**Feedback Adversarial Learning:**
Spatial Feedback for Improving Generative Adversarial Networks

Minyoung Huh*  Shao-Hua Sun*  Ning Zhang

---

**Motivation**

Leverage discriminator’s feedback signals to improve samples generated by Generative Adversarial Networks (GANs).

**Intuition**

Is the discriminator’s feedback useful for improving generated samples?

**Toy Experiment**

Train a GAN to generate points \((x, y)\) that are indistinguishable from the samples drawn from the underlying true distribution. The generated samples, the discriminator believes is fake, is improved with feedback.

**High-dimensional Data**

How can we effectively provide feedback signals to high-dimensional data such as images and voxels?

---

**Adaptive Spatial Transform**

**Goal:** allow the generator to attend and fix local regions based on the discriminator’s feedback and its previous generation.

**Conditional Normalization**

Learn linear layers that predict global scalar affine parameters to modulate feature maps using external information such as class information.

**Implements with Feedback**

A concurrent work (GauGAN [4]) translates a semantic layout to an image using a similar module: SPatially-Adaptive DEnormalization (SPADE).

---

**References**

[1] Vaswani et al., Modulating early visual processing by language, NIPS 2017
[3] Huang et al., Anticipate Style Transfer in Real-Time with Adversarial Instance Normalization, ICCV2017