

Chaerin Kong, Jeesoo Kim, Donghoon Han, Nojun Kwak
SEOUL NATIONAL UNIVERSITY, NAVER WEBTOON AI

Goal

- Pretraining-free (no source domain)
- Few-shot ($n=10$)
- Unconditional Image Synthesis

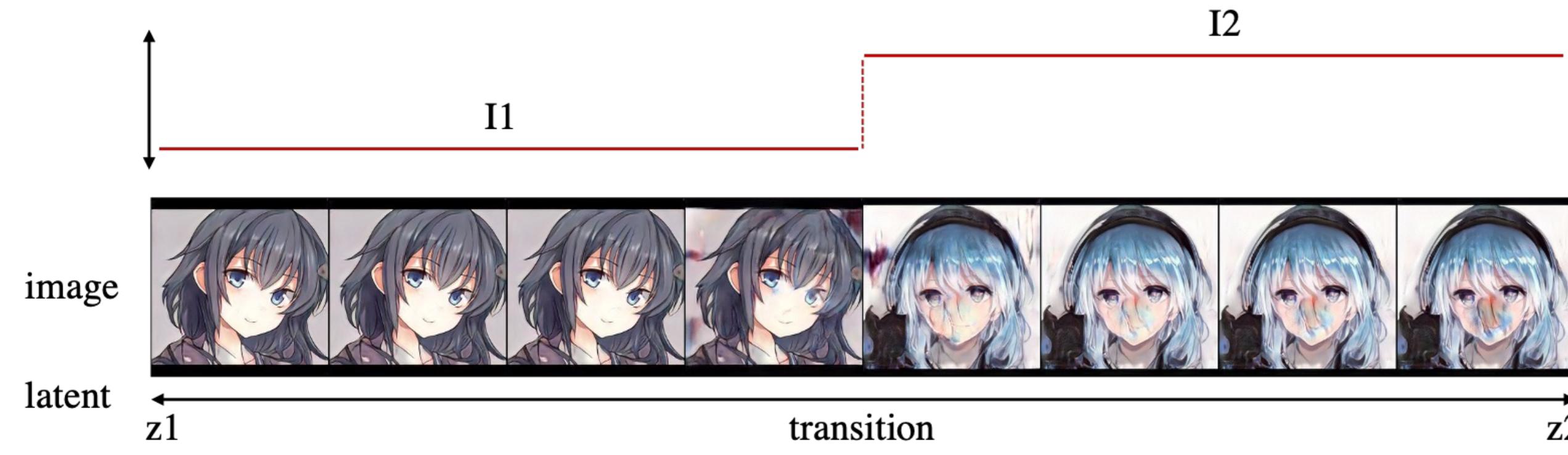
Motivation

Overfitting of Few-shot GMs

- Near-perfect fidelity
- Extremely limited sample diversity

The generator simply *duplicates* a limited set of training images (zero creativity)

Stair-like Latent Space Problem



- Transitions in latent space yields discontinuous outputs in image space

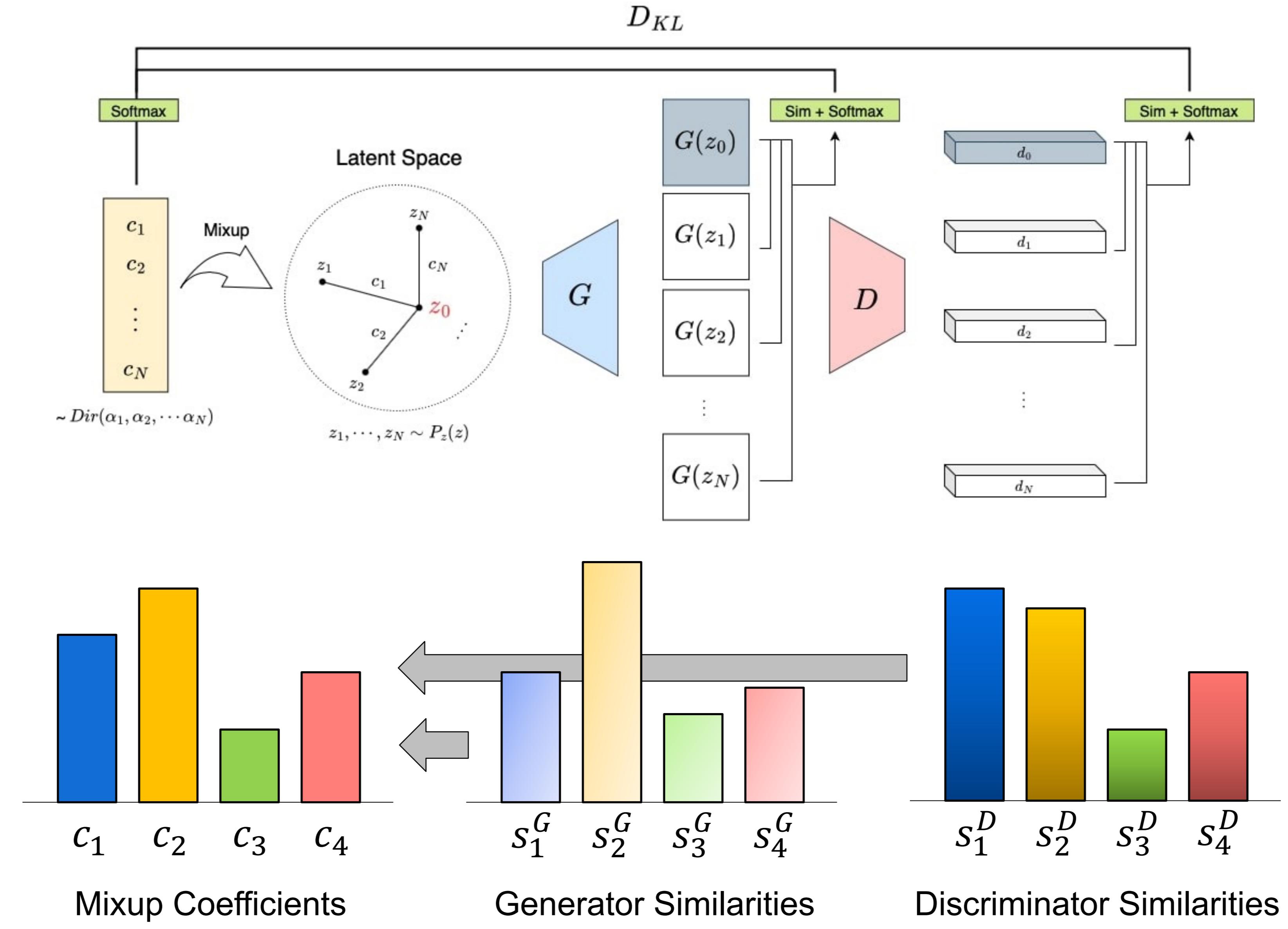
Smoothing the Generative Latent Space

- Geometric approach to enforce latent space smoothness (*surrogate target*)



- Desideratum: diverse *in-between* samples

Approach



Qualitative

10-shot Image Synthesis



Latent Interpolation

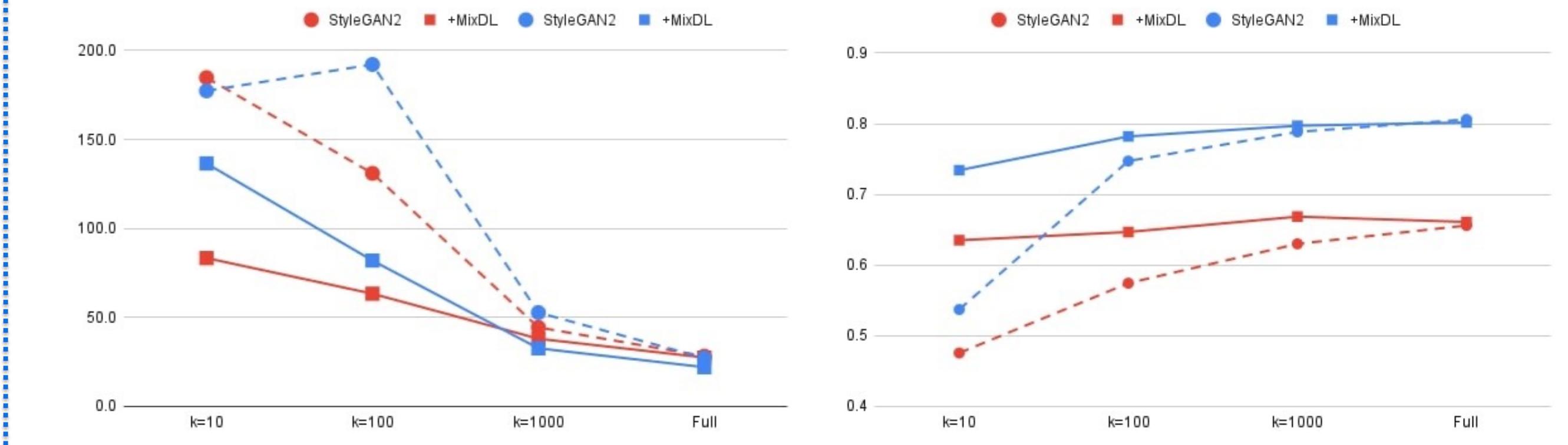


Quantitative & Analysis

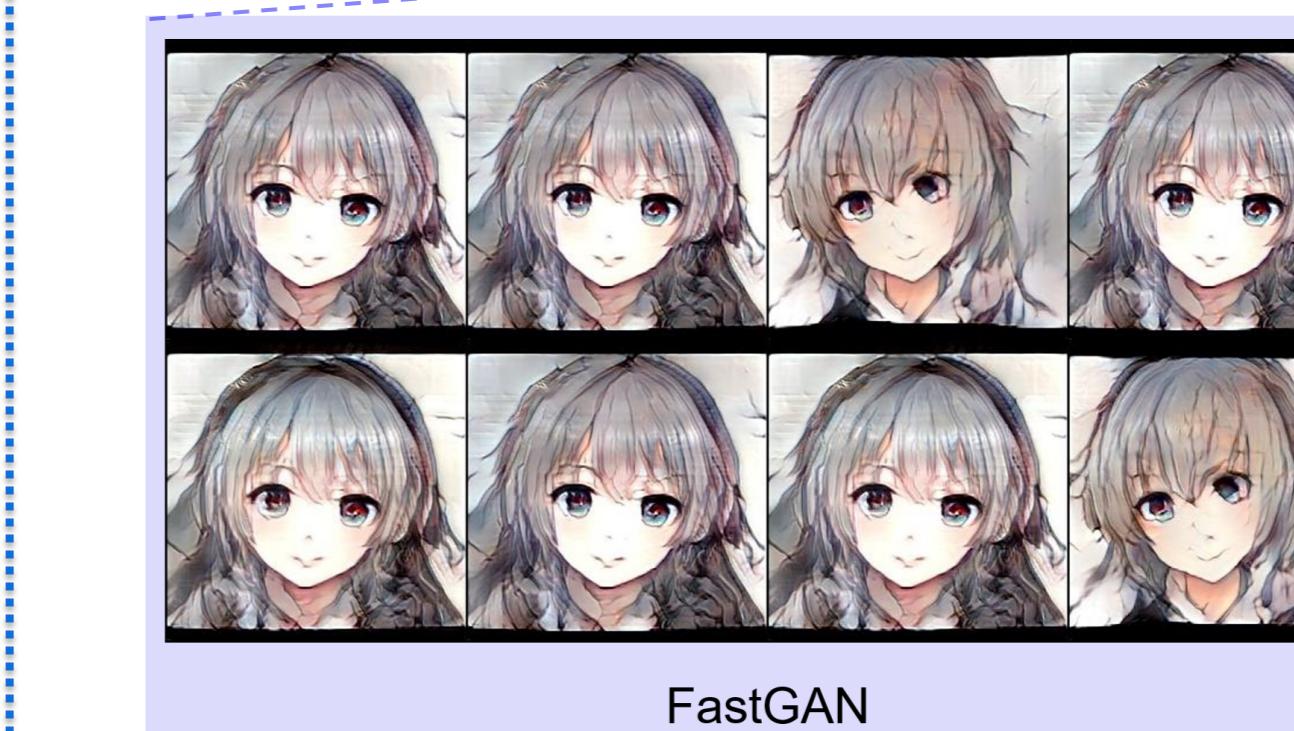
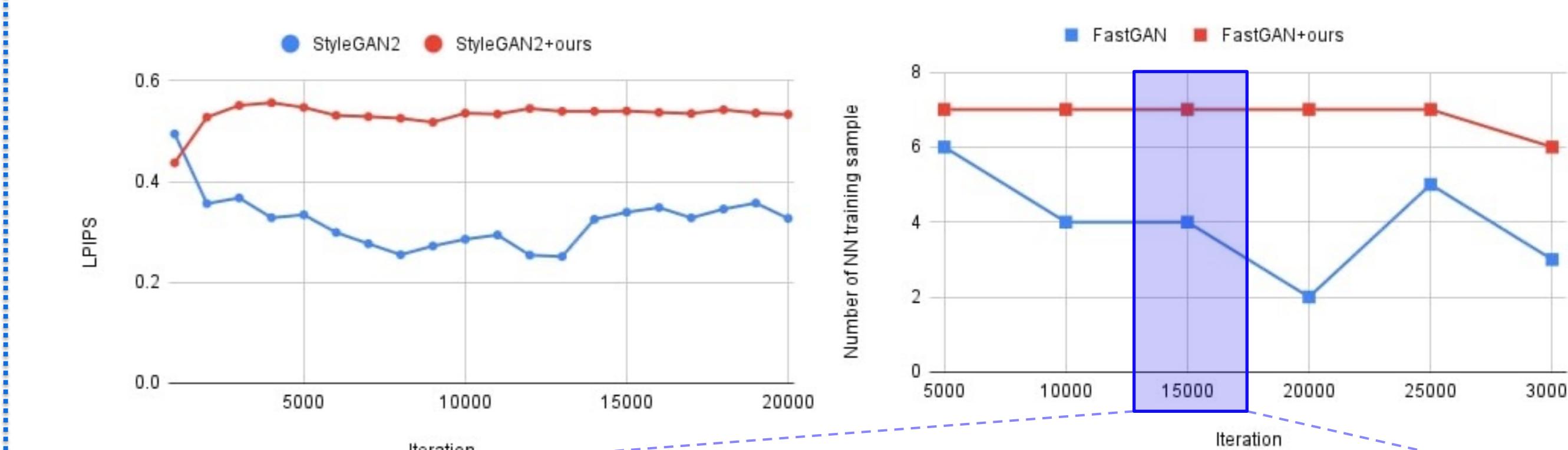
10-shot Image Synthesis

Method	Anime Face	Animal-Face Dog	Oxford Flowers	Face Sketches	Pokemon
FastGAN [27]	FID ↓ sFID ↓ LPIPS ↑	FID ↓ sFID ↓ LPIPS ↑	FID ↓ sFID ↓ LPIPS ↑	FID ↓ sFID ↓ LPIPS ↑	FID ↓ sFID ↓ LPIPS ↑
StyleGAN2 [23]	123.7 127.9 0.341	103.0 117.4 0.633	182.7 111.2 0.667	76.3 81.8 0.148	123.5 105.7 0.578
StyleGAN2 + DA [54]	166.0 111.4 0.363	177.5 127.7 0.569	94.2 84.4 0.435	257.6 136.5 0.439	
StyleGAN2 + ADA [22]	162.0 96.8 0.204	136.1 123.5 0.559	187.0 154.4 0.687	43.1 59.9 0.438	280.1 148.9 0.179
FastGAN + Ours	107.6 98.5 0.478	99.8 111.7 0.625	180.5 75.5 0.657	45.0 58.0 0.416	144.0 118.3 0.584
StyleGAN2 + Ours	73.1 92.8 0.548	96.0 99.9 0.682	136.6 67.6 0.734	39.4 43.3 0.479	117.0 57.7 0.539
StyleGAN2 + DA + Ours	70.2 94.1 0.551	96.4 107.6 0.682	129.9 66.9 0.705	35.4 50.1 0.471	114.3 79.0 0.607
StyleGAN2 + ADA + Ours	75.0 96.5 0.571	94.1 96.6 0.684	127.7 52.5 0.763	39.2 45.7 0.482	155.5 65.7 0.544
StyleGAN2 + CDC [†] [34]	93.4 107.4 0.469	206.7 110.1 0.545	107.5 99.9 0.518	45.7 46.1 0.428	126.6 79.1 0.342

Dataset Size Ablation



Learning Trajectory



Nearest Neighbor Analysis

