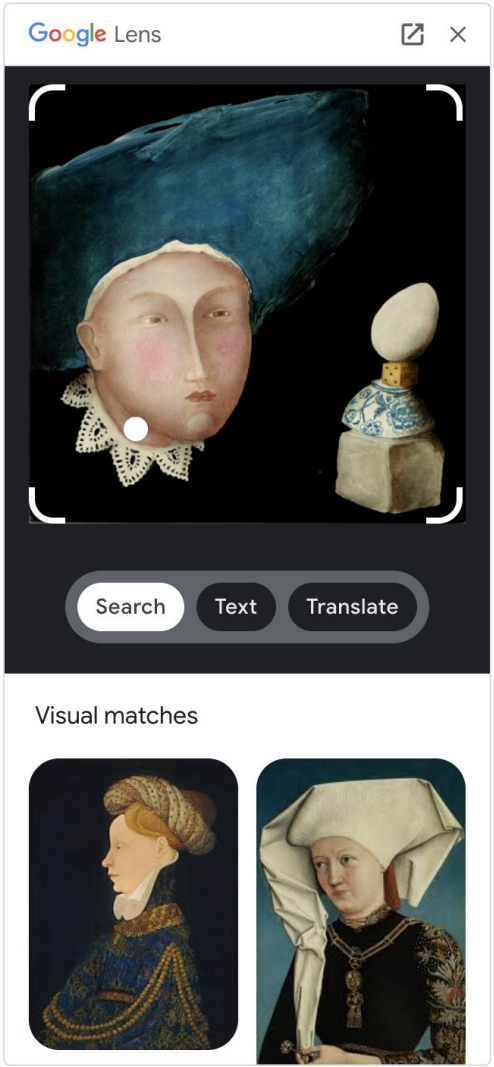
He lives and works in Rome.

His surreal and refined art is *still* **unknown to CLIP** (and to search engines in general).









GOOGLE LENS FINDS SIMILARITIES WITH PIERO DELLA FRANCESCA AND OTHER PAINTERS FROM 1400.

POST https://api.wordlift.io/graphql

GraphQL | Auth | Query | Header 2

```
query {
  articles {
    title: text(name: "schema:headline") {
      value
    }
    url: text(name: "schema:url") {
      value
    }
    image: ref(name: "schema:image")
  }
}
```

image
https://giuliorigoni.com/wp-content/uploads/2021/04/v-1100x1108.jpg
https://giuliorigoni.com/wp-content/uploads/2021/04/v.jpg
https://giuliorigoni.com/wp-content/uploads/2021/04/vv.jpg
https://giuliorigoni.com/wp-content/uploads/2021/04/vvv-466x470.jpg
https://giuliorigoni.com/wp-content/uploads/2021/04/vvvv-466x470.jpg
https://giuliorigoni.com/wp-content/uploads/2021/04/vvvvv-468x470.jpg
https://giuliorigoni.com/wp-content/uploads/2021/04/vvvvvv-462x470.jpg
https://giuliorigoni.com/wp-content/uploads/2021/04/vvvvvvv-470x466.jpg
https://giuliorigoni.com/wp-content/uploads/2021/04/vvvvvvvvv-470x468.jpg
https://giuliorigoni.com/wp-content/uploads/2021/04/vvvvvvvvv-470x464.jpg
https://giuliorigoni.com/wp-content/uploads/2021/04/vvvvvvvv-470x470.jpg
https://giuliorigoni.com/wp-content/uploads/2021/04/cibo-02a.jpg
https://giuliorigoni.com/wp-content/uploads/2021/04/cibo-01-web-5-235x209.jpg

```
image_prompts = ['https://giuliorigoni.com/wp-content/uploads/2021/04/v-1100x1108.jpg',
                 'https://giuliorigoni.com/wp-content/uploads/2021/04/v.jpg',
                 'https://giuliorigoni.com/wp-content/uploads/2021/04/vv.jpg',
                 'https://giuliorigoni.com/wp-content/uploads/2021/04/vvv-466x470.jpg',
                 'https://giuliorigoni.com/wp-content/uploads/2021/04/vvvv-466x470.jpg',
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                 'https://giuliorigoni.com/wp-content/uploads/2021/04/vvvvvvvvv-470x468.jpg',
                 'https://giuliorigoni.com/wp-content/uploads/2021/04/vvvvvvvvv-470x464.jpg',
                 'https://giuliorigoni.com/wp-content/uploads/2021/04/vvvvvvvv-470x470.jpg',
                 'https://giuliorigoni.com/wp-content/uploads/2021/04/cibo-02a.jpg',
                 'https://giuliorigoni.com/wp-content/uploads/2021/04/cibo-01-web-5-235x209.jpg',
                 'https://giuliorigoni.com/wp-content/uploads/2021/04/cibo-02-web-1-235x201.jpg',
                 'https://giuliorigoni.com/wp-content/uploads/2021/04/cibo-03-web-1-235x212.jpg',
                 'https://giuliorigoni.com/wp-content/uploads/2021/04/cibo-04-web-1-235x214.jpg',
                 'https://giuliorigoni.com/wp-content/uploads/2021/04/cibo-05-web-2-235x234.jpg',
                 'https://giuliorigoni.com/wp-content/uploads/2021/04/cibo-06-web-1-235x241.jpg']
batch_size = 1
clip_guidance_scale = 500  # Controls how much the image should look like the prompt.
tv_scale = 150             # Controls the smoothness of the final output.
range_scale = 50           # Controls how far out of range RGB values are allowed to be.
cutn = 16
n_batches = 4
init_image = None   # This can be an URL or Colab local path and must be in quotes.
skip_timesteps = 0  # This needs to be between approx. 200 and 500 when using an init image.
                    # Higher values make the output look more like the init.
init_scale = 0      # This enhances the effect of the init image, a good value is 1000.
seed = 0
```
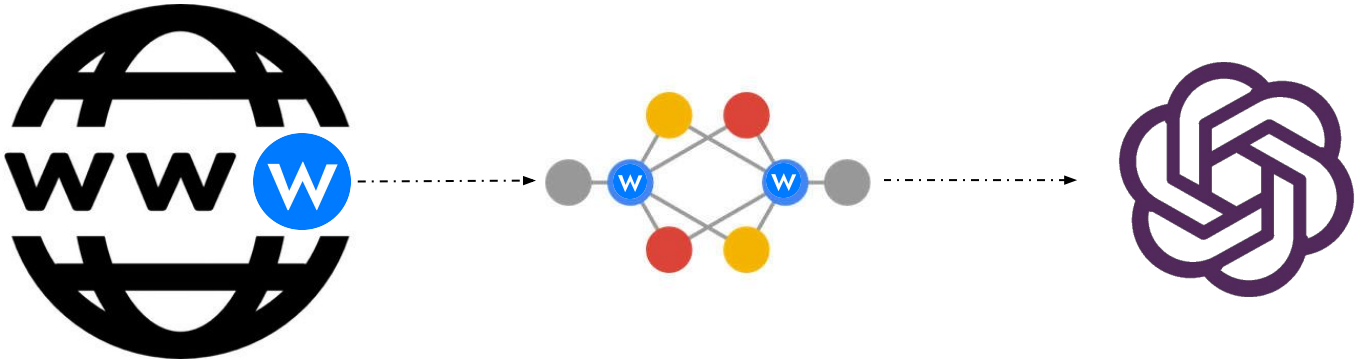

GraphQL

images

CLIP PROMPT



Giulio's Website

Knowledge Graph

CLIP + Diffusion Model

The real
Giulio Rigoni.

A fake
Giulio Rigoni.

https://bit.ly/clip-intro

a fake Kandinsky.

CLIP

A NEURAL SEARCH COMPANY

Let's encode the *images* in our download folder

```
from docarray import DocumentArray

da = DocumentArray.from_files(['/content/download/*.jpg', '/content/download/*.png'])
da = c.encode(da, show_progress=True)
```

```
[17] da.plot_image_sprites()
```

```
[18] vec = c.encode([input('sentence> ')])
     r = da.find(query=vec, limit=9)
     r[0].plot_image_sprites()
```

```
[ ] da.plot_embeddings()
```

LET'S FIND AGAIN THE FAKE PICASSO

Text > Image

```
[41] from docarray import Document

     d1 = [Document(uri='https://giuliorigoni.com/wp-content/uploads/2021/04/cibo-02a.jpg')]
     vec = c.encode(d1)
     r = da.find(query=vec, limit=9)
     r[0].plot_image_sprites()
```

```
[ ]  da.plot_embeddings()
```

LET'S FIND NOW THE FAKE GIULIO RIGONI

Image > Image

Jina
A NEURAL SEARCH COMPANY

CLIP-as-service

“ML held steady at <15% of Google’s total energy use despite it consuming ~75% of its floating point operations.”

Dave Patterson - Google

GOOGLE USES MUM (among other things) TO EXPAND ITS KNOWLEDGE GRAPH

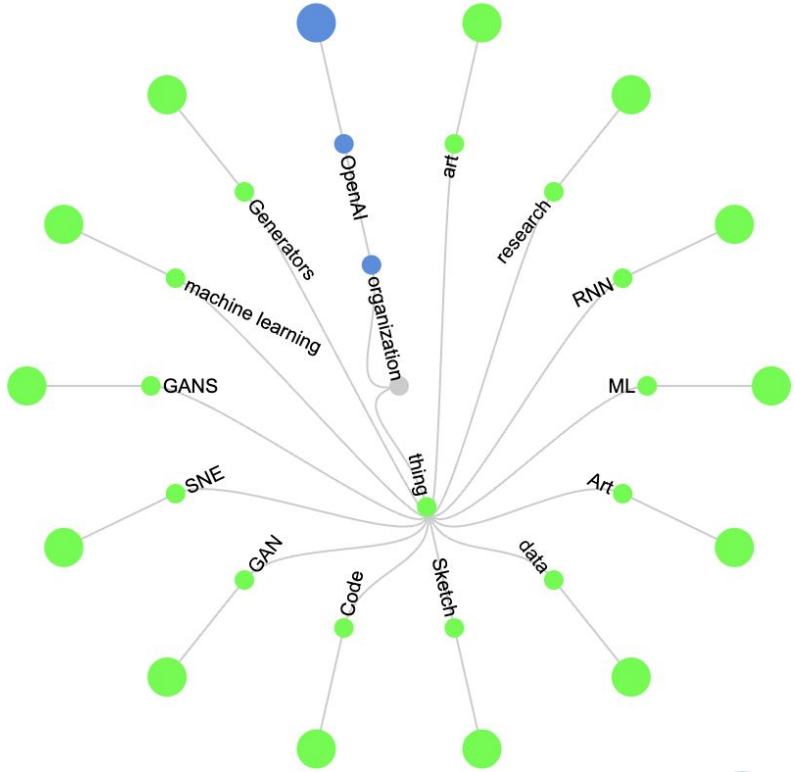
a fake Hieronymus Bosch.

“We’ve been experimenting with using MUM’s capabilities to [...] enable entirely new ways to search.”

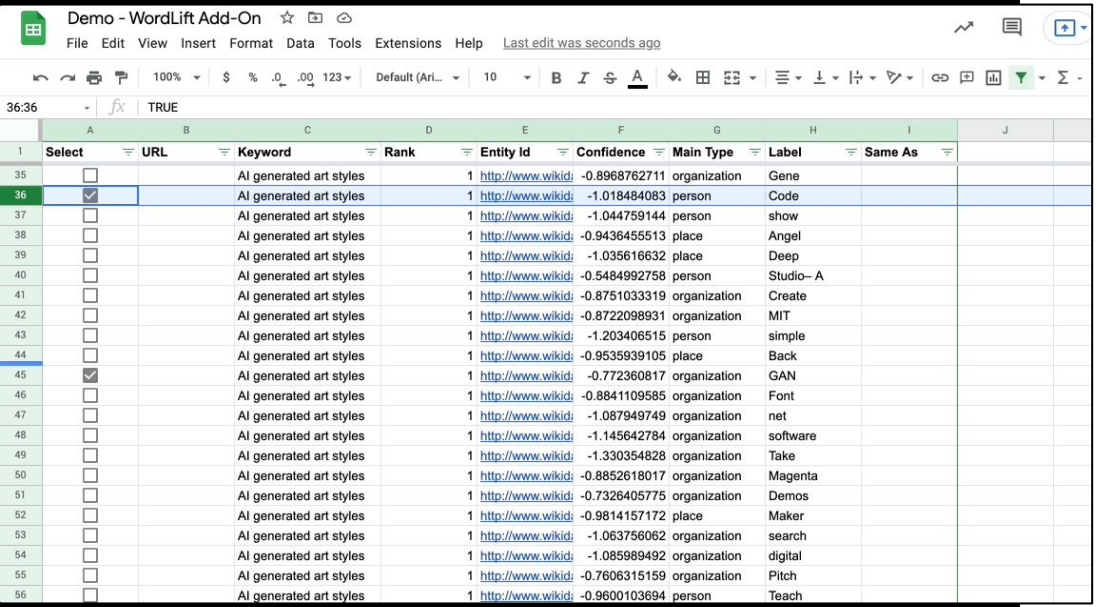
Prabhakar Raghavan - Google

SEARCH QUERY **TOP RESULTS** **KG**

“AI generated art styles”



WordLift for Google Sheets



	Select	URL	Keyword	Rank	Entity Id	Confidence	Main Type	Label	Same As
35	☐		AI generated art styles	1	http://www.wikid	-0.8968762711	organization	Gene	
36	☑		AI generated art styles	1	http://www.wikid	-1.018484083	person	Code	
37	☐		AI generated art styles	1	http://www.wikid	-1.044759144	person	show	
38	☐		AI generated art styles	1	http://www.wikid	-0.9436455513	place	Angel	
39	☐		AI generated art styles	1	http://www.wikid	-1.035616632	place	Deep	
40	☐		AI generated art styles	1	http://www.wikid	-0.5484992758	person	Studio– A	
41	☐		AI generated art styles	1	http://www.wikid	-0.8751033319	organization	Create	
42	☐		AI generated art styles	1	http://www.wikid	-0.8722098931	organization	MIT	
43	☐		AI generated art styles	1	http://www.wikid	-1.203406515	person	simple	
44	☐		AI generated art styles	1	http://www.wikid	-0.9535939105	place	Back	
45	☑		AI generated art styles	1	http://www.wikid	-0.772360817	organization	GAN	
46	☐		AI generated art styles	1	http://www.wikid	-0.8841109585	organization	Font	
47	☐		AI generated art styles	1	http://www.wikid	-1.087949749	organization	net	
48	☐		AI generated art styles	1	http://www.wikid	-1.145642784	organization	software	
49	☐		AI generated art styles	1	http://www.wikid	-1.330354828	organization	Take	
50	☐		AI generated art styles	1	http://www.wikid	-0.8852618017	organization	Magenta	
51	☐		AI generated art styles	1	http://www.wikid	-0.7326405775	organization	Demos	
52	☐		AI generated art styles	1	http://www.wikid	-0.9814157172	place	Maker	
53	☐		AI generated art styles	1	http://www.wikid	-1.063756062	organization	search	
54	☐		AI generated art styles	1	http://www.wikid	-1.085989492	organization	digital	
55	☐		AI generated art styles	1	http://www.wikid	-0.7606315159	organization	Pitch	
56	☐		AI generated art styles	1	http://www.wikid	-0.9600103694	person	Teach	

A SEO-optimized Graph ready in a Snap!

- Converts queries on Google to **an optimized JSON-LD** that **boosts your pages**
- Extracts **top queries from Google Search Console**
- Provides **sameAs links to Wikidata**
- Helps you **sift through most relevant entities** by Google ranking and confidence

WordLift for Google Sheets

It just works™

Impressions +17%

Clicks +30%

after 3 weeks

More details at
https://bit.ly/wl-case-studies

DOES SEMANTIC SEO REALLY SCALE?

(especially for Enterprise brands)

a fake de Chirico.

2.191 entities

55 web sites

11.323 triples

+35% clicks

5 types

In less than a month

DBpedia

IS IT JUST
ABOUT TRAINING
GOOGLE?

AI-Generated Text

EACH PRODUCT VARIANT GETS ITS OWN PERSONALIZED DESCRIPTION

An updated take on a classic shape, Ray-Ban RB2283 Burbank sunglasses are designed to make heads turn. The brown lenses, havana frame and tortoise temples deliver the same quality and performance you expect from an authentic Ray-Ban style, while adding a touch of modern sophistication.

Standard Text

ALL PRODUCT VARIANT SHARE THE SAME DESCRIPTION

Straight from the archive, Mr Burbank is back from the ‘60s with the same authentic name and original details. Its squared acetate rectangular style puts the vintage vibe into a timeless perspective. Available also with classic black or Havana and with transparent gradient frame that recalls its origins, Mr Burbank is ready to enchant you.

NATURAL LANGUAGE GENERATION

existing

Shop Pre-Owned Prada 1990s Tinted Rounded Sunglasses In Gold, starting at $209. Similar ones also available. On SALE now! Brown/gold-tone gold plated metal 1990s tinted rounded sunglasses from Prada Pre-Owned featuring yellow tinted lenses, oval frame, curved tips, nose pads and tortoiseshell detailing. Please be mindful that this piece has led a previous life, and may tell its story through minor imperfection. Purchasing this item continues its narrative, so you can be confident that you’re making a POSITIVELY CONSCIOUS choice for the planet. We know you’ll look after them, but these glasses come with protection, just in case.

- Template based
- Repetitive
- Not informative

new

Prada PRD3700 sunglasses are a bestseller that continues to stand the test of time. This classic shape has been worn by cultural intellectuals who have changed the course of the world. With gold temples and yellow lenses, you'll always be one step ahead. Lenses are polarized lenses to keep your eyes protected and safe from harmful UVA and UVB rays.

- Unique for each variant
- Respects the TOV of the brand
- SEO-friendly and informative

CONTENT VALIDATION

IS THE INFORMATION AVAILABLE IN THE TEXT?

IS THE TEXT VALID IN TERMS OF SEO AND GUIDELINES?

IS THE AVAILABLE INFORMATION CORRECT?

snorkel

VALIDATION RESULTS

existing

Shop Pre-Owned Prada 1990s Tinted Rounded Sunglasses In Gold, starting at $209. Similar ones also available. On SALE now! Brown/gold-tone gold plated metal 1990s tinted rounded sunglasses from Prada Pre-Owned featuring yellow tinted lenses, oval frame, curved tips, nose pads and tortoiseshell detailing. Please be mindful that this piece has led a previous life, and may tell its story through minor imperfection. Purchasing this item continues its narrative, so you can be confident that you're making a POSITIVELY CONSCIOUS choice for the planet. We know you'll look after them, but these glasses come with protection, just in case.

==> Detected attributes:lens color, brand, product_type
==> All attributes have correct values.
==> Attributes not found:product name, lens material, frames material, gender, temples color

new (A)

Prada PRD3700 sunglasses are a bestseller that continues to stand the test of time. This classic shape has been worn by cultural intellectuals who have changed the course of the world. With gold temples and yellow lenses, you'll always be one step ahead. Lenses are polarized to keep your eyes protected and safe from harmful UVA and UVB rays.

==> Detected attributes:lens color, brand, product name, product_type
==> All attributes have correct values.
==> Attributes not found:lens material, frames material, gender

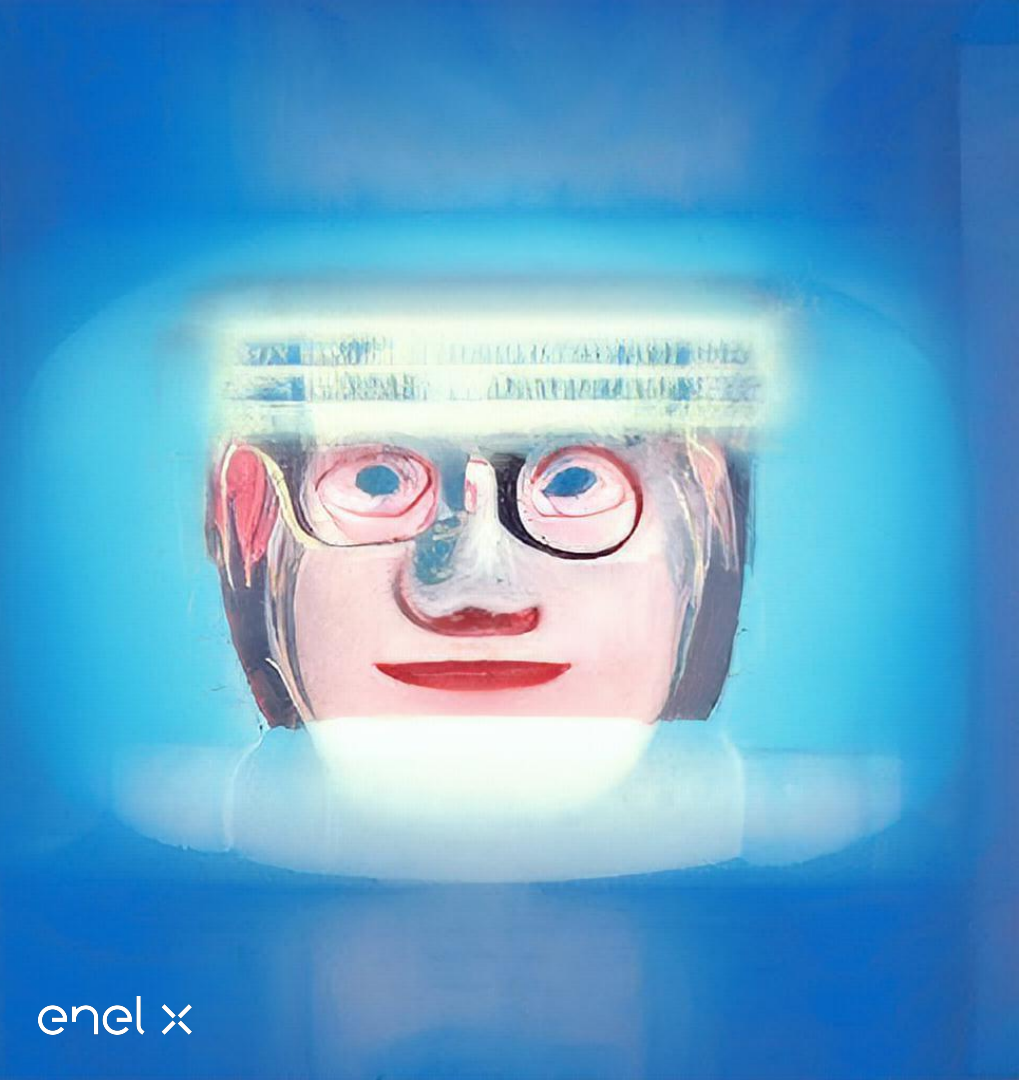
new (B)

Prada PRD3700 eyeglasses are a bestseller that continues to stand the test of time. This classic shape has been worn by cultural intellectuals who have changed the course of the world. With gold temples and blue lenses you'll always be one step ahead. Lenses are polarized to keep your eyes protected and safe from harmful UVA and UVB rays.

==> Detected attributes:lens color, brand, product name, product_type
==> Attributes with wrong values:lens color, product_type
==> Attributes not found:lens material, frames material, gender

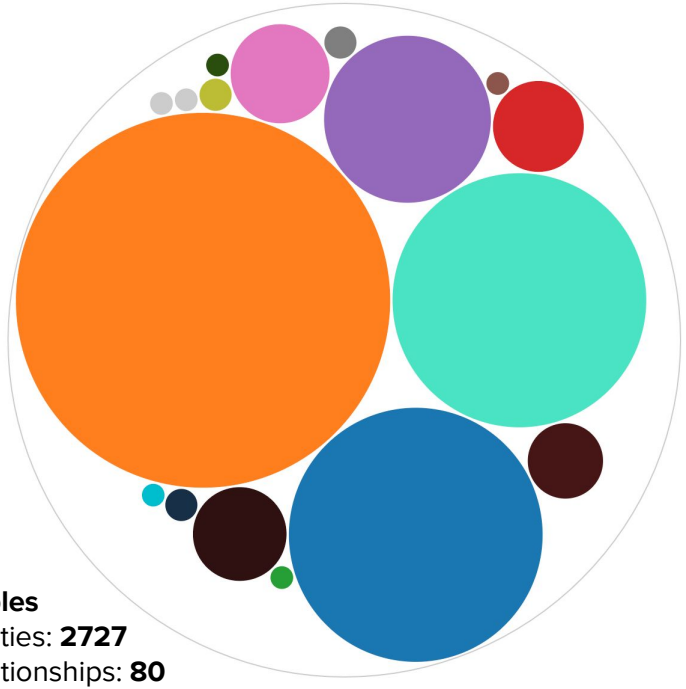
snorkel

https://bit.ly/kgc-validation



KG-POWERED CHATBOT

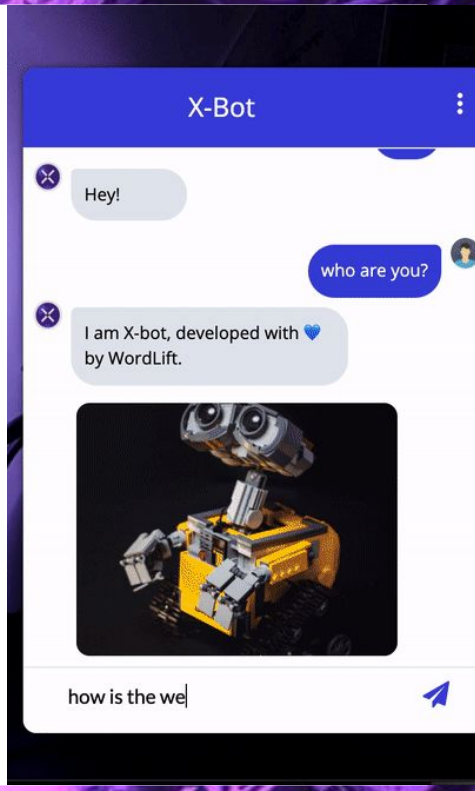
a fake David Hockney.



@type [csvDistinct]

- http://schema.org/Answer
- http://schema.org/Article
- http://schema.org/Brand
- http://schema.org/Country
- http://schema.org/FAQPage
- http://schema.org/ImageObject
- http://schema.org/Offer
- http://schema.org/Organization
- http://schema.org/Person
- http://schema.org/Place
- http://schema.org/Question
- http://schema.org/Service
- http://schema.org/Service
  http://schema.org/Thing
- http://schema.org/SoftwareApplication
- http://schema.org/Thing

size: **10136, triples**
er of unique entities: **2727**
er of unique relationships: **80**

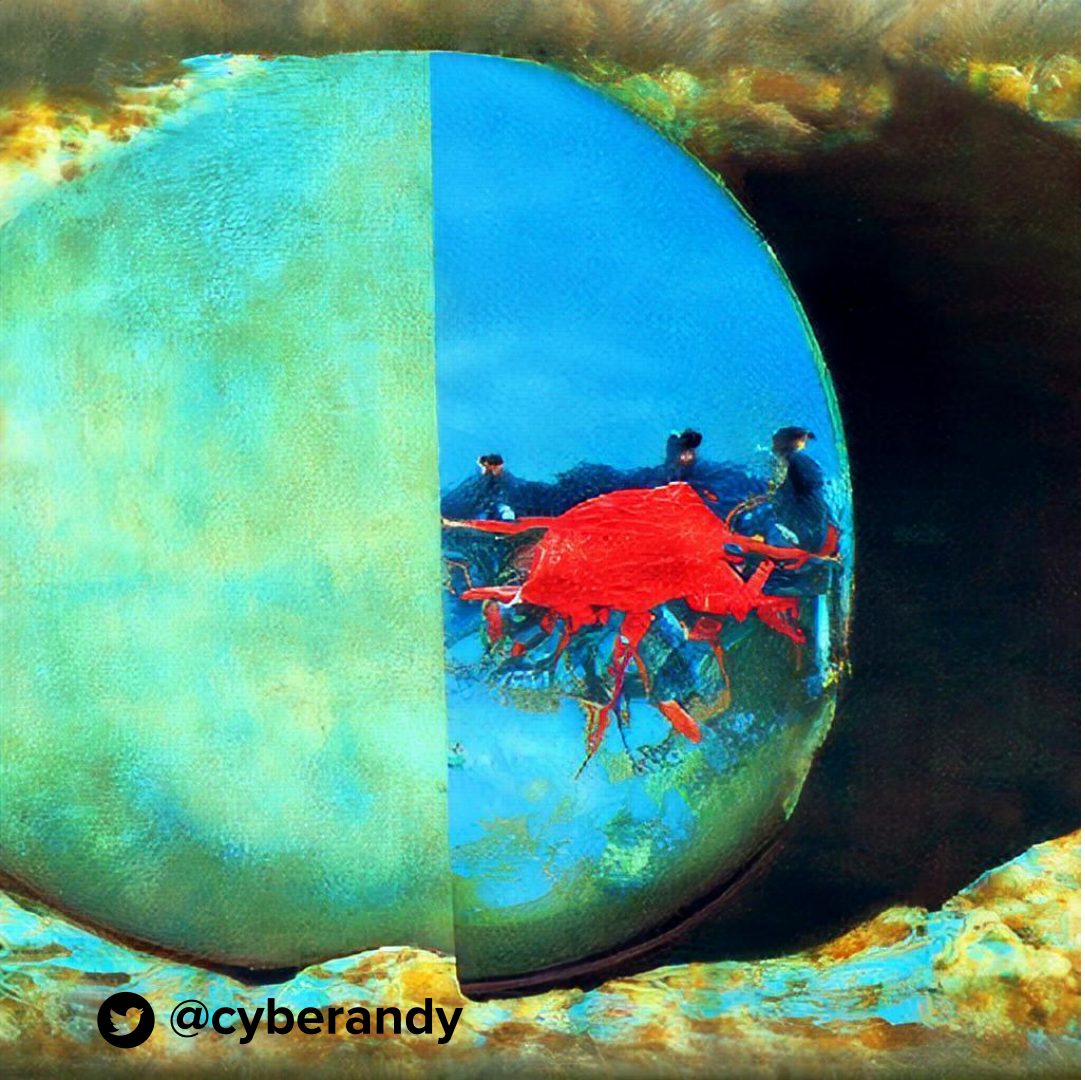


THANK YOU!

a fake Max Ernst.

👉 wordlift.io

#KGConference



REFERENCES:

Colab that you can use:

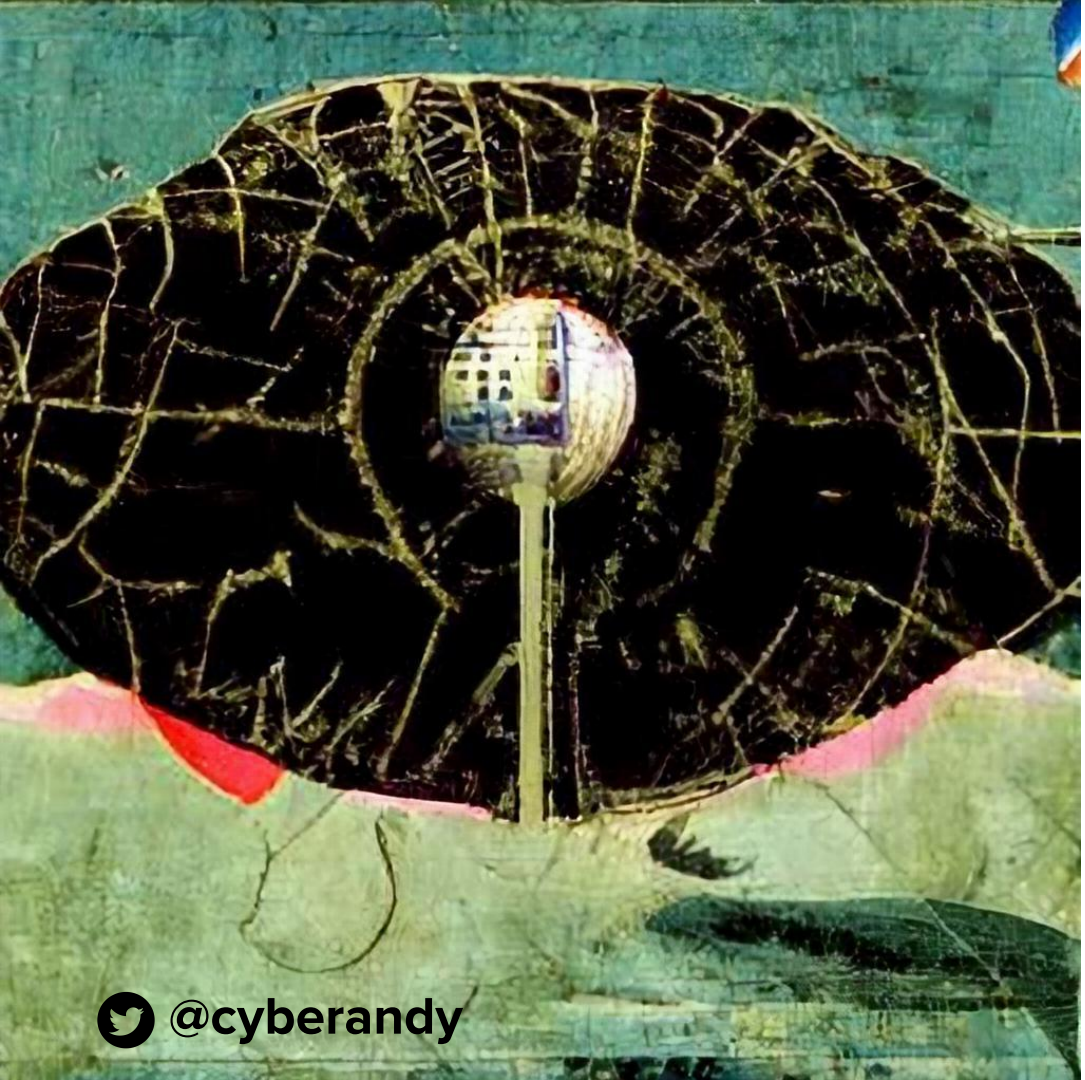
- https://bit.ly/clip-intro
- https://bit.ly/kgc-validation
- A list of image-making Colabs

Repositories:

- CLIP-as-Service by Jina AI
- CLIP by OpenAI
- Guided Diffusion by OpenAI
- DALL-E by OpenAI powered by Jina AI

Articles:

- CLIP Prompt Engineering by Matthew McAtter
- What is Semantic SEO? (WordLift)
- What is Semantic SEO? (Bill Slawski for Gofishdigital)
- Semantic SEO - A WebStory (Valentina Izzo for WordLift)
- SEO and KG-based Chatbot (Beatrice Gamba for WordLift)
- Multimodal Search, Exploring the multilingual path (Elie Raad for WordLift)



CREDITS :

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