Generative AI with Diffusion Models

Part 6: Wrap-up & Assessment

Agenda

- Part 1: From U-Nets to Diffusion
- Part 2: Denoising Diffusion Probabilistic Models
- Part 3: Optimizations
- Part 4: Classifier-Free Diffusion Guidance
- Part 5: CLIP
- Part 6: Wrap-up & Assessment

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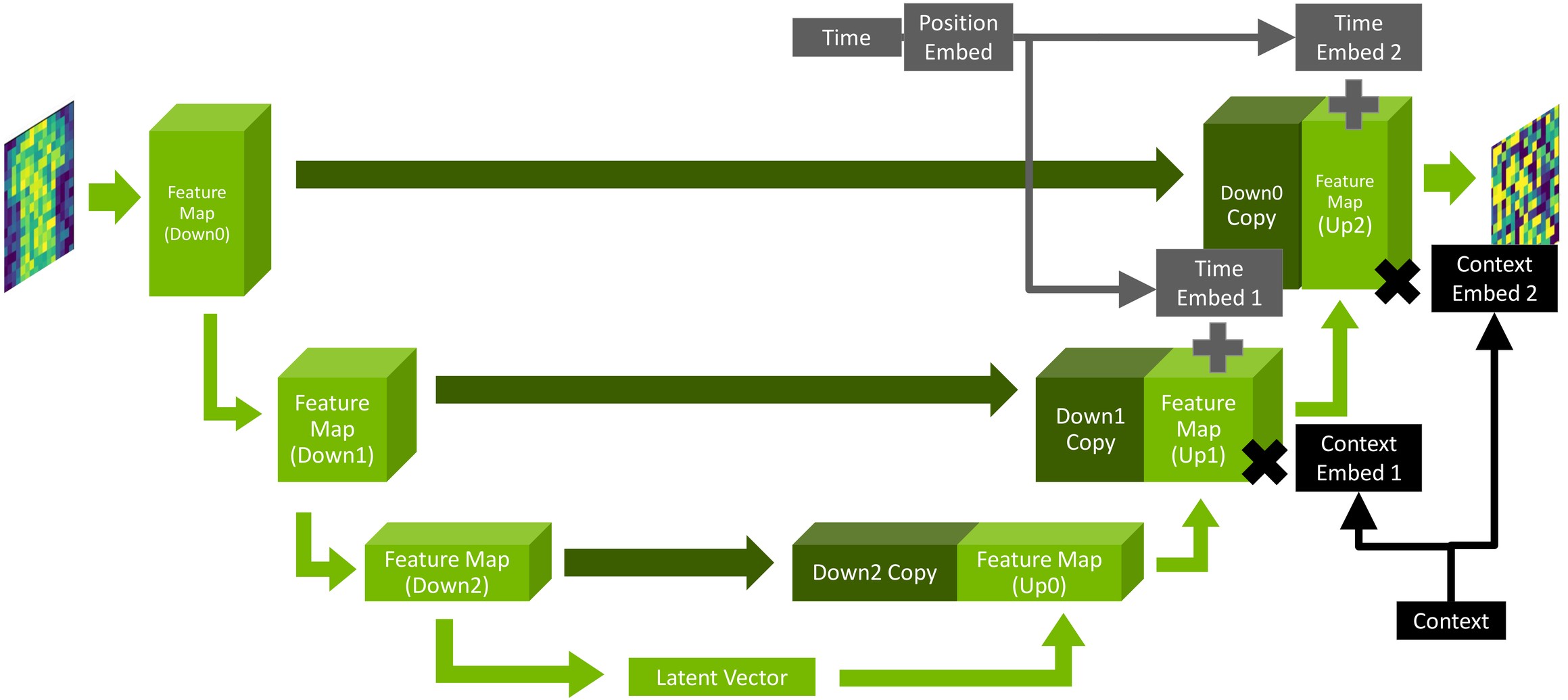
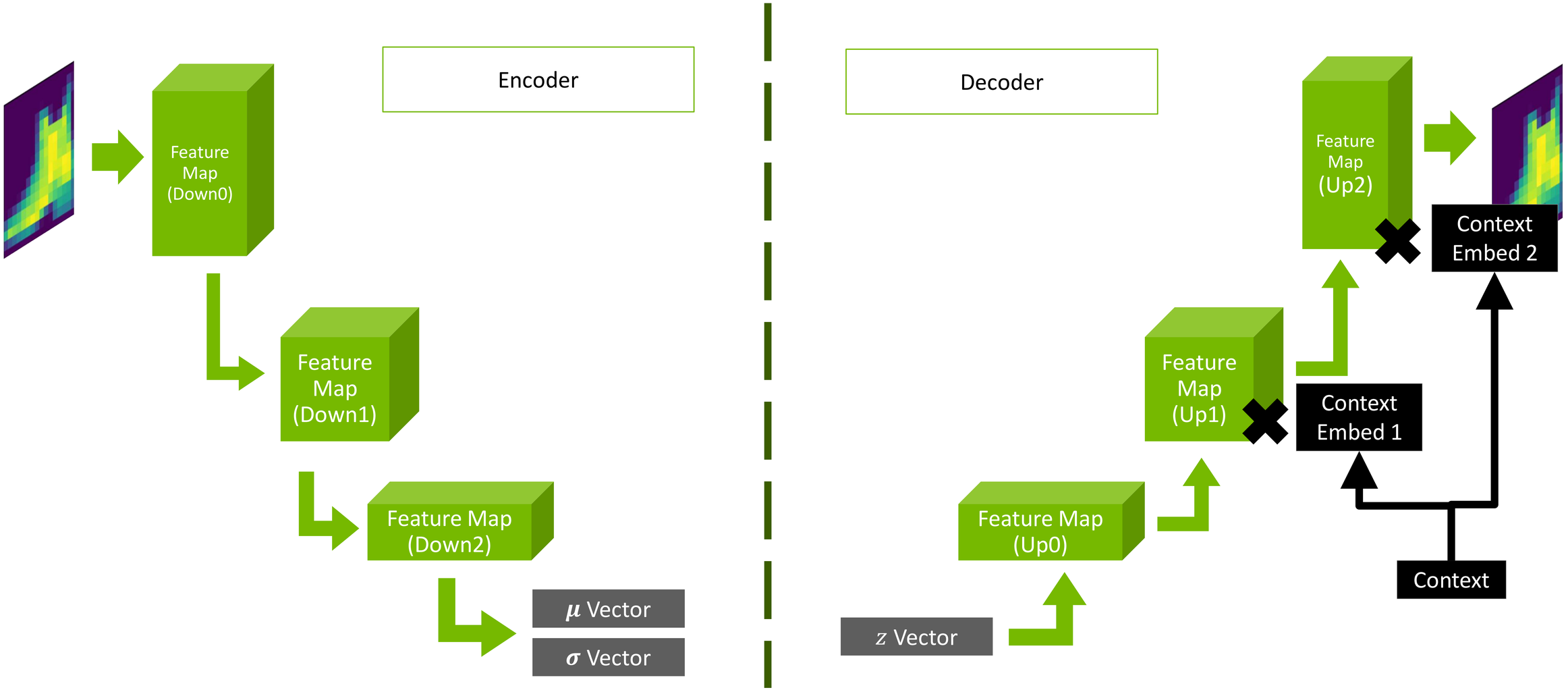
Variational Autoencoders (VAE)

U-Net


Time
Position Embed
Time Embed 2
Feature Map (Down0)
Down0 Copy
Feature Map (Up2)
Time Embed 1
Context Embed 2
Feature Map (Down1)
Down1 Copy
Feature Map (Up1)
Context Embed 1
Feature Map (Down2)
Down2 Copy
Feature Map (Up0)
Context
Latent Vector

NVIDIA.

Variational Autoencoder



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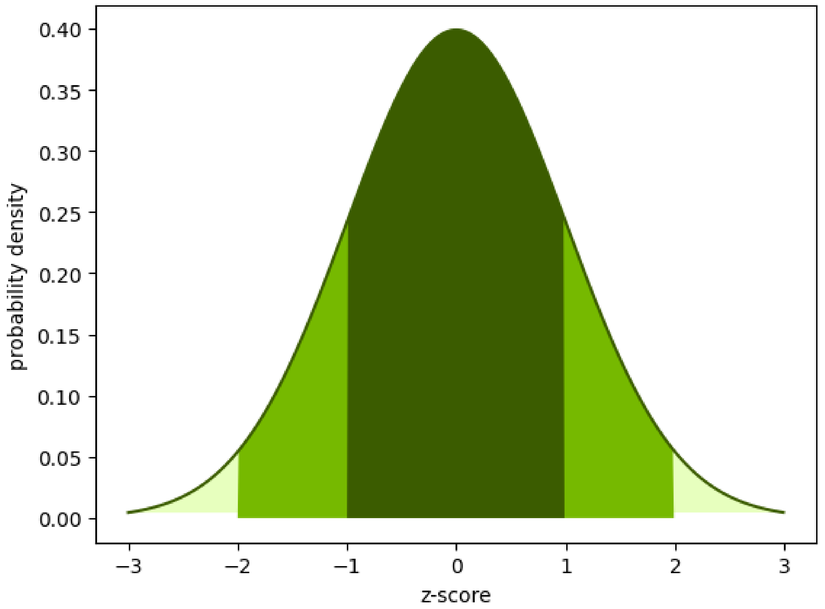
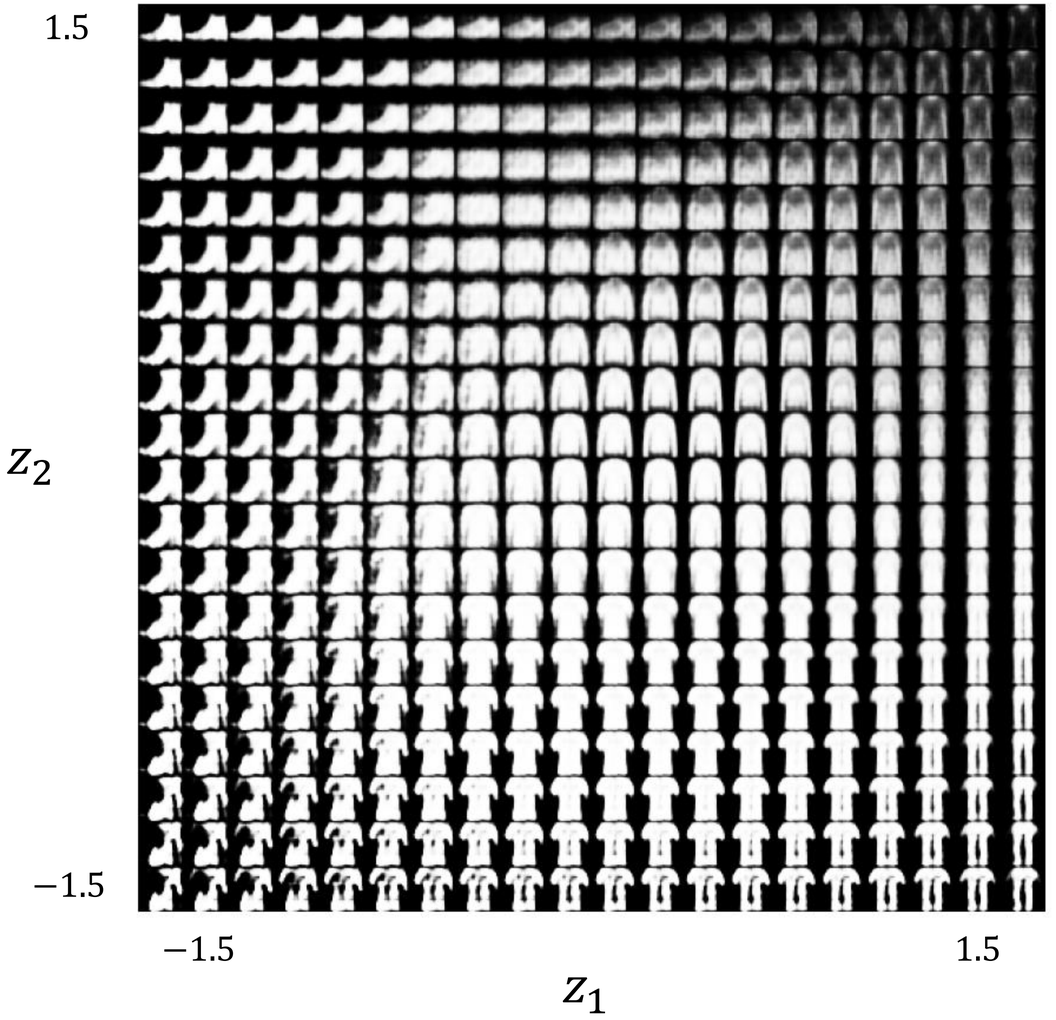
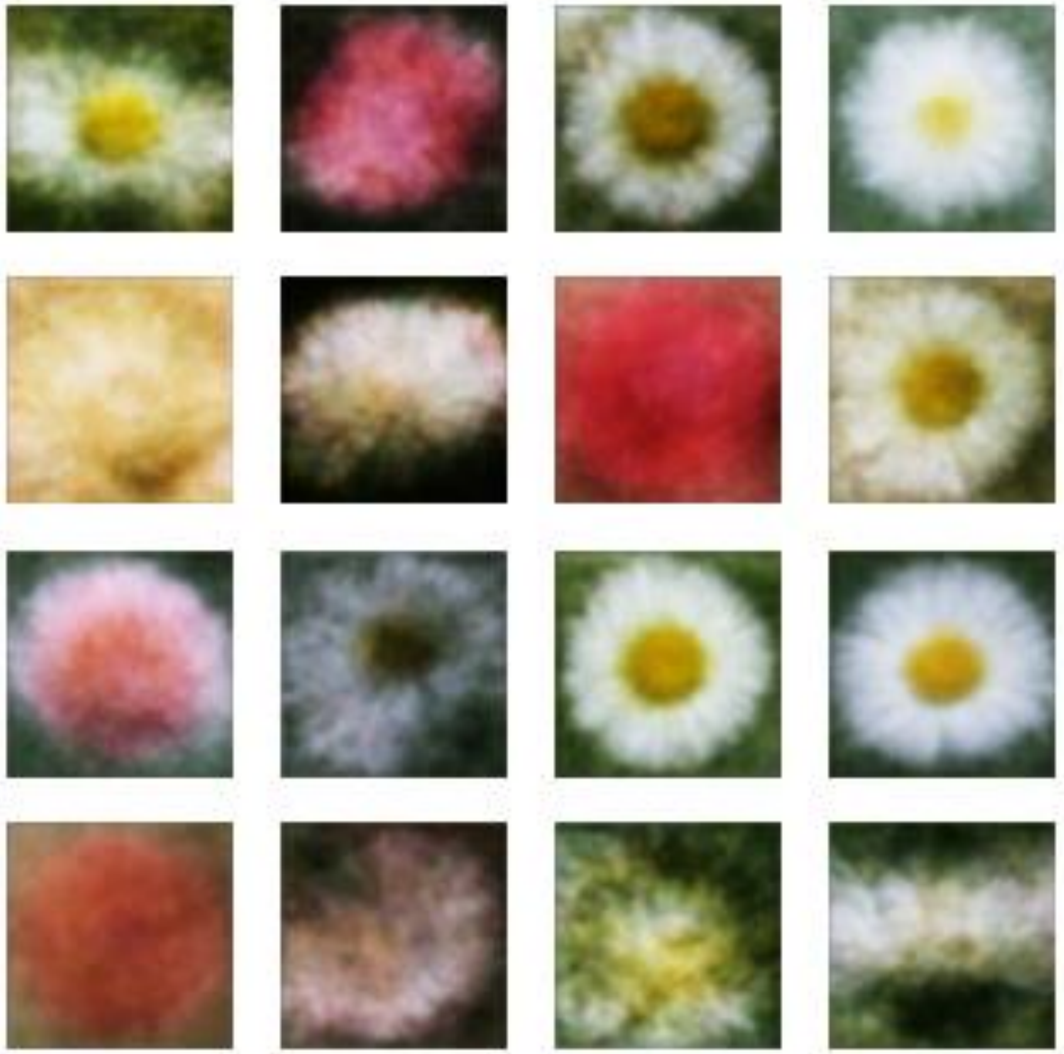
Variational Autoencoder



FashionMNIST
2 Latent Variables



Variational Autoencoder



Modified TF Flowers
20 Latent Variables
16 Random Images

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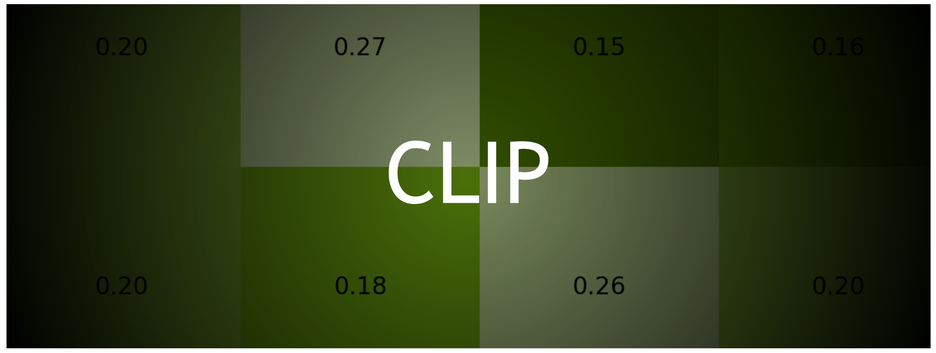
State of the Art Models

State of the Art Models

All of them are used



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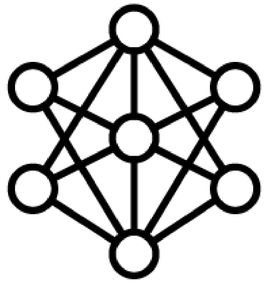
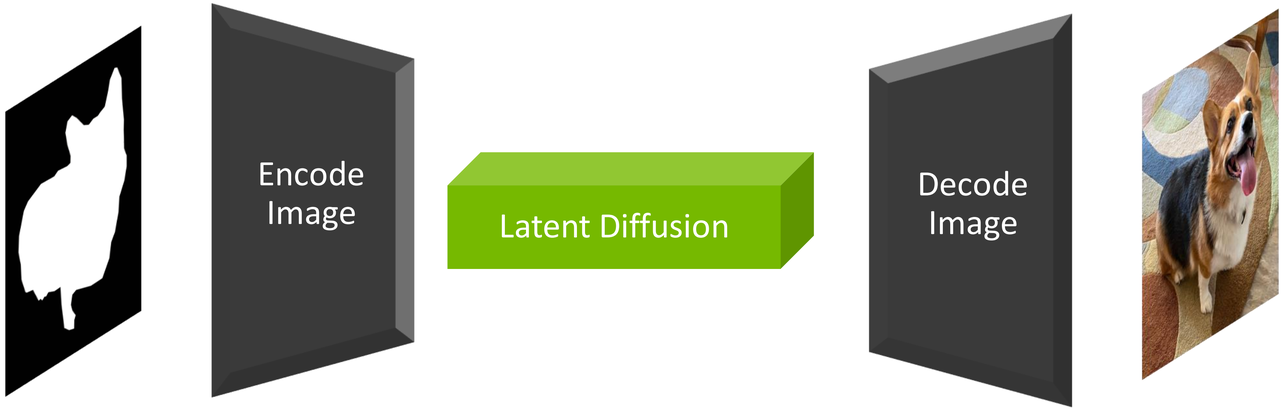
Latent Diffusion



VAE

Diffusion



Tiled Upsampling

Transposed Convolution Review

Kernel

.25	.25
.25	.25

Image

1	0	1
0	1	0
1	0	1

Output

.25	0	0	.25
0	.25	.25	0
0	.25	.25	0
.25	0	0	.25

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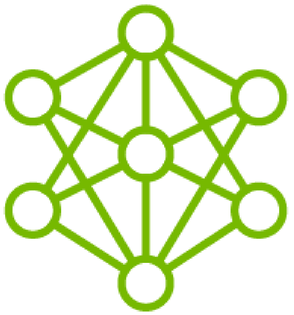
Tiled Upsampling

Convolving with a Neural Network

Kernel?



Image

1	0	1
0	1	0
1	0	1

Output

?	?	?	?
?	?	?	?
?	?	?	?
?	?	?	?

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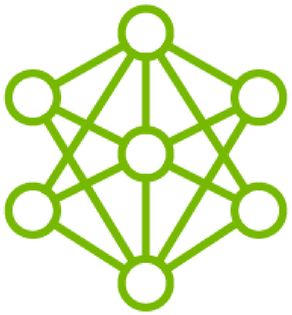
Tiled Upsampling

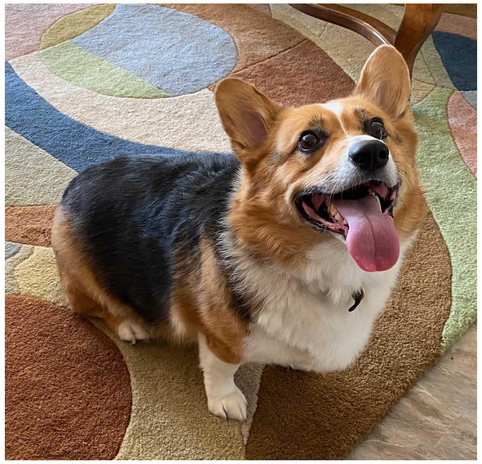
Convolving with a Neural Network

Kernel?



Image

Output



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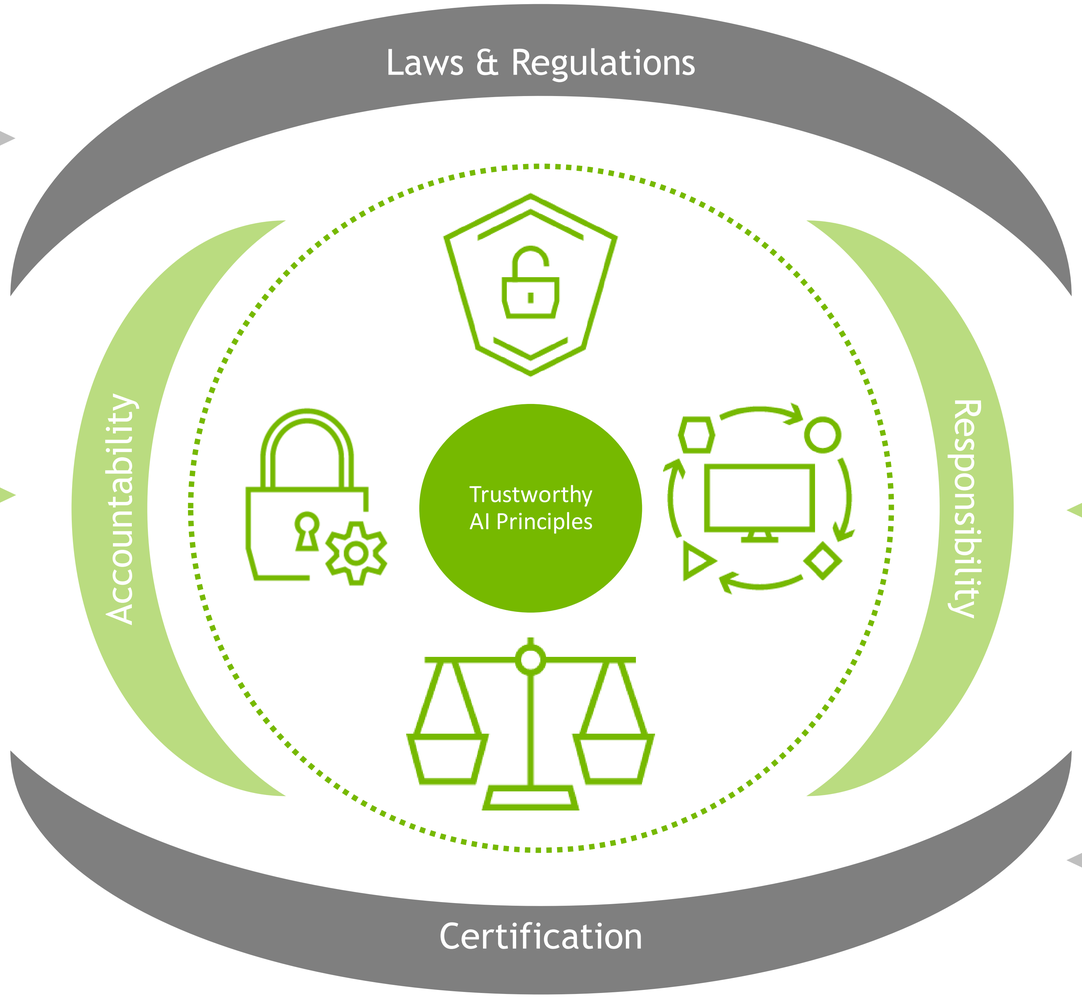
Trustworthy AI

Foundations of Trustworthiness

An AI model complies with relevant laws, regulations, and standards for the region and industry where it is deployed

Accountability means being answerable for the impact of an AI on the societal system that uses it and being thoughtful about how it might be misused



Responsibility can be legal or moral. Legal responsibility requires a violation of a law or regulation. Moral responsibility occurs from an action or an intentional failure to act.

An AI model has been certified as fit for purpose as required by the region or industry where it is deployed

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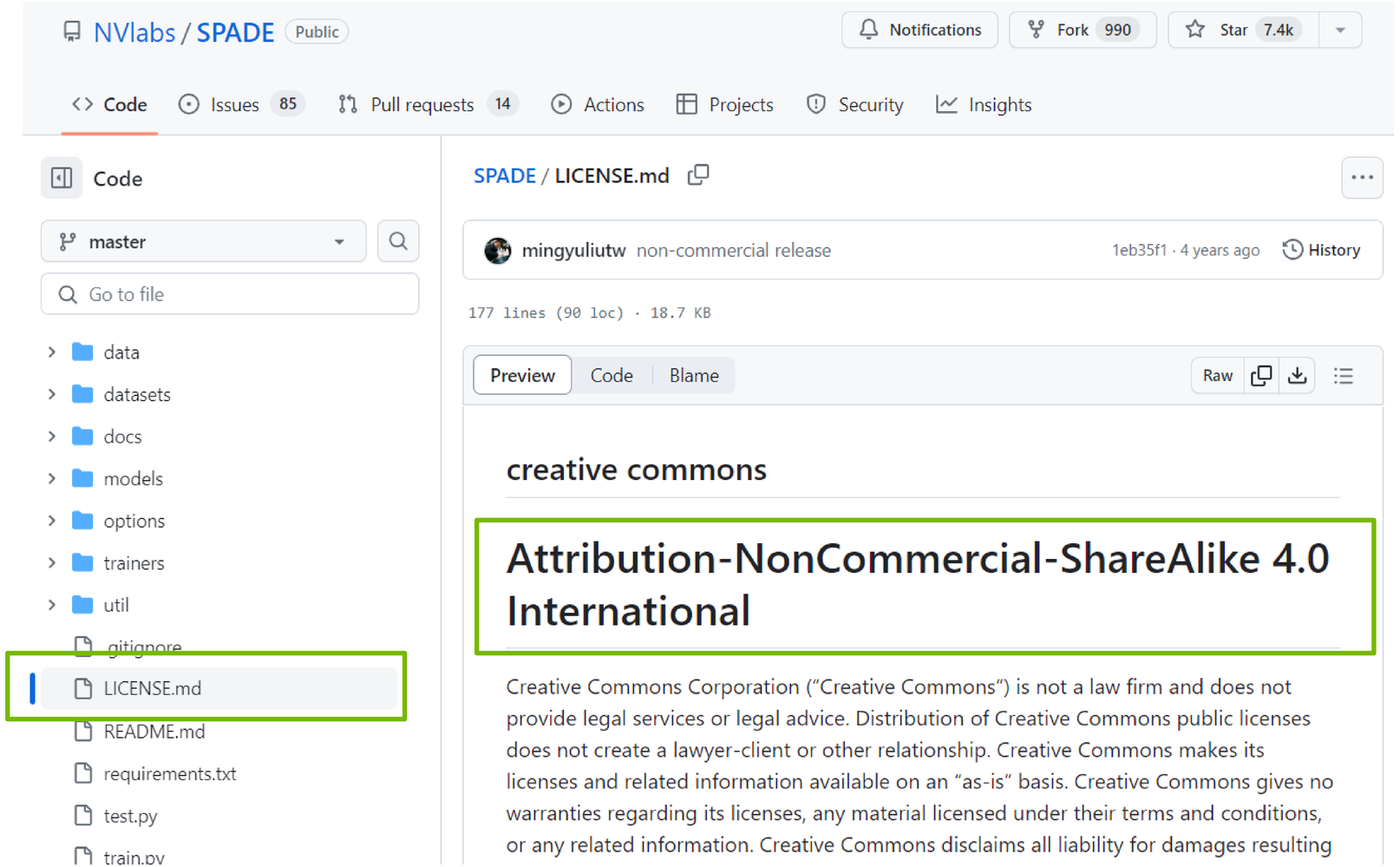
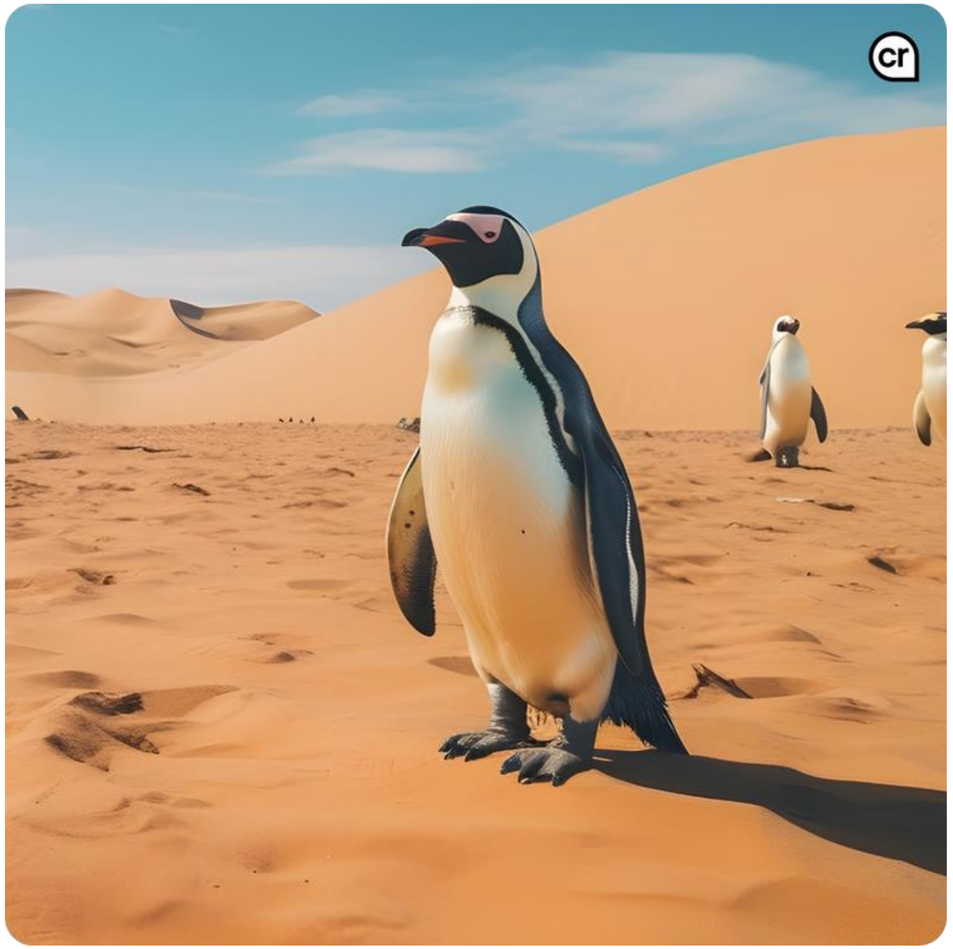
Check the License



Many code repositories and datasets have a license file which describe the use limitations such as:

- Whether the asset can be used for commercial purposes
- How the authors would like to be recognized or attributed

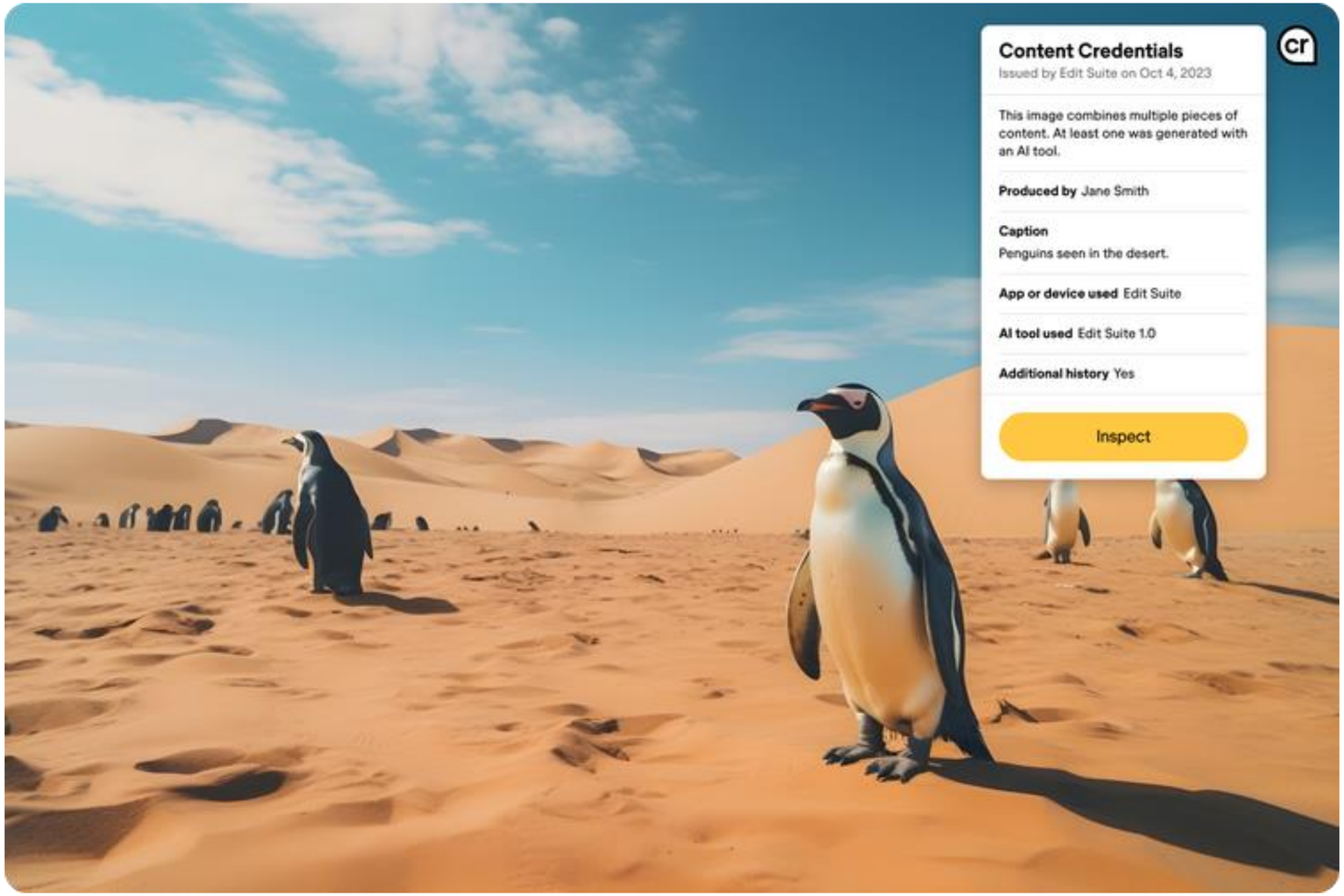
Trustworthy AI Tools



Content Authenticity Initiative

content credentials

Trustworthy AI Tools



All content generated with Adobe Firefly is clearly labeled and can be inspected

content credentials

Select another file from your device or drag and drop anywhere

Generated image
Sep 27, 2023

Search for possible matches

Generated image
Sep 27, 2023

Compare

Generated image

Sep 27, 2023

Content summary

This image was generated with an AI tool.

Credit and usage

The producer chose to share the following info:

AI tool used

Adobe Firefly Pipeline

Process

The app or device used to produce this content recorded the following info:

App or device used

Adobe Firefly 1.0

Actions

Created

content credentials

Inspect content to dig deeper

Drag content into Verify to inspect its Content Credentials in detail and see how it has changed over time.

Content Credentials are still rolling out, so the content you choose to inspect may not have information to view.

Select a file from your device
or drag and drop anywhere

Supported formats: AVIF, DNG, HEIC, JPEG, M4A, MP4, PNG, SVG, TIFF, WAV, WebP

Change language

The Verify inspection tool allows us see the provenance of a digital file

Compare

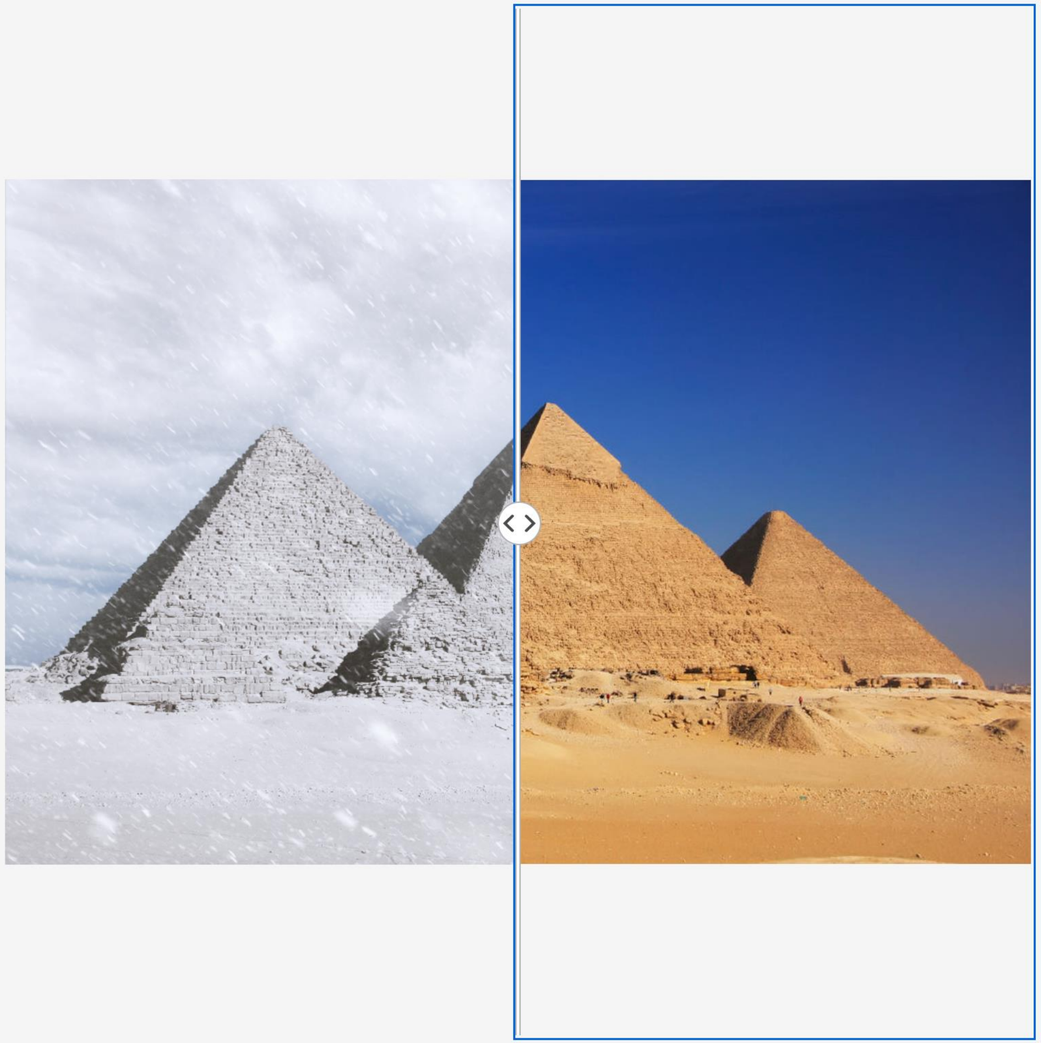
Compare view: Slider

snowy-pyramids.png
Apr 21, 2023

AdobeStock_55134478.jpeg
Oct 26, 2022

Untitled Image
No Content Credential

AdobeStock_250269283.jpeg
Oct 28, 2022



AdobeStock_55134478.jpeg
Oct 26, 2022

Credit and usage

The producer chose to share the following info:

Website

https://stock.adobe.com/55134478

Process

The app or device used to produce this content recorded the following info:

App or device used

Adobe Stock

Actions

Published image
Received and distributed image

About this Content Credential

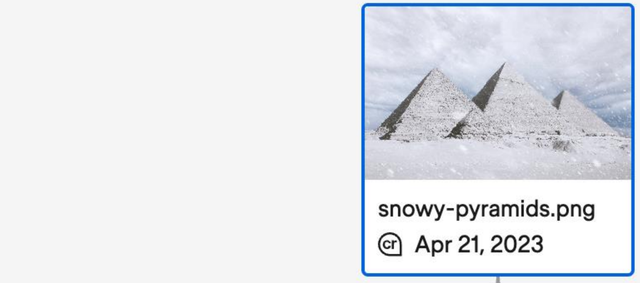
Issued by

content credentials

Select another file from your device or drag and drop anywhere

snowy-pyramids.png
Apr 21, 2023

Search for possible matches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Apr 21, 2023

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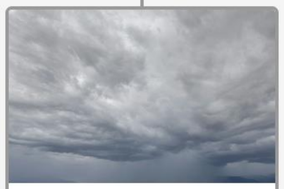
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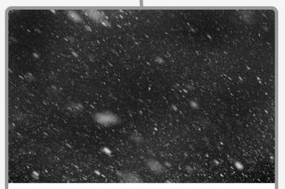
No Content Credential


AdobeStock_2502692..
Oct 28, 2022

Compare

Change language

snowy-pyramids.png
Apr 21, 2023

Content summary

This image was generated with an AI tool.

Credit and usage

The producer chose to share the following info:

Produced by

Pia Blumenthal

Social media accounts

Pia Blumenthal
Behance

pia___b
Twitter

AI tool used

undefined

The Content Credentials pin will appear next to content online, indicating that provenance information is present.

Content
Authenticity
Initiative

Adobe Firefly

Adobe Firefly

https://firefly.adobe.com/

Text to Image

Generate images from a detailed text description.

Create with Firefly

Generative Fill

Use a brush to remove objects or paint in new ones.

Create with Firefly

Text Effects

Apply styles or textures to words and phrases.

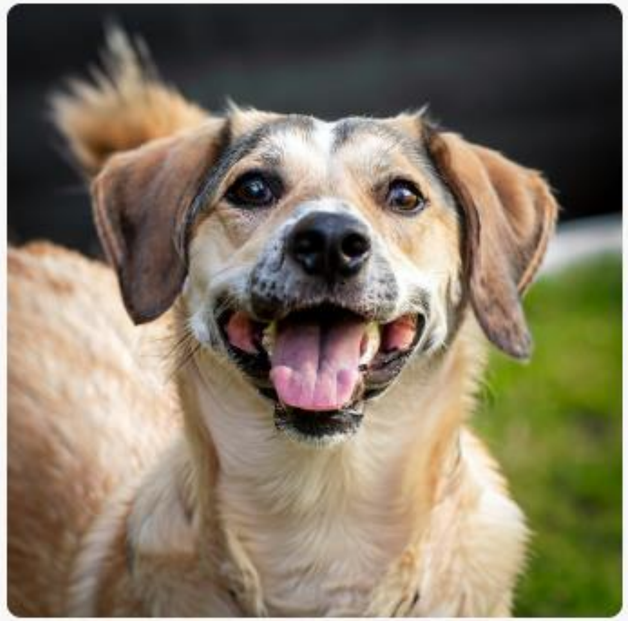
Create with Firefly

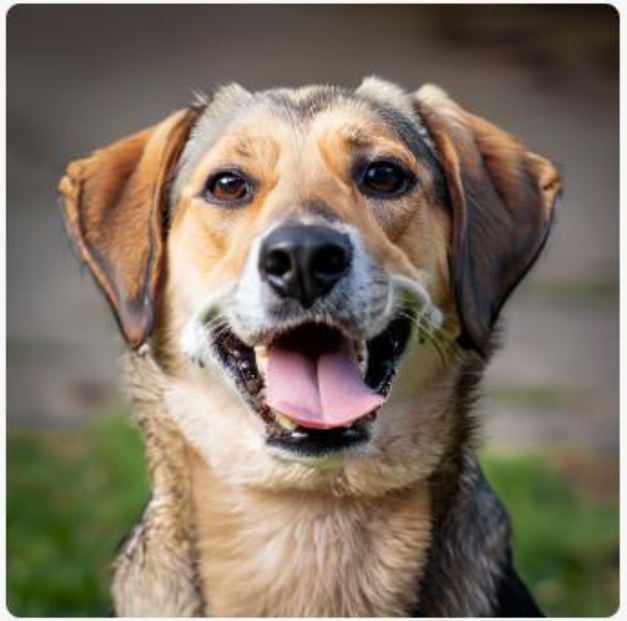
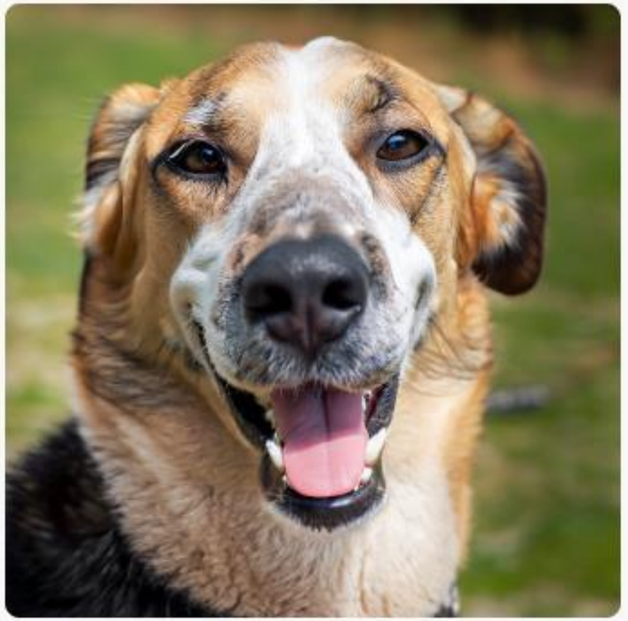
NVIDIA.

Prompt Engineering

State-of-the-art Models

Better understanding the vocabulary the model was trained will make it easier to influence the results.



“Portrait of a happy canine with a 17mm lens”

Good Luck!

Two cute robots that look like computer boards waving goodbye under a starry sky