Generative Adversarial Networks

What can GANs do?

- Generate fake faces
- “Style mixing” of faces

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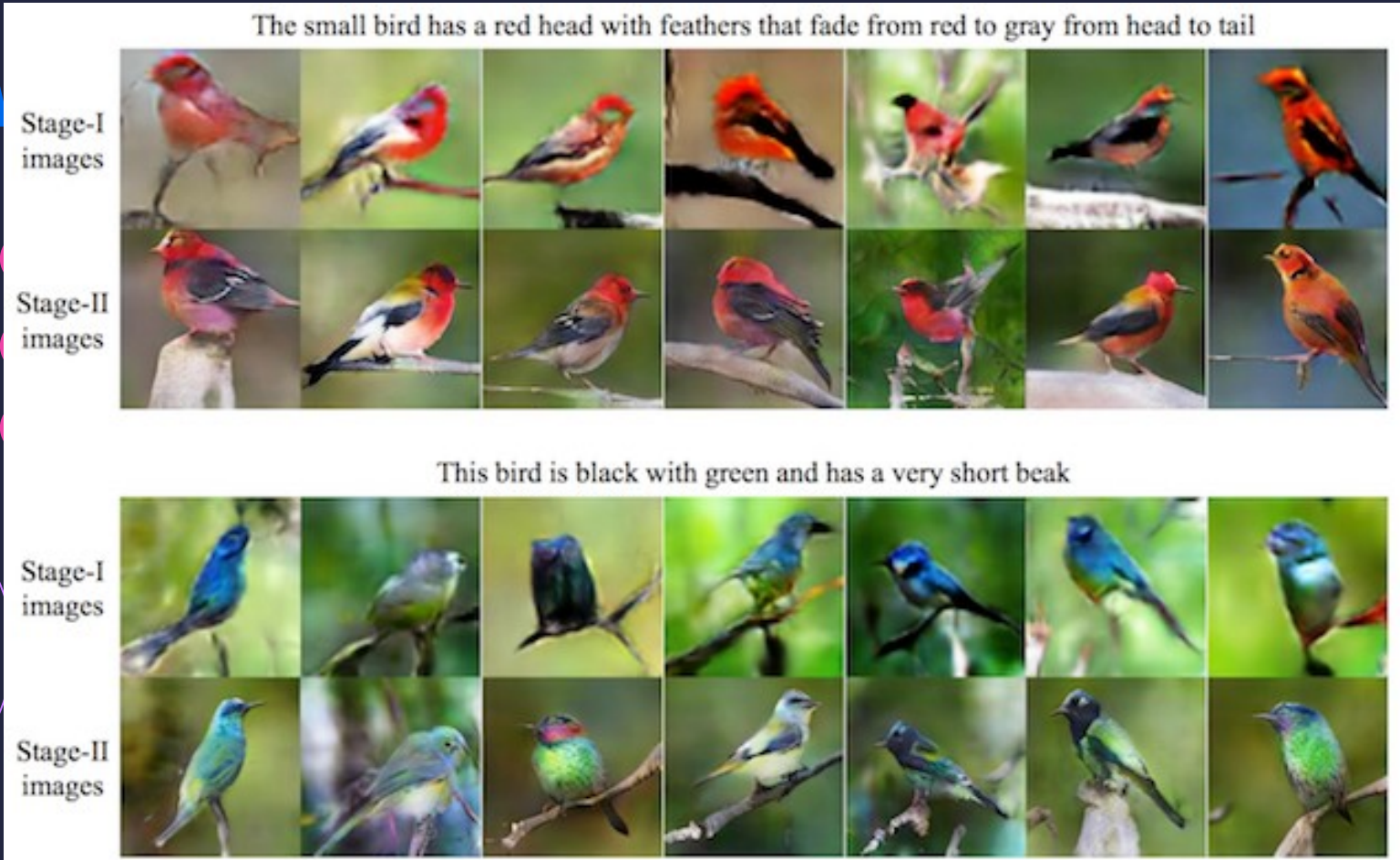

The small bird has a red head with feathers that fade from red to gray from head to tail
Stage-I images
Stage-II images
This bird is black with green and has a very short beak
Stage-I images
Stage-II images

What can GANs do?

- Generate fake faces
- “Style mixing” of faces
- Text to image translation
- ...and so on

How do they work?

Begin with a dataset of real images.

(We want the generator to create similar works.)

Generator vs. Discriminator

"The artist"

"The critic"

Discriminator's job:
Identify real examples from the dataset vs. fake ones created by the **generator**.

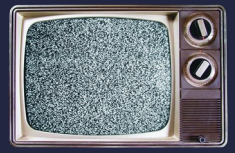
Loss functions

Generator's job:
Trick the **discriminator** into thinking generated examples are real.

Ultimately, we only care about the output from the generator.

But the **discriminator** is the one who forces the generator to get good.

What exactly happens at each step?



"Latent space" samples

Generator

Generated samples

Training examples

Real samples

Discriminator

Discriminator output

Finally, the **generator** and **discriminator** each ask "What did I do wrong?" By analyzing their own performance, they become slightly less dumb.

Backpropagation

What are we building today?