

生成モデル

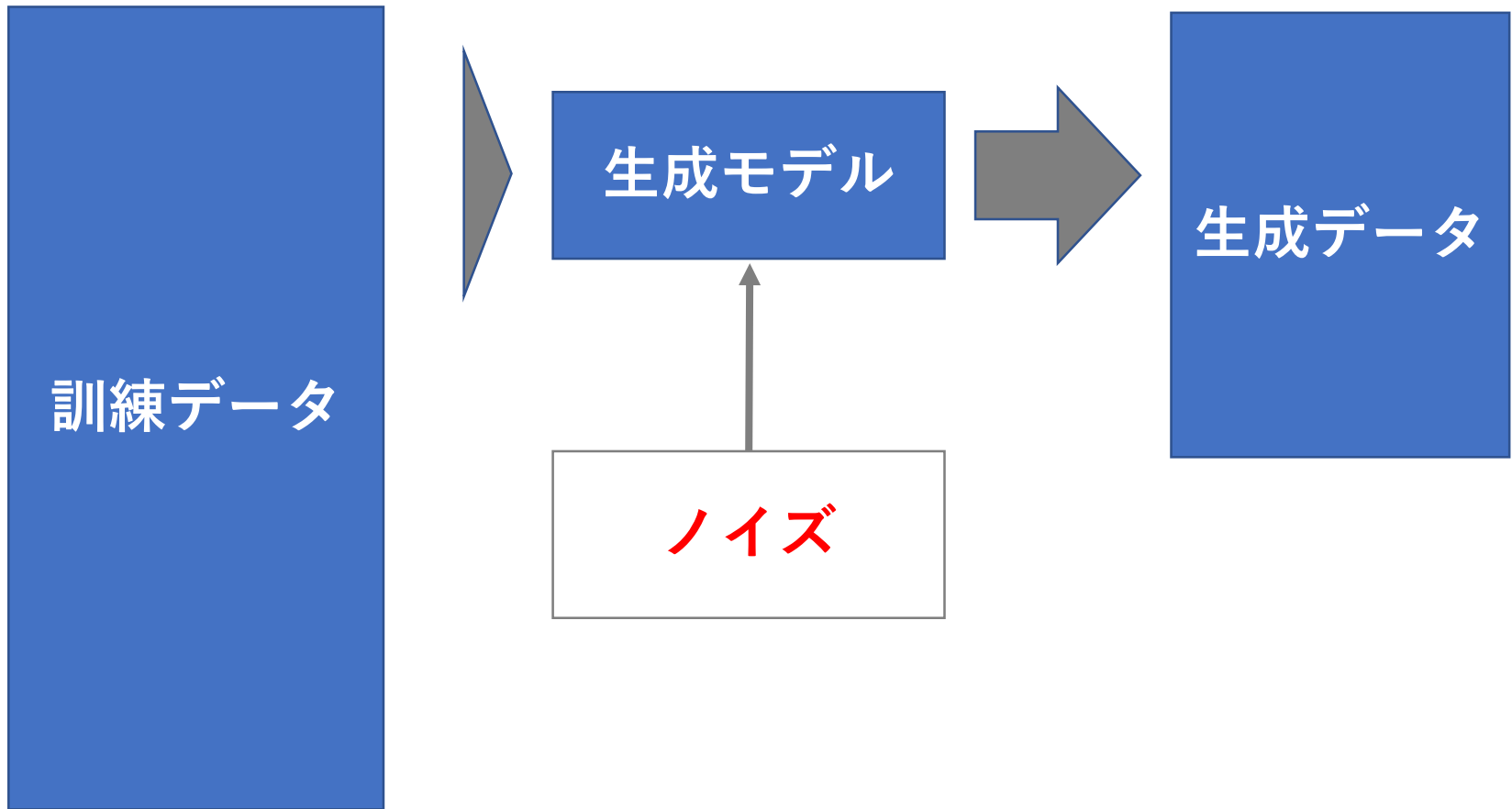
PGGANを参照

- Progressive Growing of GANs for Improved Quality, Stability, and Variation
- <https://www.youtube.com/watch?v=G06dEcZ-QTg>

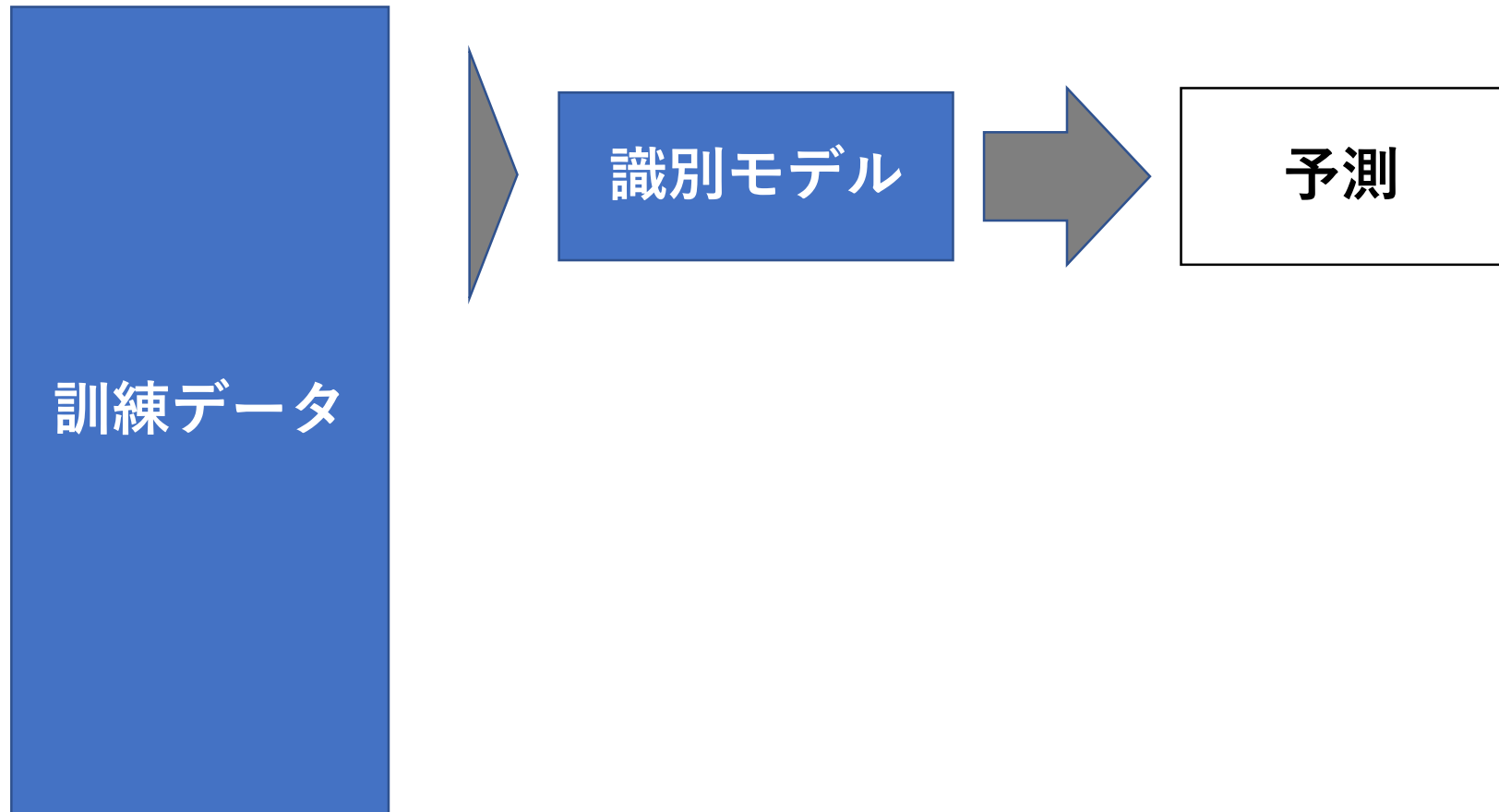
PGGAN

- Tero Karras, Timo Aila, Samuli Laine, Jaakko Lehtinen; Progressive Growing of GANs for Improved Quality, Stability, and Variation
- 著者はNVIDIAの人たち
- YouTubeの冒頭の顔の写真はCelebAというデータセットで訓練した結果を元に生成されたもの

生成モデルとは



一方、識別モデルは...



識別モデリングと生成モデリング

- **識別モデリング**

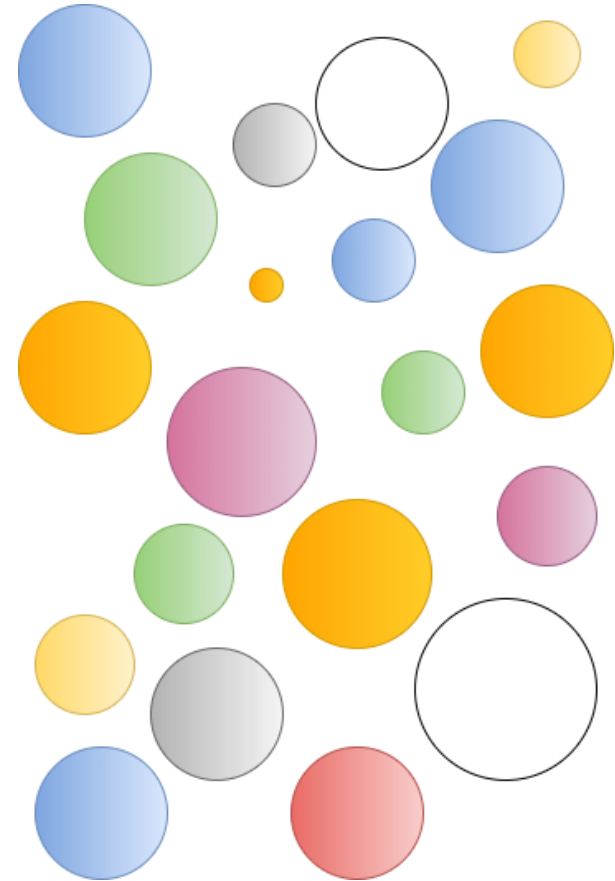
- 観測 \mathbf{x} が与えられたときのラベル y の得られる確率を推定

- **生成モデリング**

- 観測 \mathbf{x} の分布（確率分布）を推定する

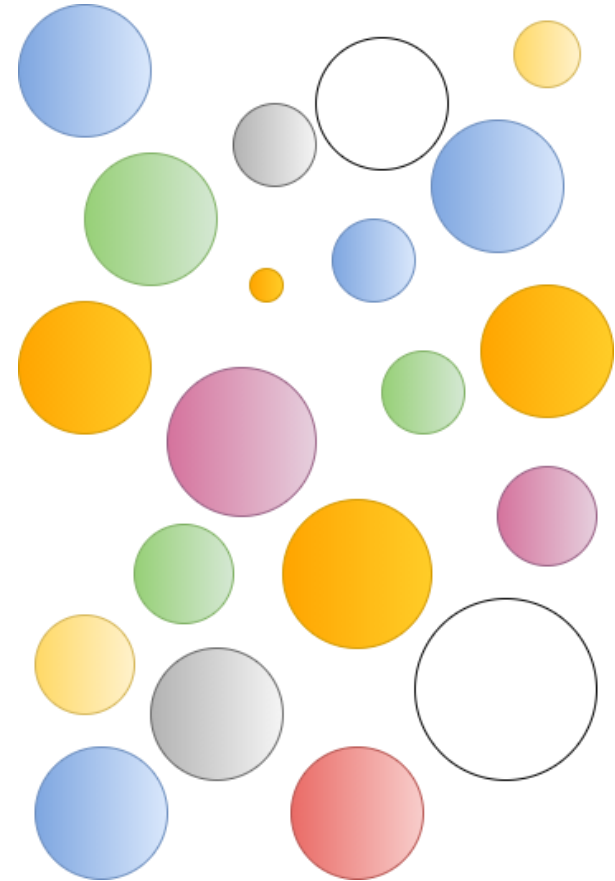
生成モデリングの潜在空間と生成データの関係

- 右の画像の一つ一つの丸は $n \times n$ 配列として表せる
- しかし、 $n \times n$ の空間内で丸を表すものはごくわずか
- $n \times n$ の空間内を適当に取ってきても、それが丸を表すことは期待できない

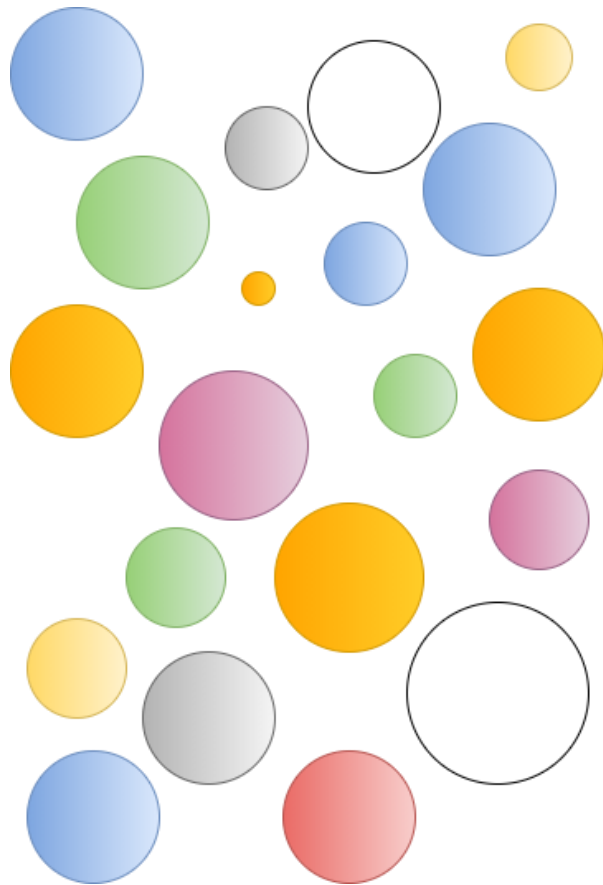


生成モデリングの潜在空間と生成データの関係

- しかし、ひとつひとつの丸は2つのパラメータで表せることは、我々人間にはすぐにわかる
- （半径、色）
- 半径と色を変形すると、ここにはない画像も生成できる

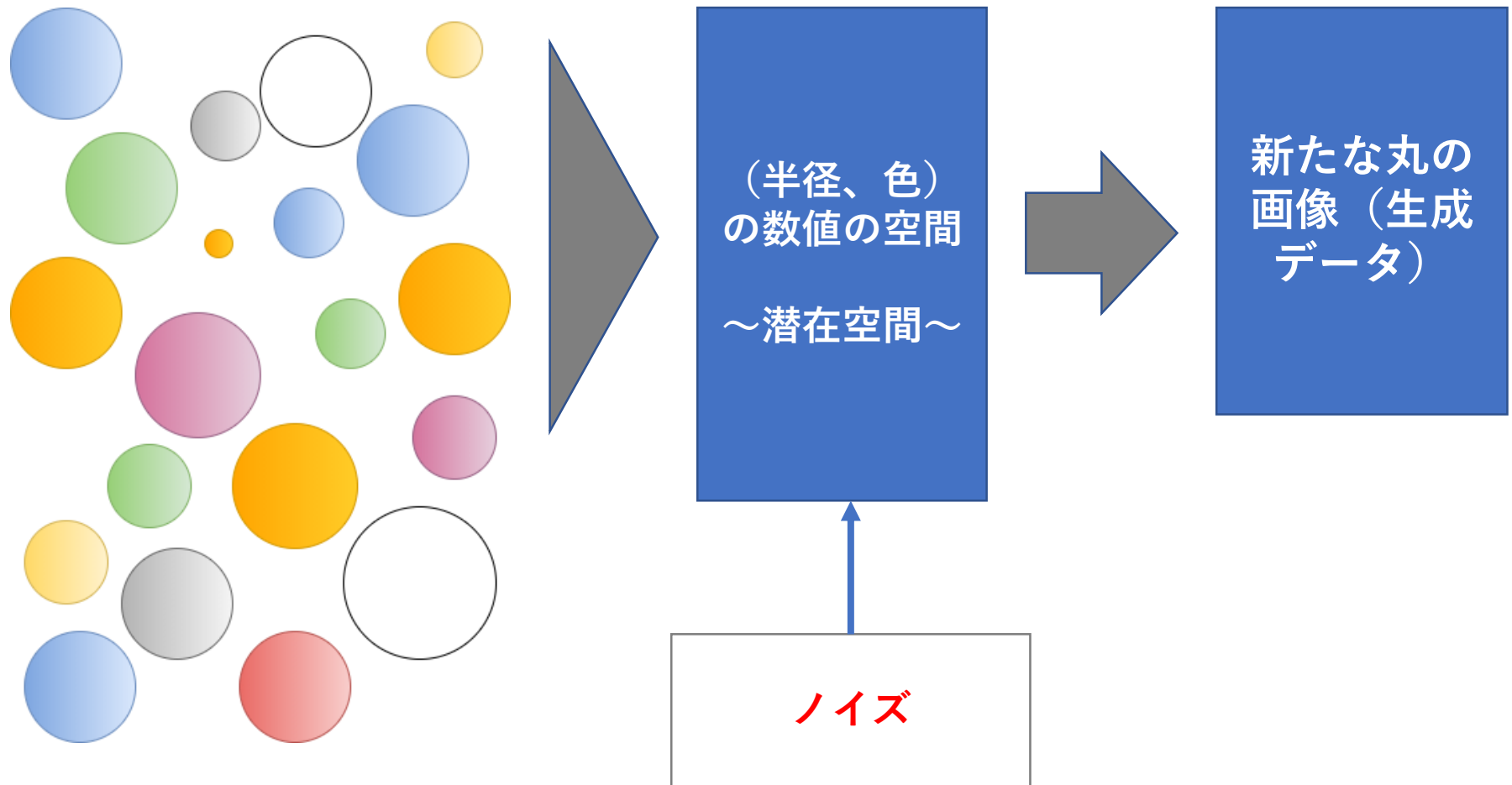


生成モデリングの潜在空間と生成データ の関係



(半径、色)
の数値の空間
～潜在空間～

生成モデリングの潜在空間と生成データの関係



デモ (PGGAN)

- PGGAN自体の詳しい説明はせず、潜在空間と生成画像の関係について見てみる
- 訓練には膨大な計算機資源と時間が必要
- デモには訓練済みのモデルを使用 (TensorFlow Hub)

GANs for Good- A Virtual Expert Panel by DeepLearning.AI

- 先月（9/30）Zoom上で開催（OpenAI主催）
- <https://www.youtube.com/watch?v=9d4jmPmTWmc>
- GANの産みの親Ian Goodfellowが基調講演
- 以下でGoodfellowのこの講演の概要を参照

GANs for Good- A Virtual Expert Panel by DeepLearning.AI

GANs for Good- A Virtual Expert Panel by DeepLearning.AI

Generative Adversarial Networks

The diagram illustrates the architecture of a Generative Adversarial Network (GAN). It consists of two main components: a Discriminator (D) and a Generator (G).

Real Data Path (Left):

- Input: A real image (butterfly).
- Process: Differentiable function D .
- Output: $D(x)$ tries to be near 1.

Generated Path (Right):

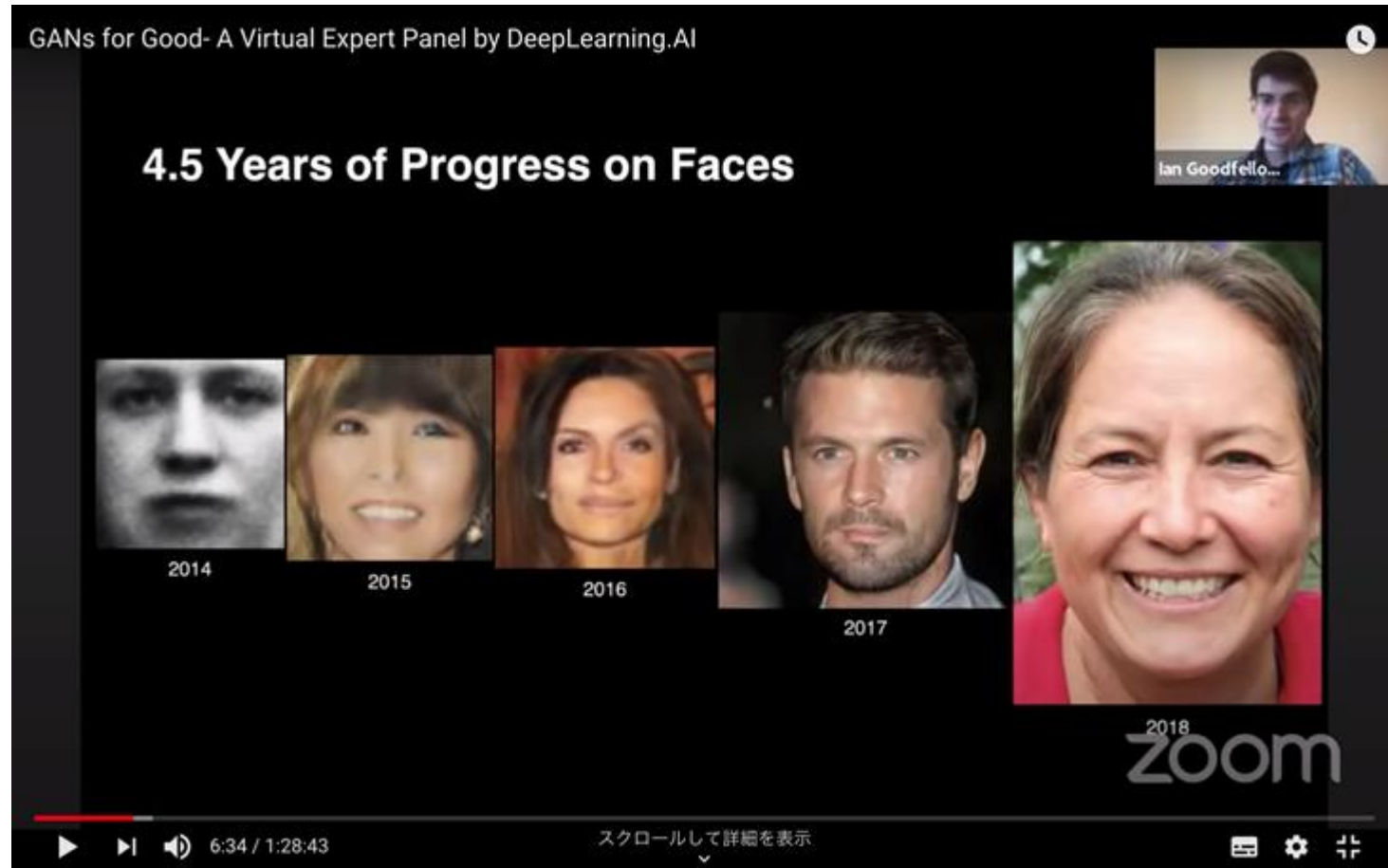
- Input: Input noise z .
- Process: Differentiable function G .
- Output: x sampled from model.
- Process: Differentiable function D .
- Output: $D(G(z))$ tries to be near 1.

Objective: $D(x)$ tries to make $D(G(z))$ near 0, G tries to make $D(G(z))$ near 1.

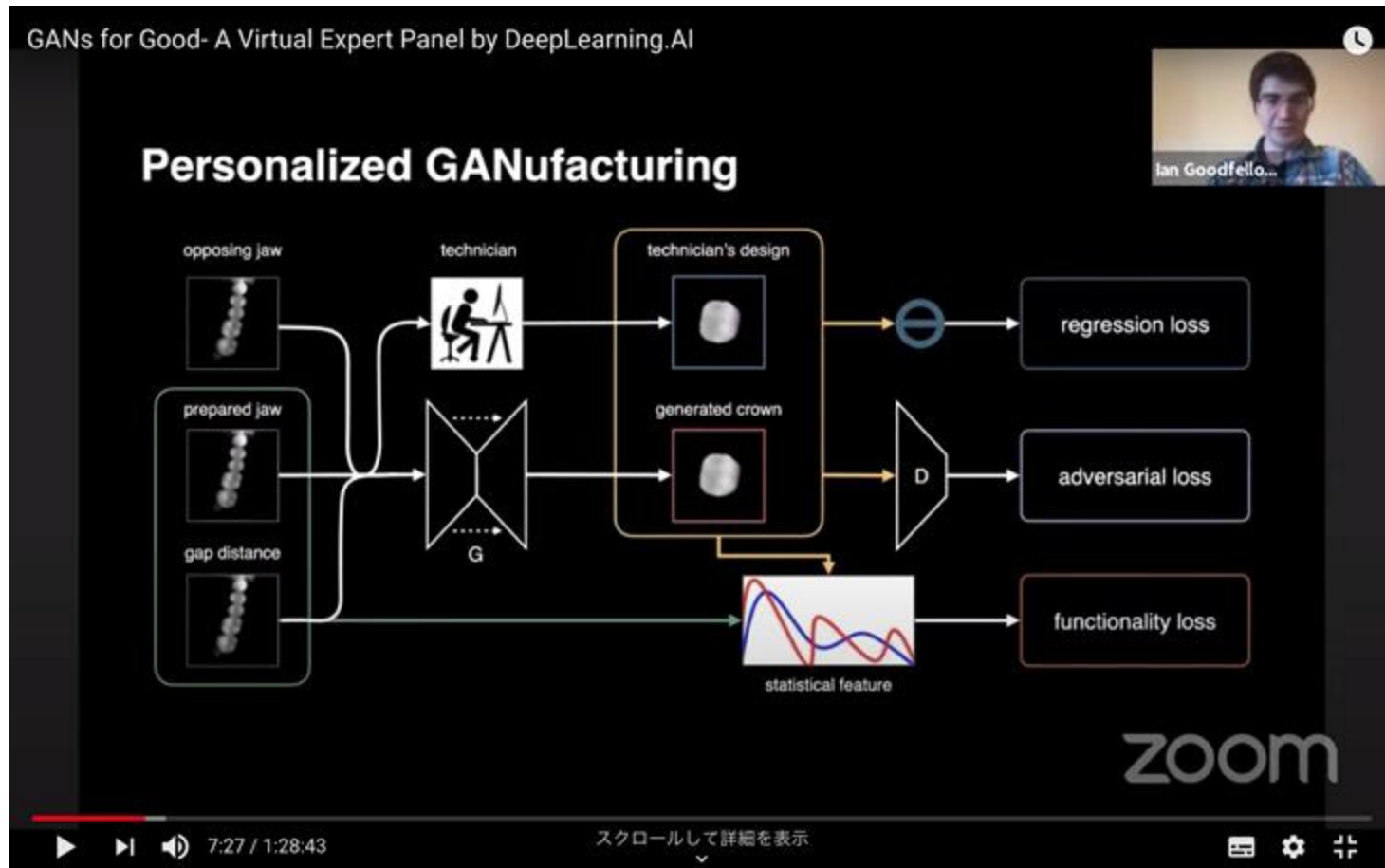
zoom

5:17 / 1:28:43 スクロールして詳細を表示

GANs for Good- A Virtual Expert Panel by DeepLearning.AI



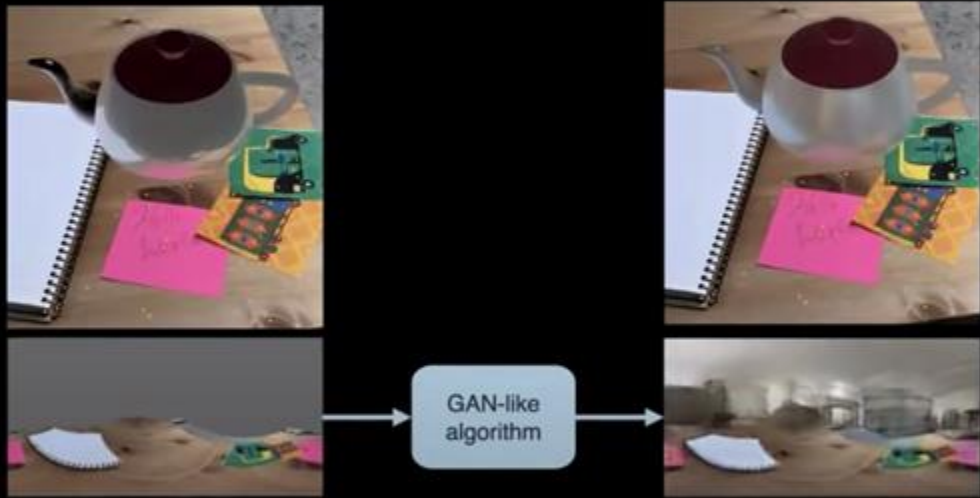
GANs for Good- A Virtual Expert Panel by DeepLearning.AI



GANs for Good- A Virtual Expert Panel by DeepLearning.AI

GANs for Good- A Virtual Expert Panel by DeepLearning.AI

Environment Maps for AR



Incomplete Environment Map

GAN-like algorithm

Output Environment Map

zoom

8:36 / 1:28:43 スクロールして詳細を表示

GANs for Good- A Virtual Expert Panel by DeepLearning.AI

GANs for Good- A Virtual Expert Panel by DeepLearning.AI

GANs for Simulated Training Data

Unlabeled Real Images

Synthetic

Refiner

Refined

zoom

9:56 / 1:28:43 スクロールして詳細を表示

GANs for Good- A Virtual Expert Panel by DeepLearning.AI

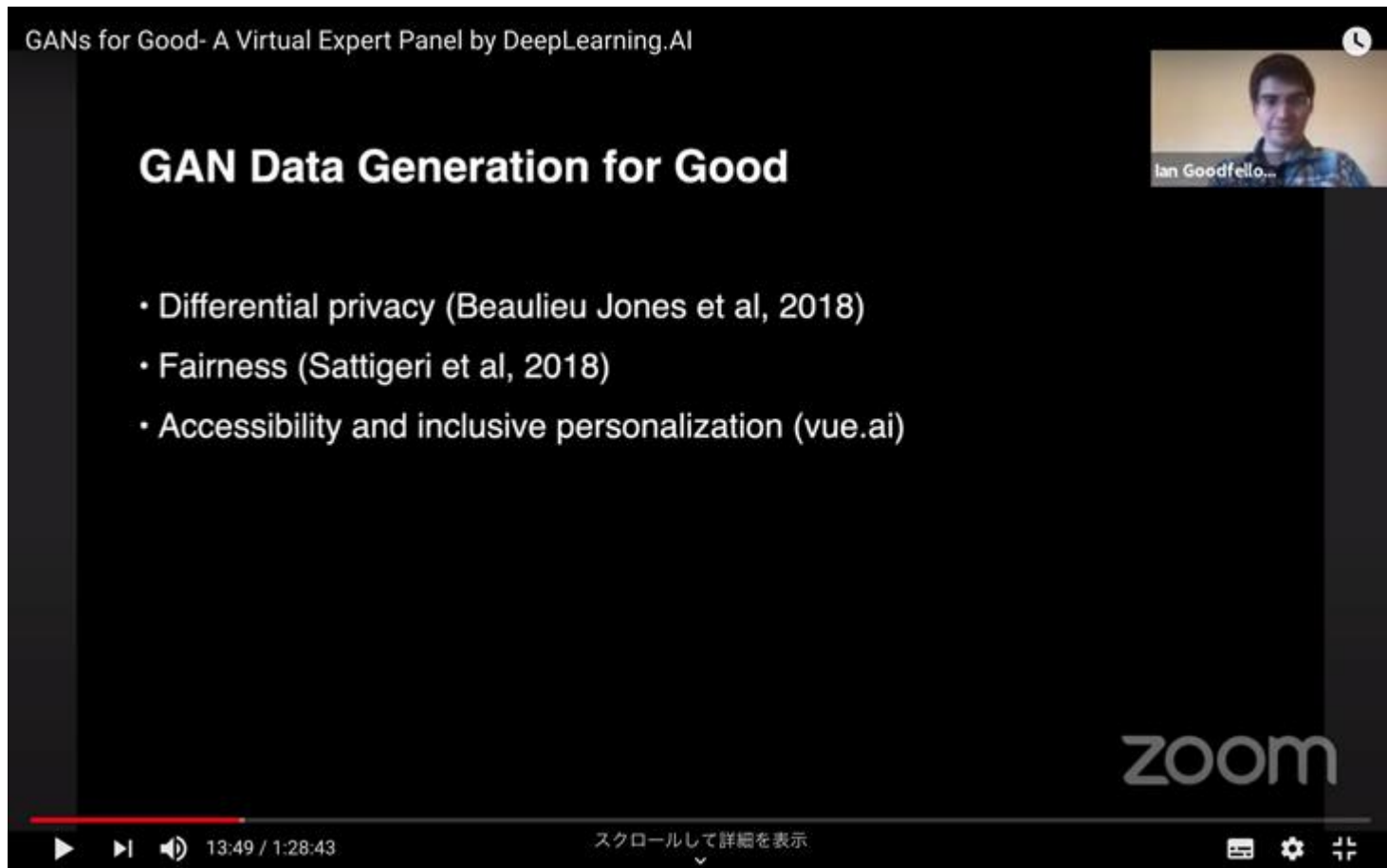
GANs for Good- A Virtual Expert Panel by DeepLearning.AI

GANs for QuickPath Data

zoom

12:02 / 1:28:43 スクロールして詳細を表示

GANs for Good- A Virtual Expert Panel by DeepLearning.AI



GANs for Good- A Virtual Expert Panel by DeepLearning.AI

GAN Data Generation for Good

- Differential privacy (Beaulieu Jones et al, 2018)
- Fairness (Sattigeri et al, 2018)
- Accessibility and inclusive personalization (vue.ai)

zoom

13:49 / 1:28:43 スクロールして詳細を表示

The image is a screenshot of a Zoom video player. The main content area shows a presentation slide with a black background and white text. The slide title is 'GAN Data Generation for Good'. Below the title is a bulleted list of three items: 'Differential privacy (Beaulieu Jones et al, 2018)', 'Fairness (Sattigeri et al, 2018)', and 'Accessibility and inclusive personalization (vue.ai)'. In the top right corner of the video frame, there is a small video feed of a man, identified by the caption 'Ian Goodfello...'. The Zoom player interface includes a progress bar at the bottom showing '13:49 / 1:28:43', a play button, a volume icon, and a subtitle icon. The Zoom logo is visible in the bottom right corner of the video frame.

Neural Style Transfer



Neural Style Transfer

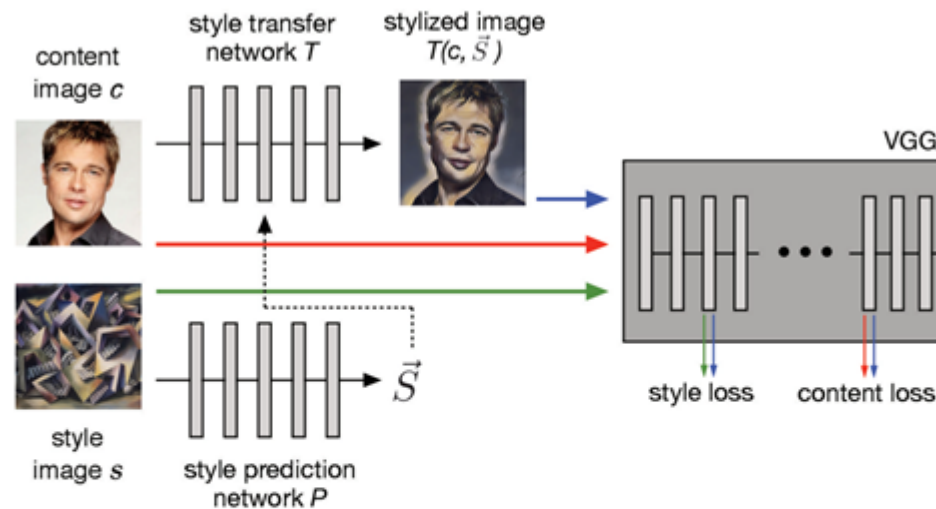


Figure 2: Diagram of model architecture. The style prediction network $P(\cdot)$ predicts an embedding vector \vec{S} from an input style image, which supplies a set of normalization constants for the style transfer network. The style transfer network transforms the photograph into a stylized representation. The content and style losses [9] are derived from the distance in representational space of the VGG image classification network [23]. The style transfer network largely follows [3] and the style prediction network largely follows the Inception-v3 architecture [24].

Golnaz Ghiasi, Honglak Lee, Manjunath Kudlur, Vincent Dumoulin, Jonathon Shlens;
Exploring the structure of a real-time, arbitrary neural artistic stylization network,
<https://arxiv.org/abs/1705.06830>

Neural Style Transferのデモ

- Colab上でデモを行います
- 画像は自由に選択できるので、色々と試行
- Golnaz Ghiasi, Honglak Lee, Manjunath Kudlur, Vincent Dumoulin, Jonathon Shlens; Exploring the structure of a real-time, arbitrary neural artistic stylization network
- 初見のスタイルにも対応できる高速変換可能なネットワーク