NUS-ISS
Problem Solving Using Pattern Recognition

Deep learning: Create

by Dr. Tan Jen Hong

How deep learning is used to create: Use cases

The scientist named the population, after their distinctive horn, Ovid's Unicorn. These four-horned, silver-white unicorns were previously unknown to science.

Now, after almost two centuries, the mystery of what sparked this odd phenomenon is finally solved.

Dr. Jorge Pérez, an evolutionary biologist from the University of La Paz, and several companions, were exploring the Andes Mountains when they found a small valley, with no other animals or humans.

Pérez noticed that the valley had what appeared to be a natural fountain, surrounded by two peaks of rock and silver snow.

Pérez and the others then ventured further into the valley. "By the time we reached the top of one peak, the water looked blue, with some crystals on top," said Pérez.

Pérez and his friends were astonished to see the unicorn herd. These creatures could be seen from the air without having to move too much to see them – they were so close they could touch their horns.

psupr/m5.3/v1.0

A news report

The prompt

In a shocking finding, scientist discovered a herd of unicorns living in a remote, previously unexplored valley, in the Andes Mountains. Even more surprising to the researchers was the fact that the unicorns spoke perfect English.

psupr/m5.3/v1.0

NUS | iSS

GPT-2
The good and the bad

- AI writing assistants

- More capable dialogure agents

- Unsupervised translation between languages

- Better speech recognition systems

- Generate misleading news articles

- Impersonate others online

- Automate the production of abusive or faked content to post on social media

- Automate the production of spam/ phishing content

psupr/m5.3/v1.0

NUS National University of Singapore | ISS

GPT-2

Grave concerns

- Due to concerns about large language models being used to generate deceptive, biased, or abusive language at scale, the researchers did not release the full dataset and code.

- They were not sure they were doing the right things, but they hoped the community should start to tackle this issue.
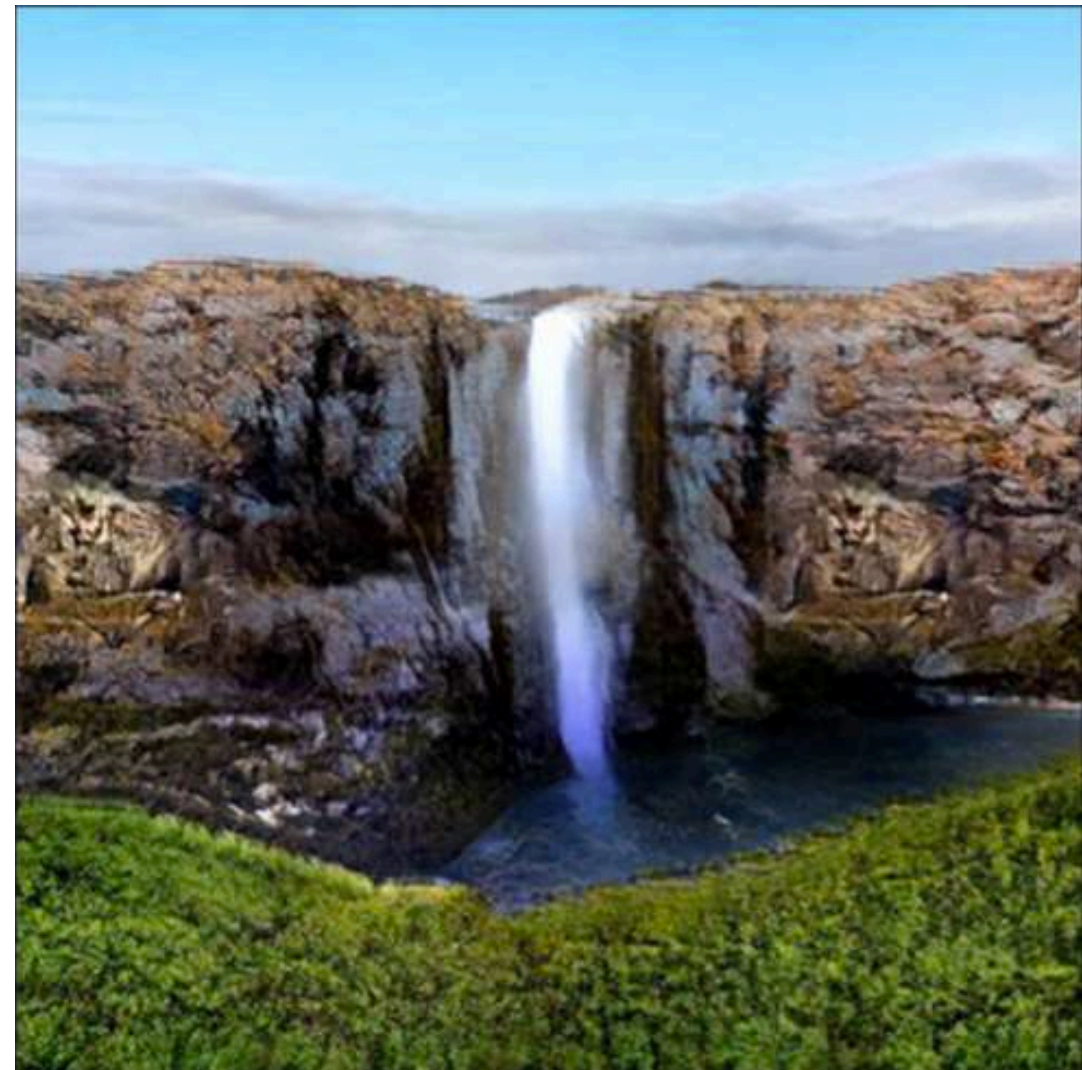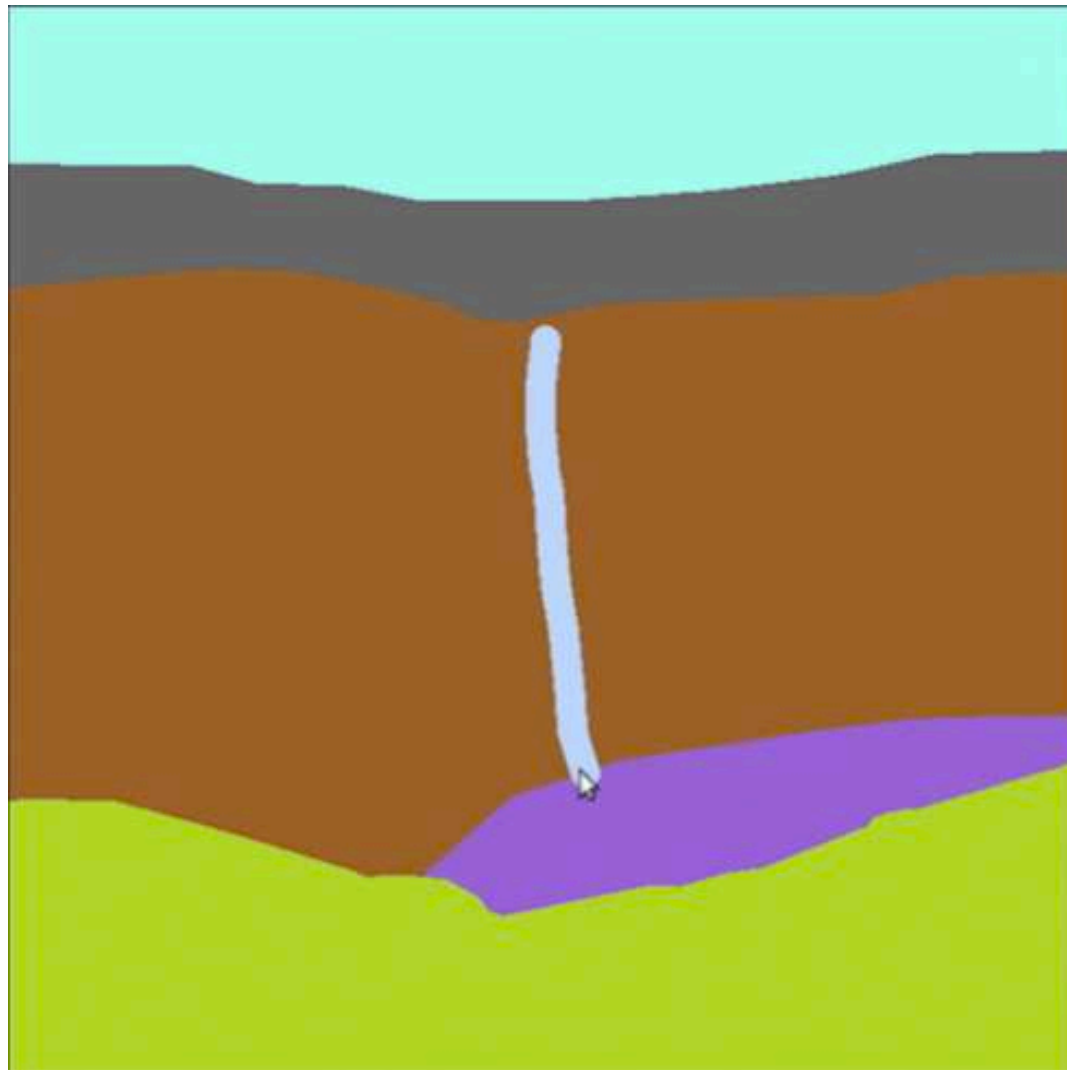
psupr/m5.3/v1.0

NUS | ISS

Drawing

A sketch

sky

cloud

rock

water

river

tree

psupr/m5.3/v1.0

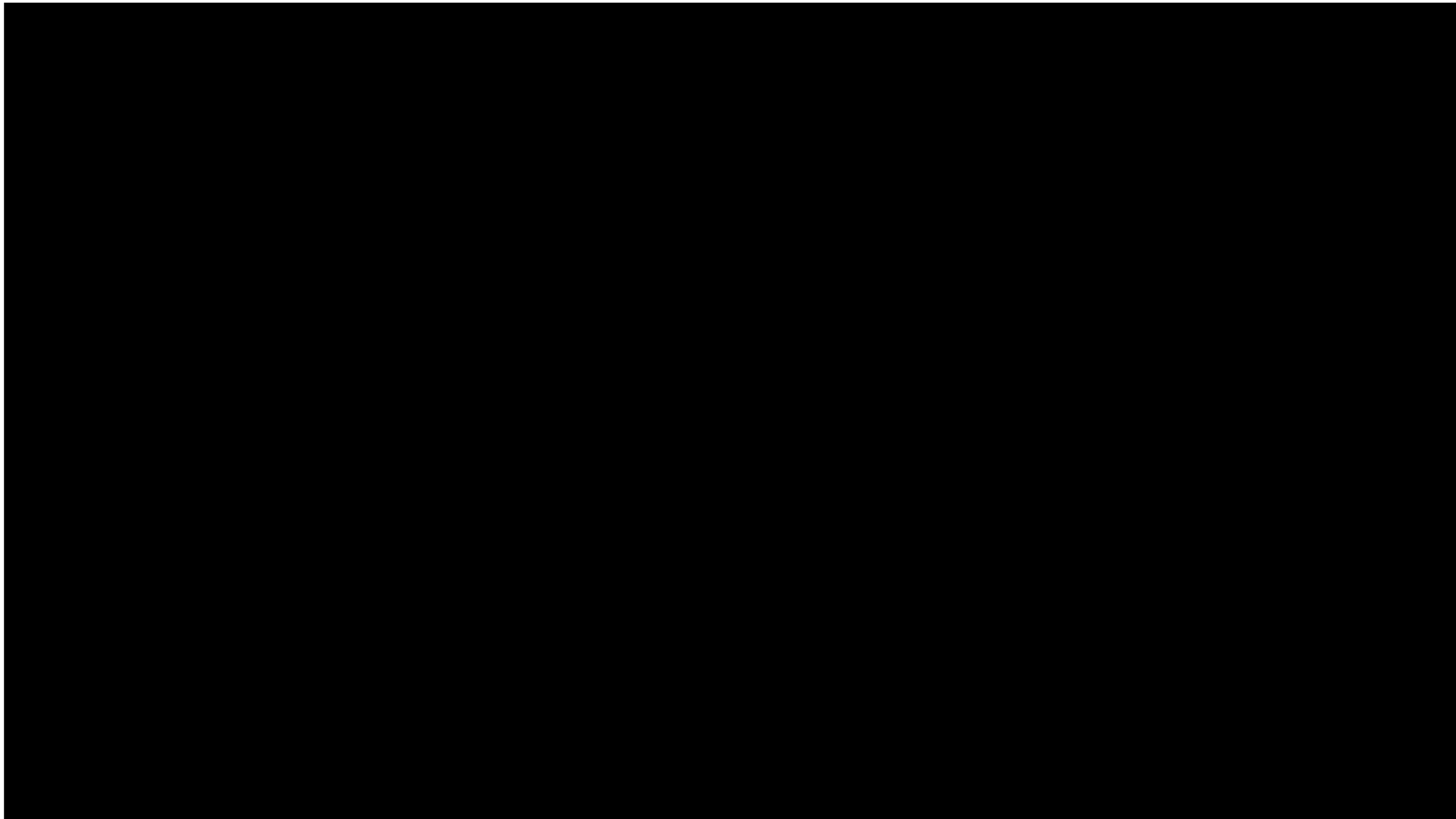NUS National University of Singapore | ISS

Drawing

A sketch

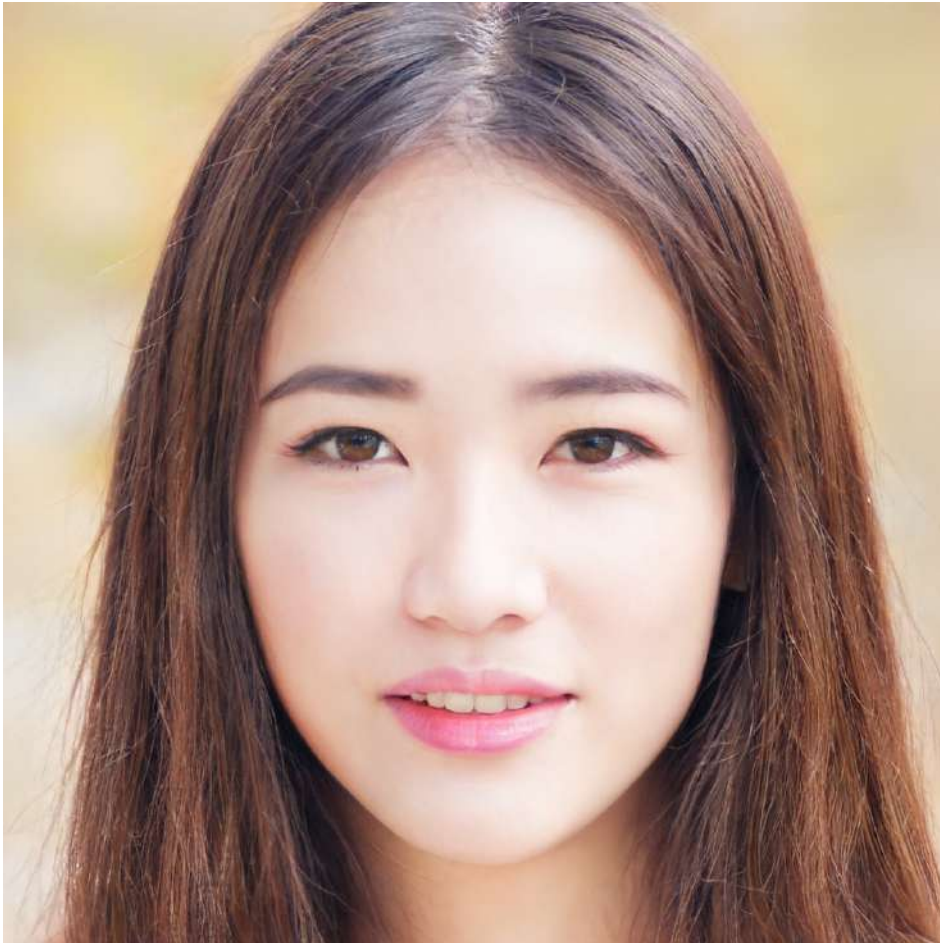Source: https://blogs.nvidia.com/blog/2019/03/18/gaugan-photorealistic-landscapes-nvidia-research/

NUS | ISS
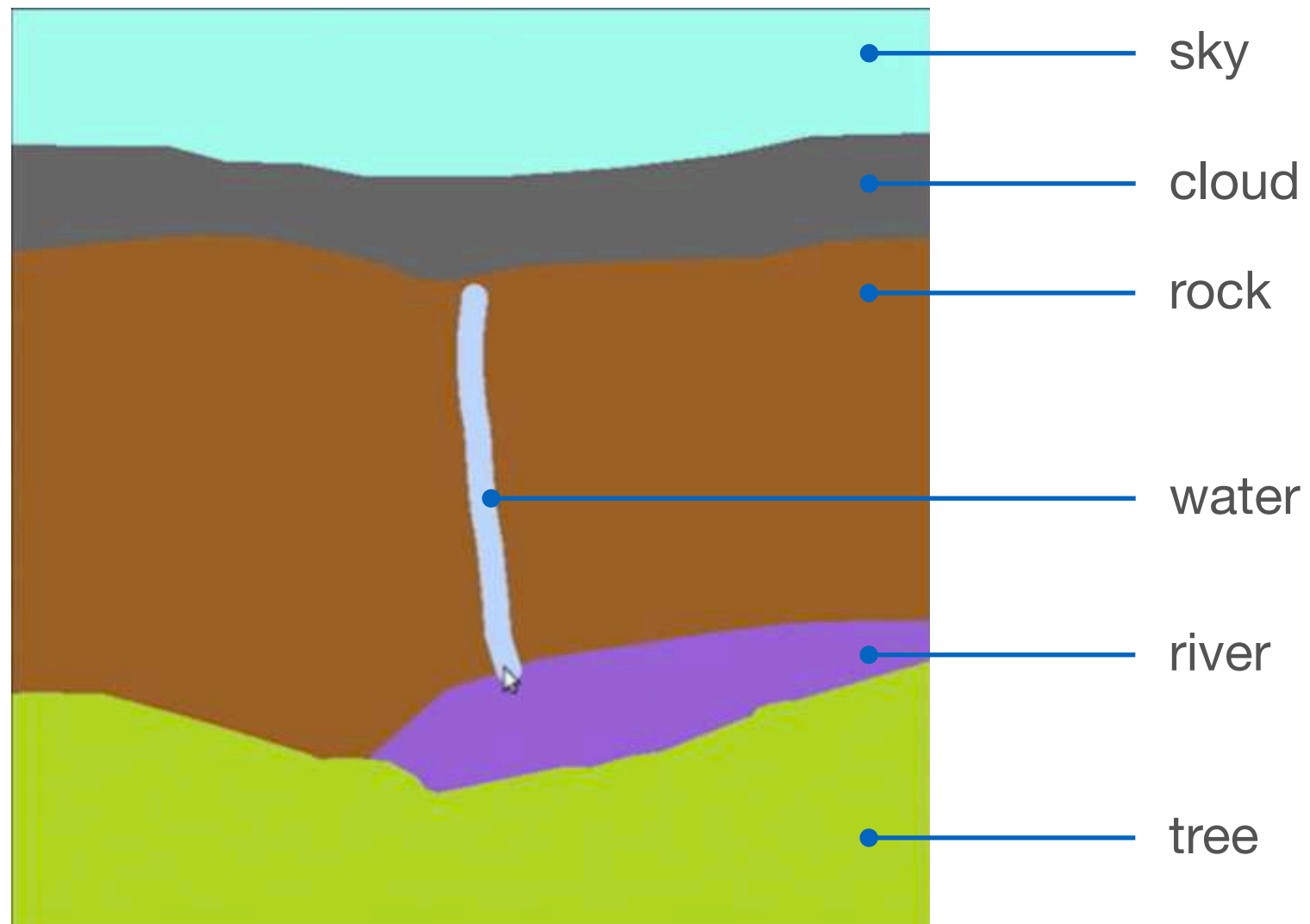
Drawing

GauGAN (inspired by Gauguin)

Source: https://blogs.nvidia.com/blog/2019/03/18/gaugan-photorealistic-landscapes-nvidia-research/

psupr/m5.3/v1.0
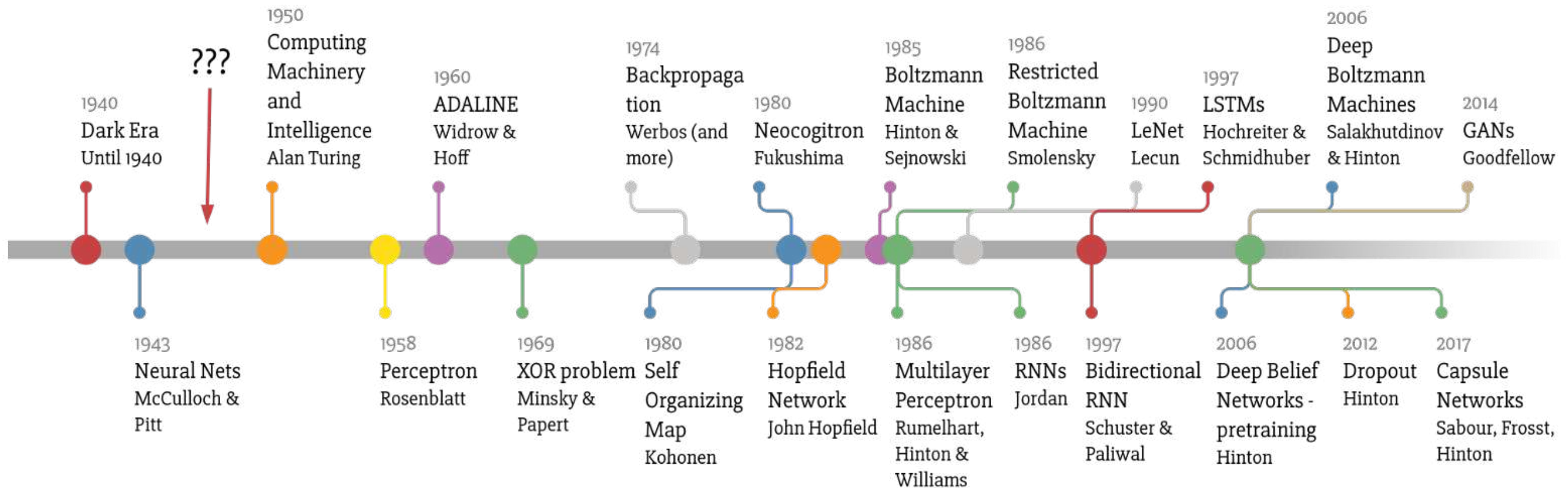
NUS | iSS

Do you know...

Who she or he is?

Source: https://thispersondoesnotexist.com

psupr/m5.3/v1.0

NUS | iSS

Generative adversarial networks

Source: https://medium.com/@faviovazquez

NUS National University of Singapore | **iSS** INSTITUTE OF SYSTEMS SCIENCE
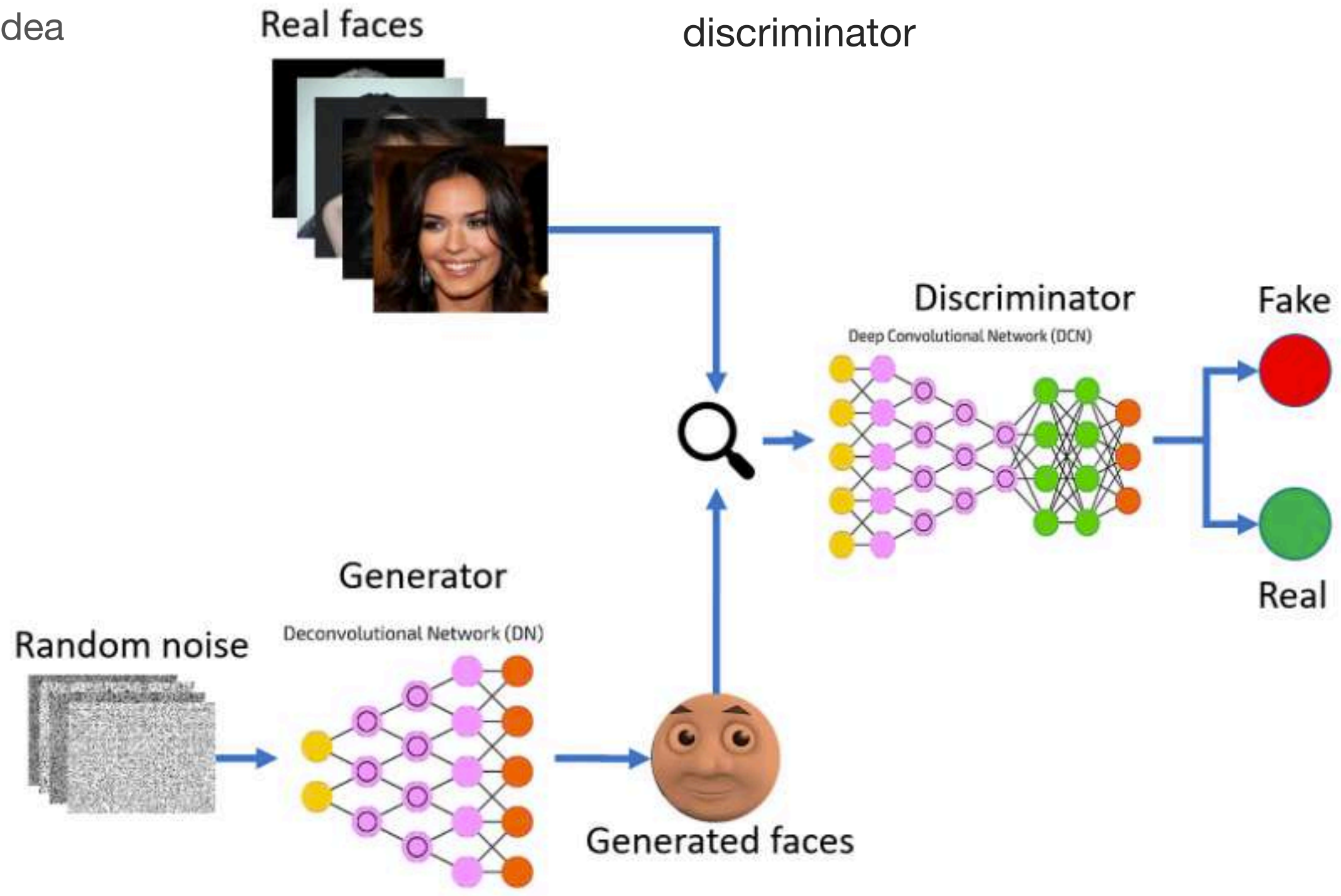
Generative Adversarial Networks

The idea

• The generated faces and the real faces take turn to be fed into the discriminator

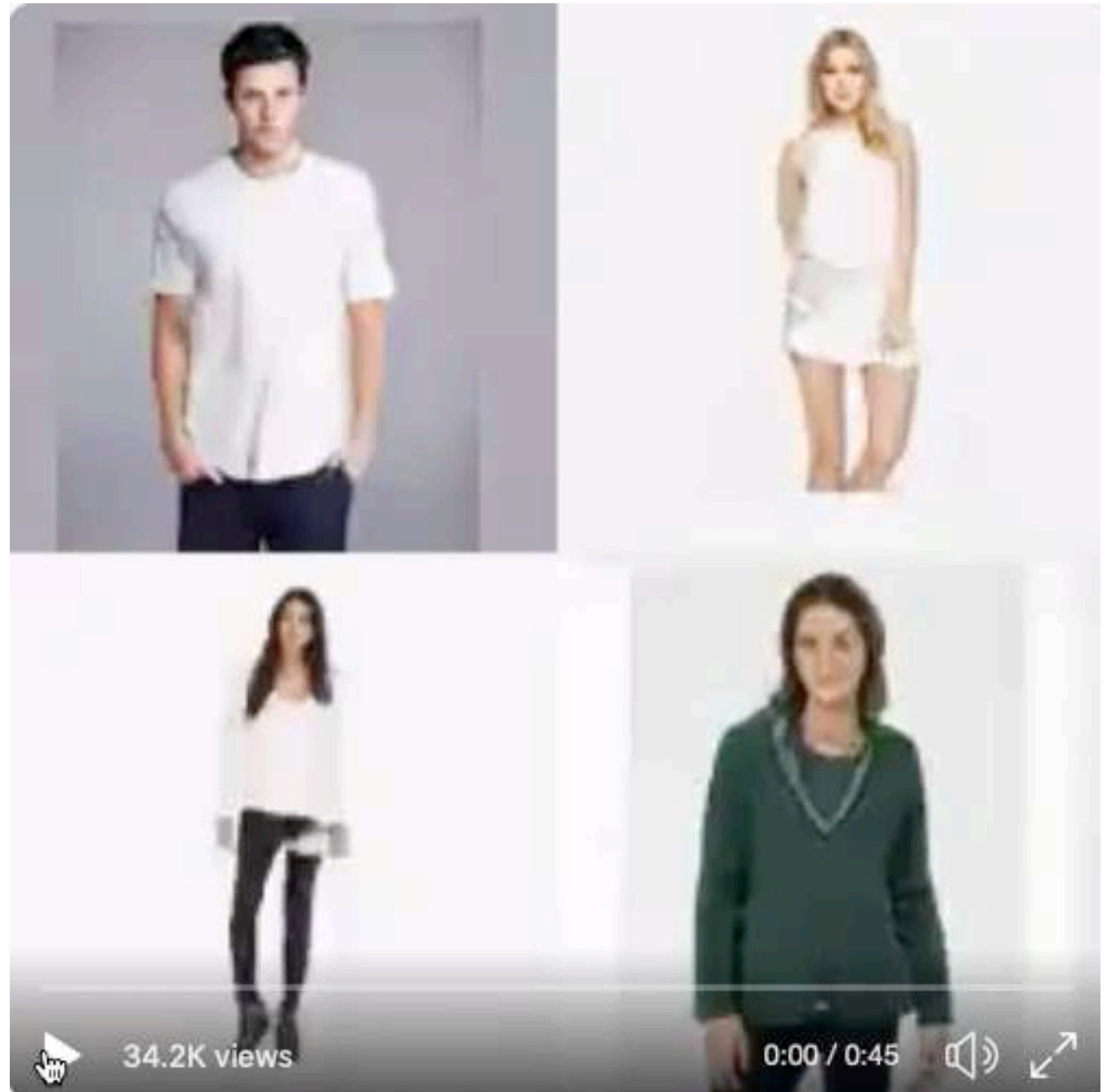psupr/m5.3/v1.0

Change face
Unlimited possibilities

Source: https://app.generative.photos

psupr/m5.3/v1.0

Practical usage
fashion

psupr/m5.3/v1.0

Practical usage
fashion

psupr/m5.3/v1.0

Generative Adversarial Networks

styleGAN

Source: https://www.lyrn.ai/2018/12/26/a-style-based-generator-architecture-for-generative-adversarial-networks/

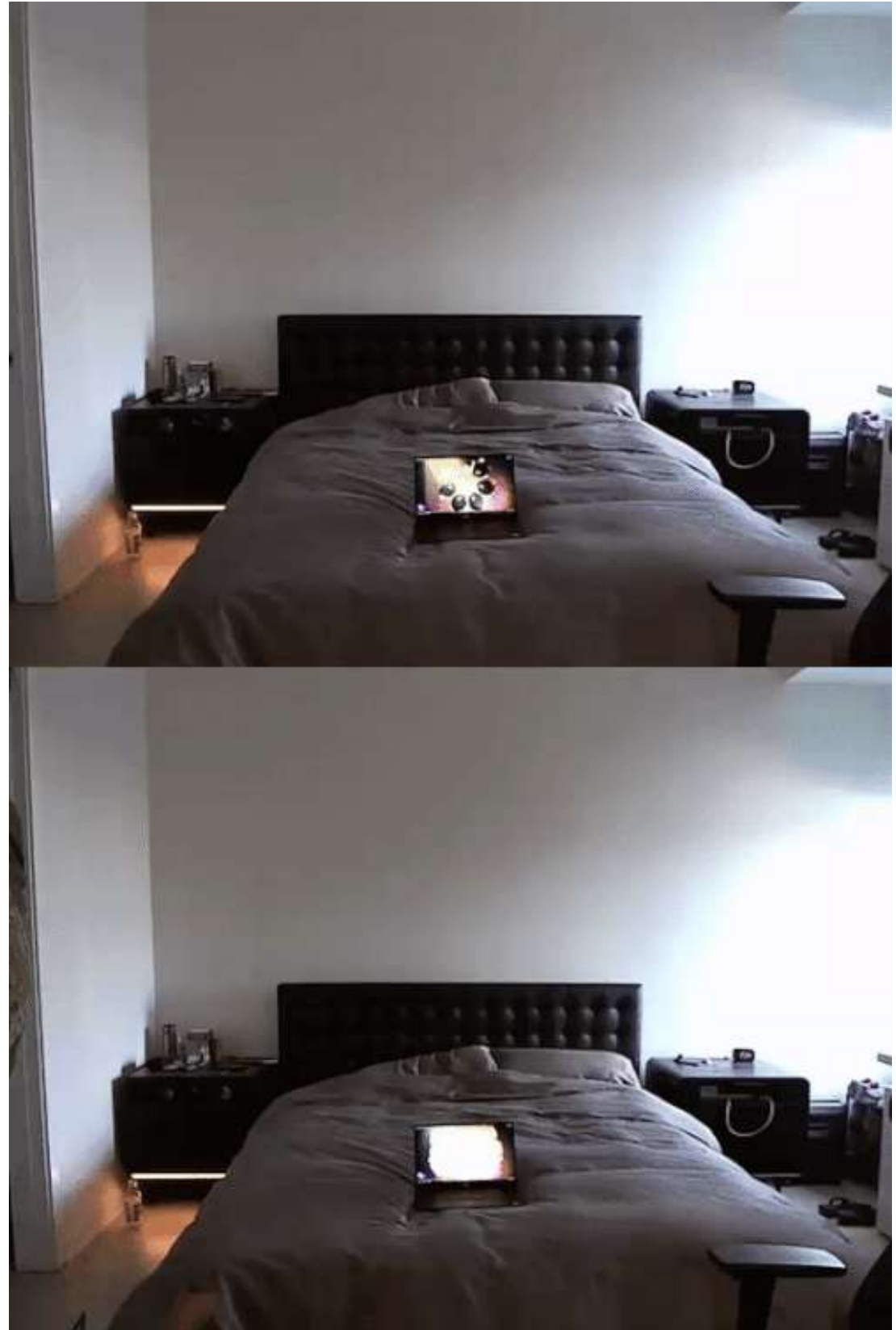psupr/m5.3/v1.0
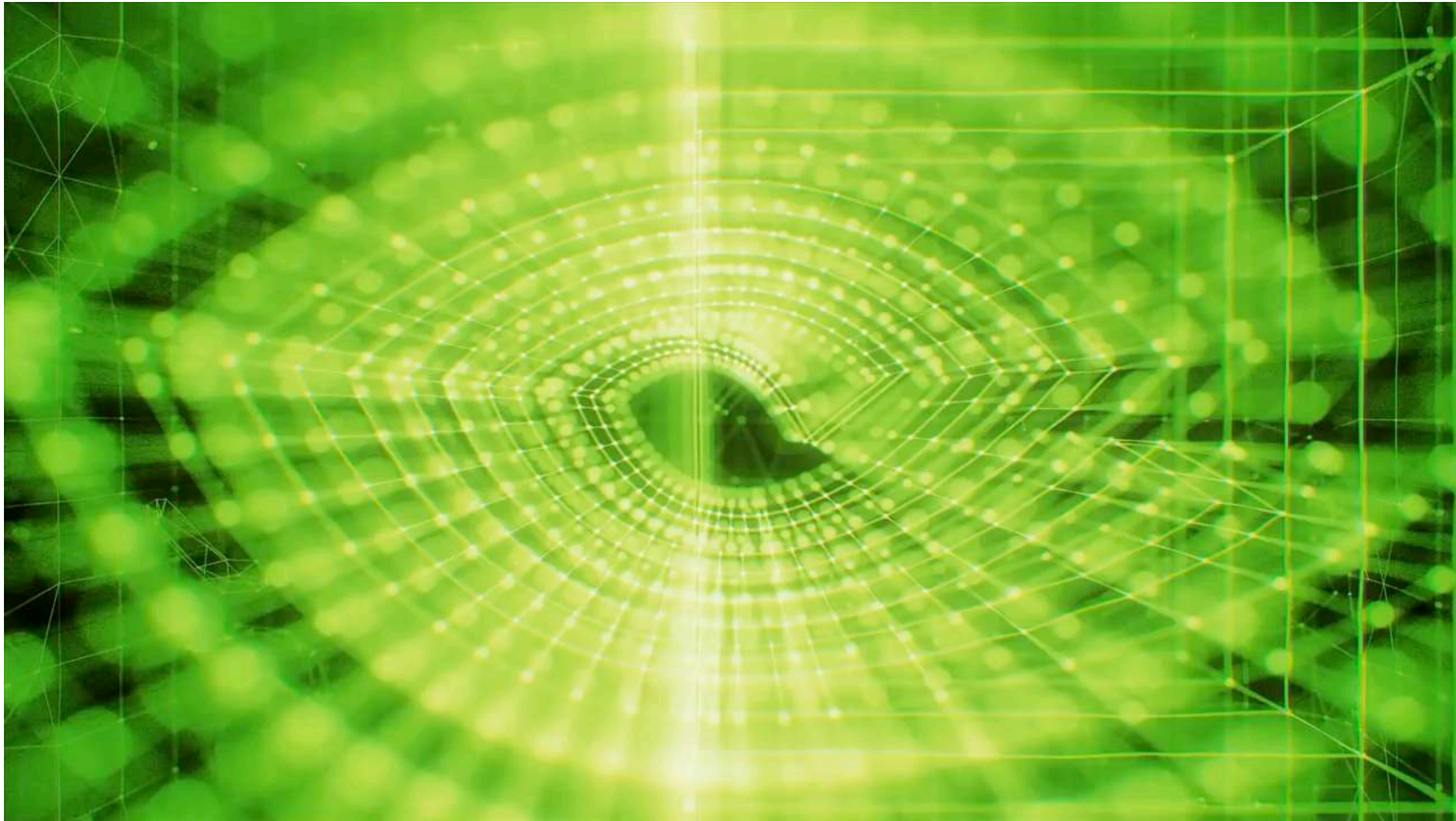
Generative Adversarial Networks
Change face

psupr/m5.3/v1.0

psupr/m5.3/v1.0

Disappearing people

The guy is missing ….

psupr/m5.3/v1.0

Generative Adversarial Networks

How about ... anime?

Source: https://crypko.ai

NUS | ISS
National University of Singapore

•Sold through auction at Sotheby
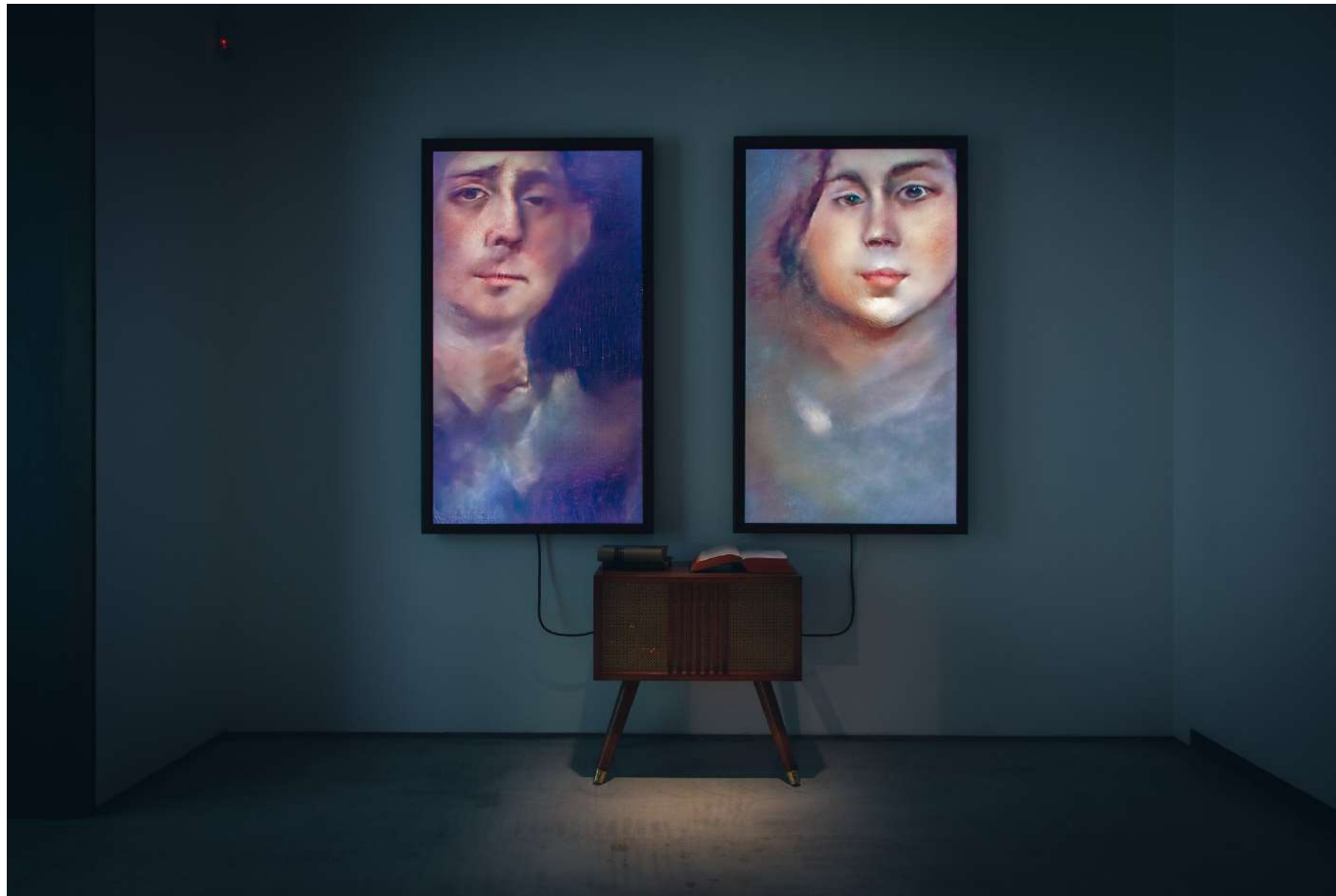
Source: Sothebys
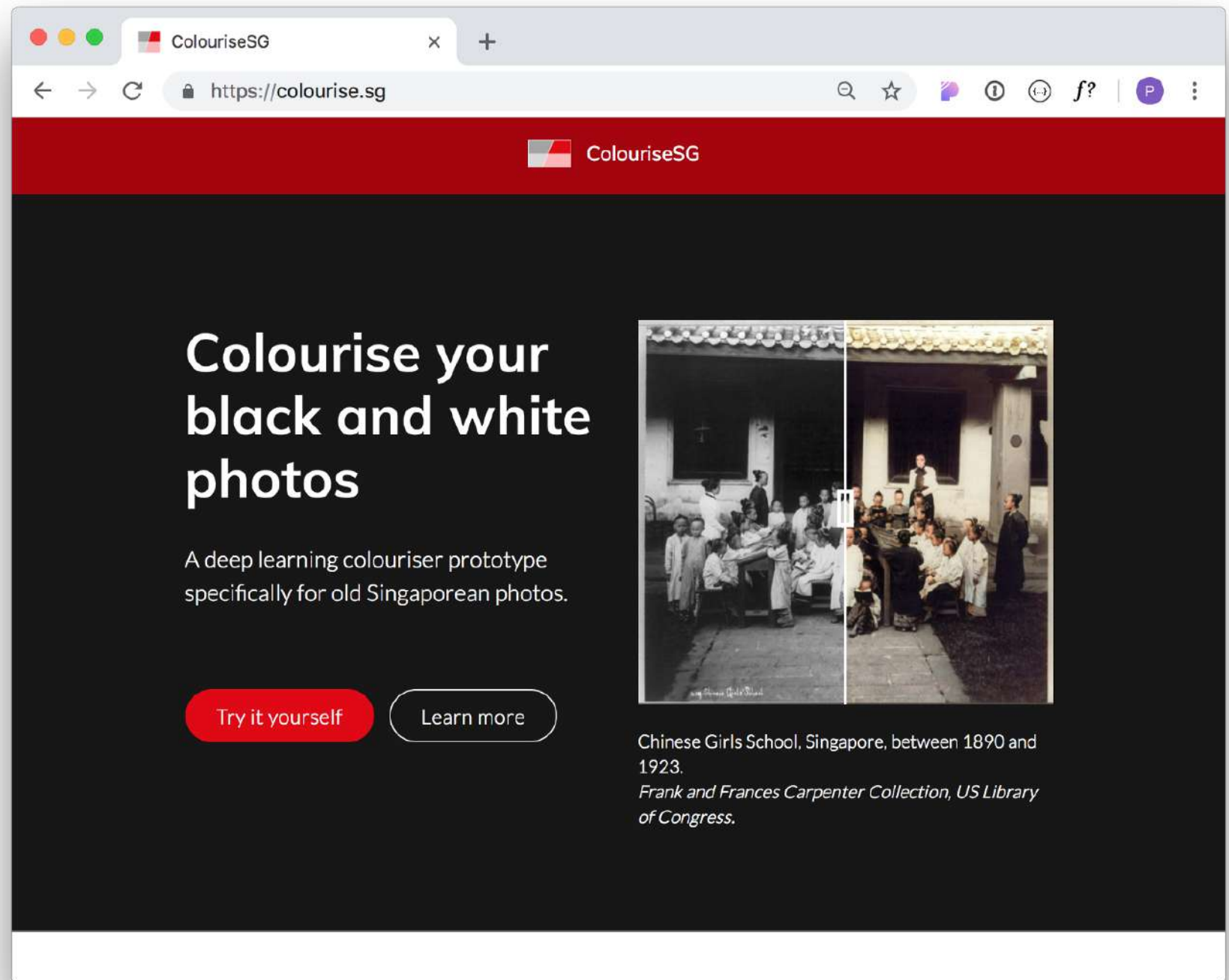
NUS National University of Singapore | ISS INSTITUTE OF SYSTEMS SCIENCE

Practical usage
By Singapore government

psupr/m5.3/v1.0

Practical usage

By Singapore government

psupr/m5.3/v1.0

Colourise SG

My attempt

psupr/m5.3/v1.0 NUS | iSS

Colourise SG

My attempt

psupr/m5.3/v1.0

My attempt

psupr/m5.3/v1.0

Re-master (colorize) vintage film

A-Bomb blast effects (1952)

- 8 reference images were used to colour this video

Source: http://iizuka.cs.tsukuba.ac.jp/projects/remastering/en/index.html

psupr/m5.3/v1.0

How about 3D?
Face?

psupr/m5.3/v1.0

NUS | ISS

How about 3D in a scene?
Generates from a single image

Source: https://github.com/facebookresearch/synsin