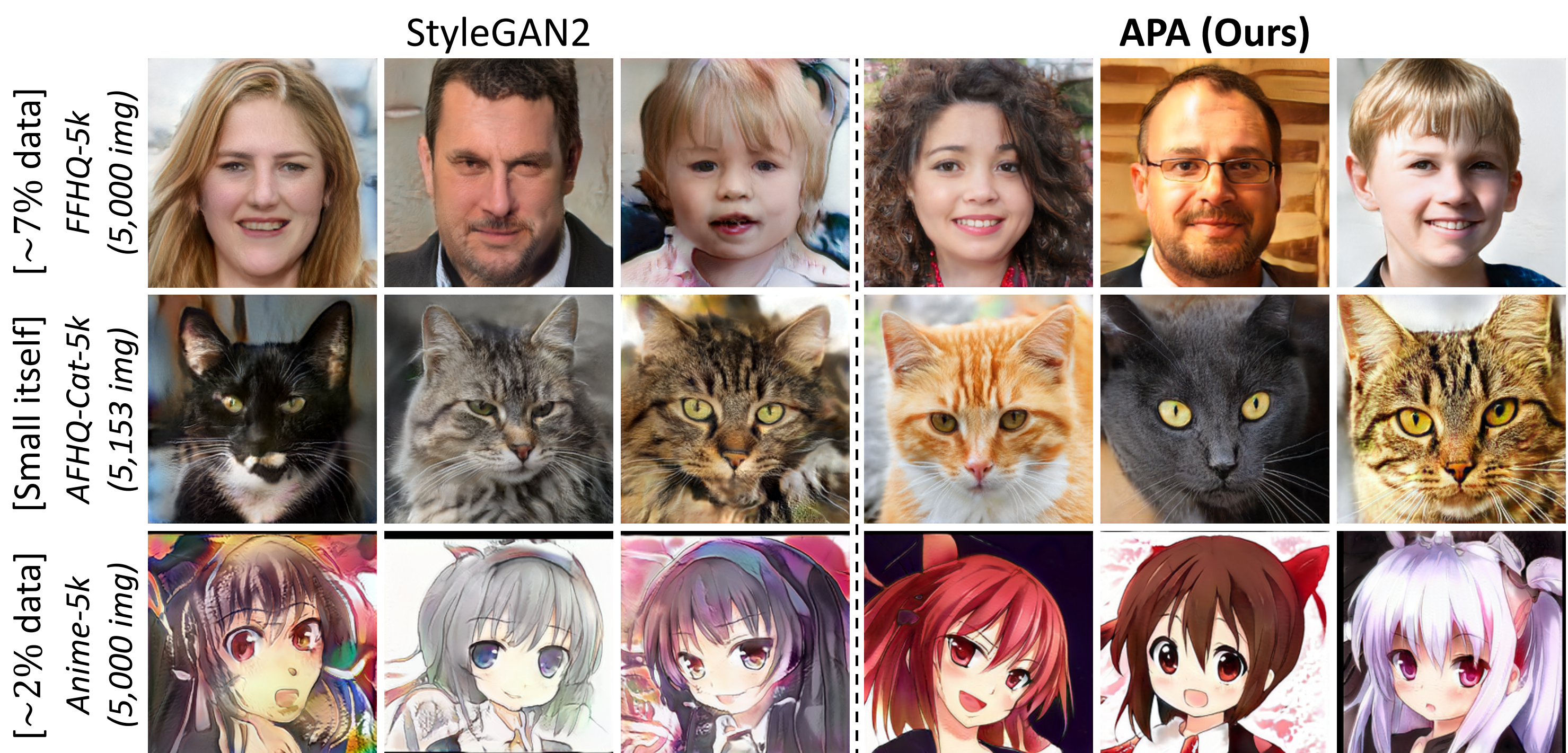




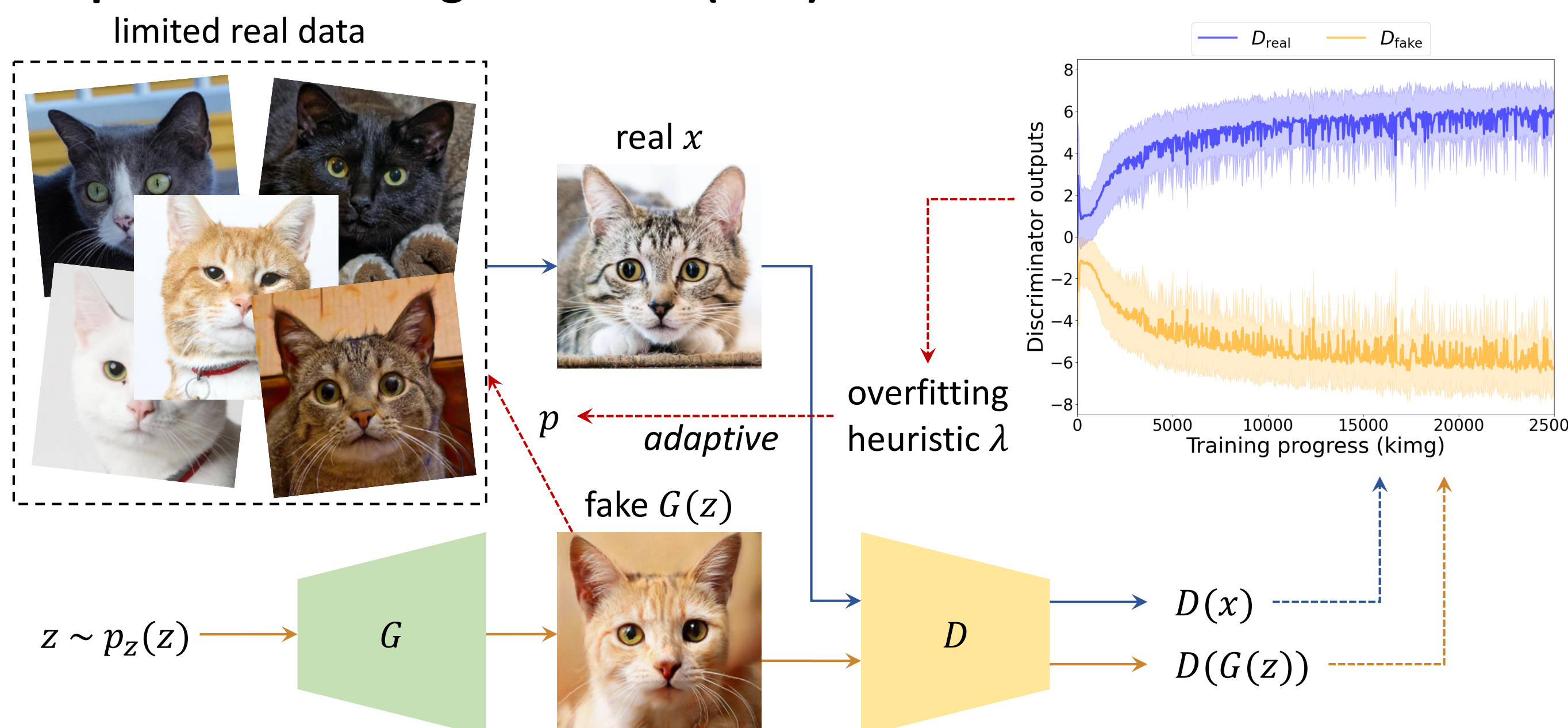
1. Motivation



- Poor quality of images generated by state-of-the-art GANs under limited data
- To ease the practical deployment of GANs while preserving the quality
- Sufficient data is sometimes infeasible, sparse, or privacy-sensitive

3. Methodology

Adaptive Pseudo Augmentation (APA)



Overfitting Heuristic λ : three variants

$$\lambda_r = \mathbb{E}(\text{sign}(D_{\text{real}})), \quad \lambda_f = -\mathbb{E}(\text{sign}(D_{\text{fake}})), \quad \lambda_{rf} = \frac{\mathbb{E}(\text{sign}(D_{\text{real}})) - \mathbb{E}(\text{sign}(D_{\text{fake}}))}{2}$$

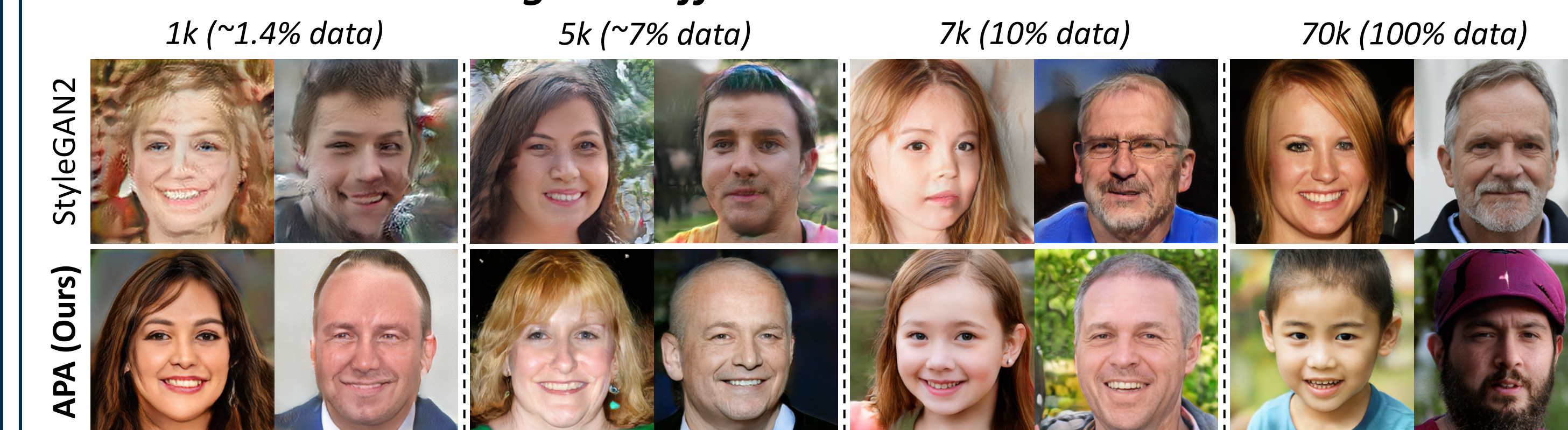
where D_{real} and D_{fake} are defined as

$$D_{\text{real}} = \text{logit}(D(x)), \quad D_{\text{fake}} = \text{logit}(D(G(z))),$$

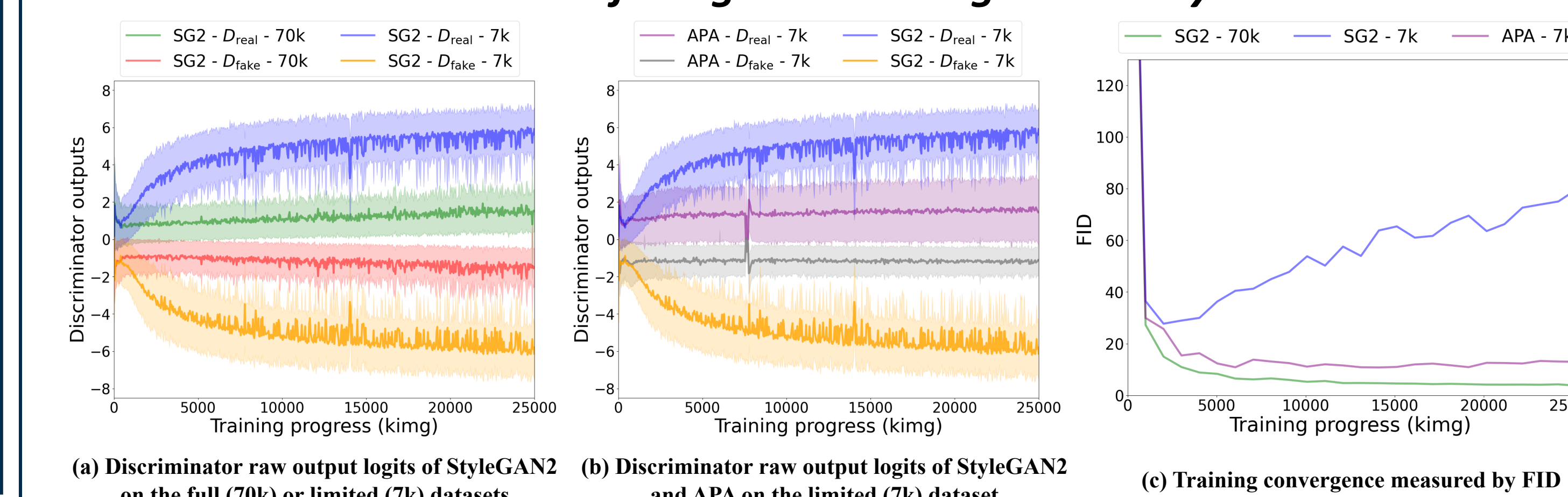
* $\lambda = 0$: no overfitting
 $\lambda = 1$: complete overfitting

4. Results and Analysis (Cont.)

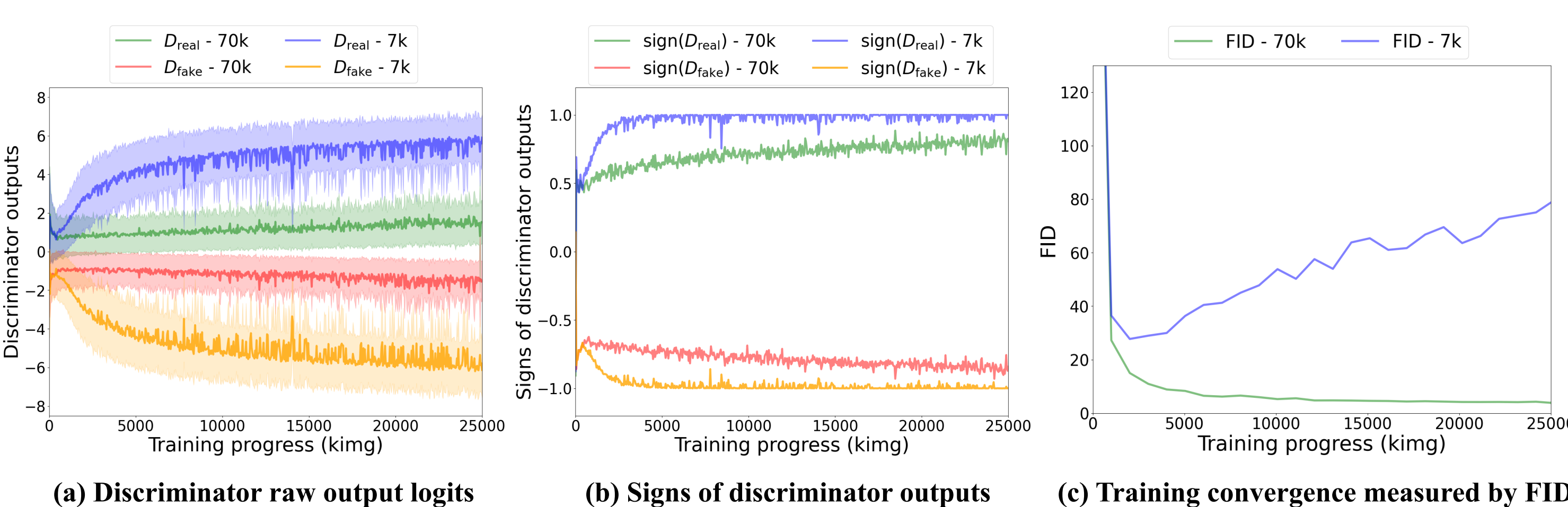
Effectiveness of APA: given different data amounts



Effectiveness of APA: overfitting and convergence analysis



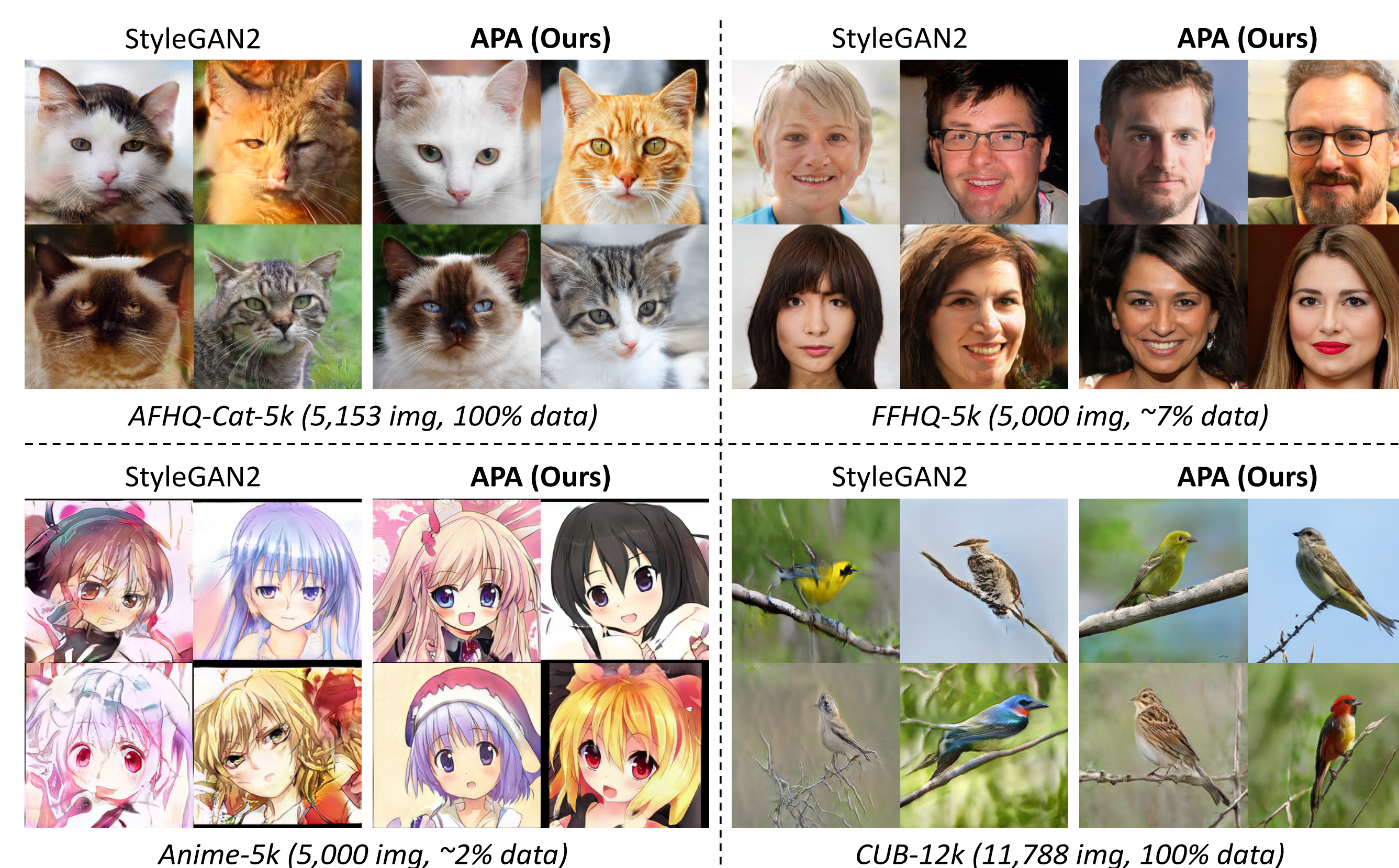
2. Underlying Cause: Discriminator Overfitting



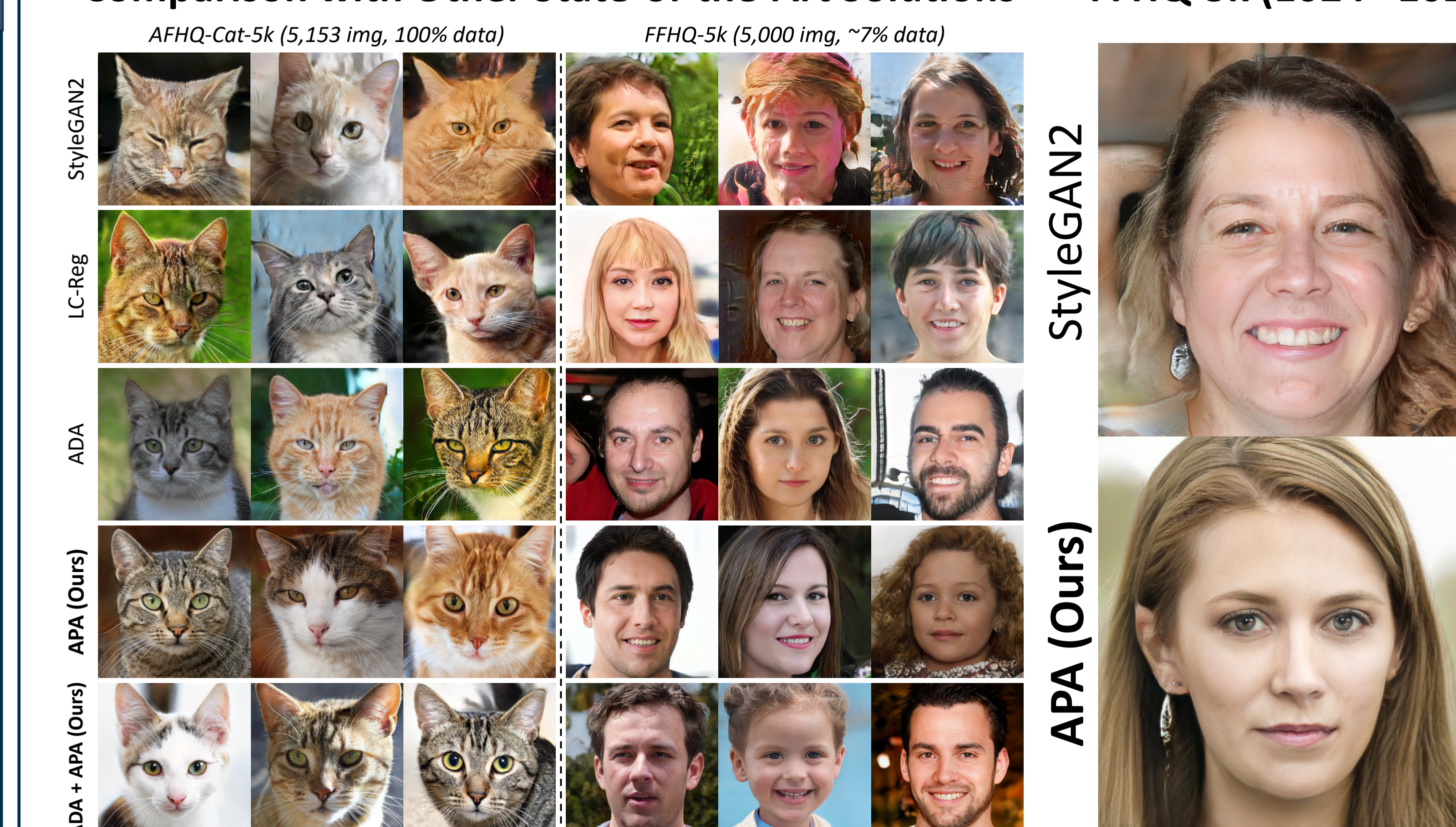
- The discriminator predictions diverge much more rapidly with limited training data, indicating quick overfitting.
- The overfitting of the discriminator impedes the generator's convergence, rendering severe instability of training dynamics.
- The less informative feedback to the generator leads it to converge to an inferior point, compromising the quality of synthesized images.

4. Results and Analysis

Effectiveness of APA: on various datasets



Comparison with Other State-of-the-Art Solutions • FFHQ-5k (1024×1024)



Code (Official PyTorch Implementation): <https://github.com/EndlessSora/DeceiveD>