

Goal

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

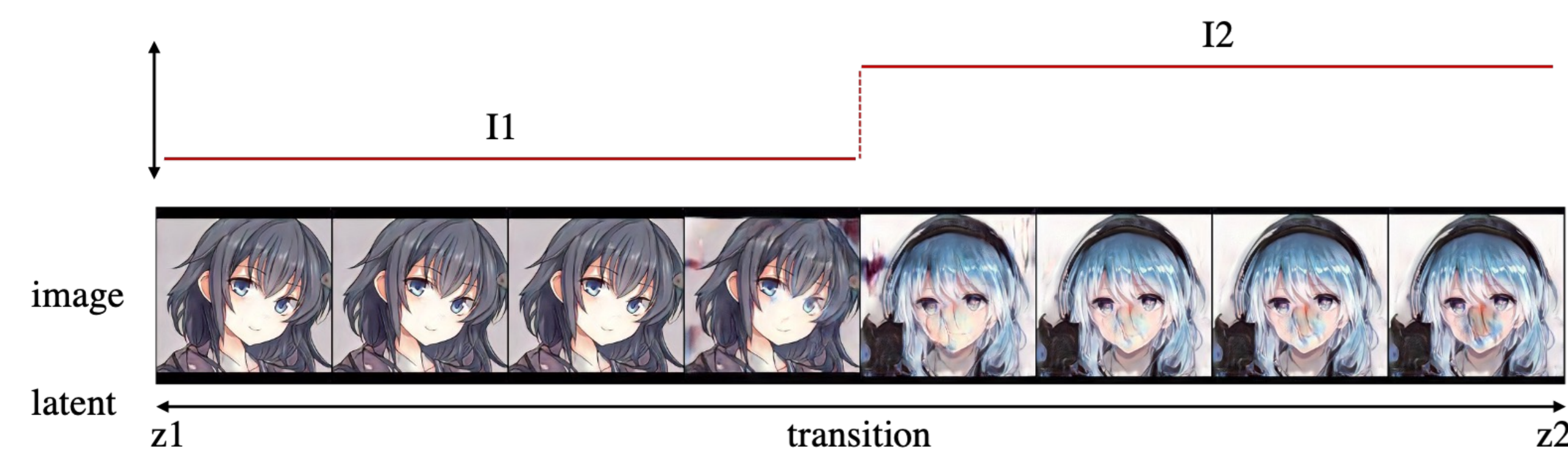
Motivation

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

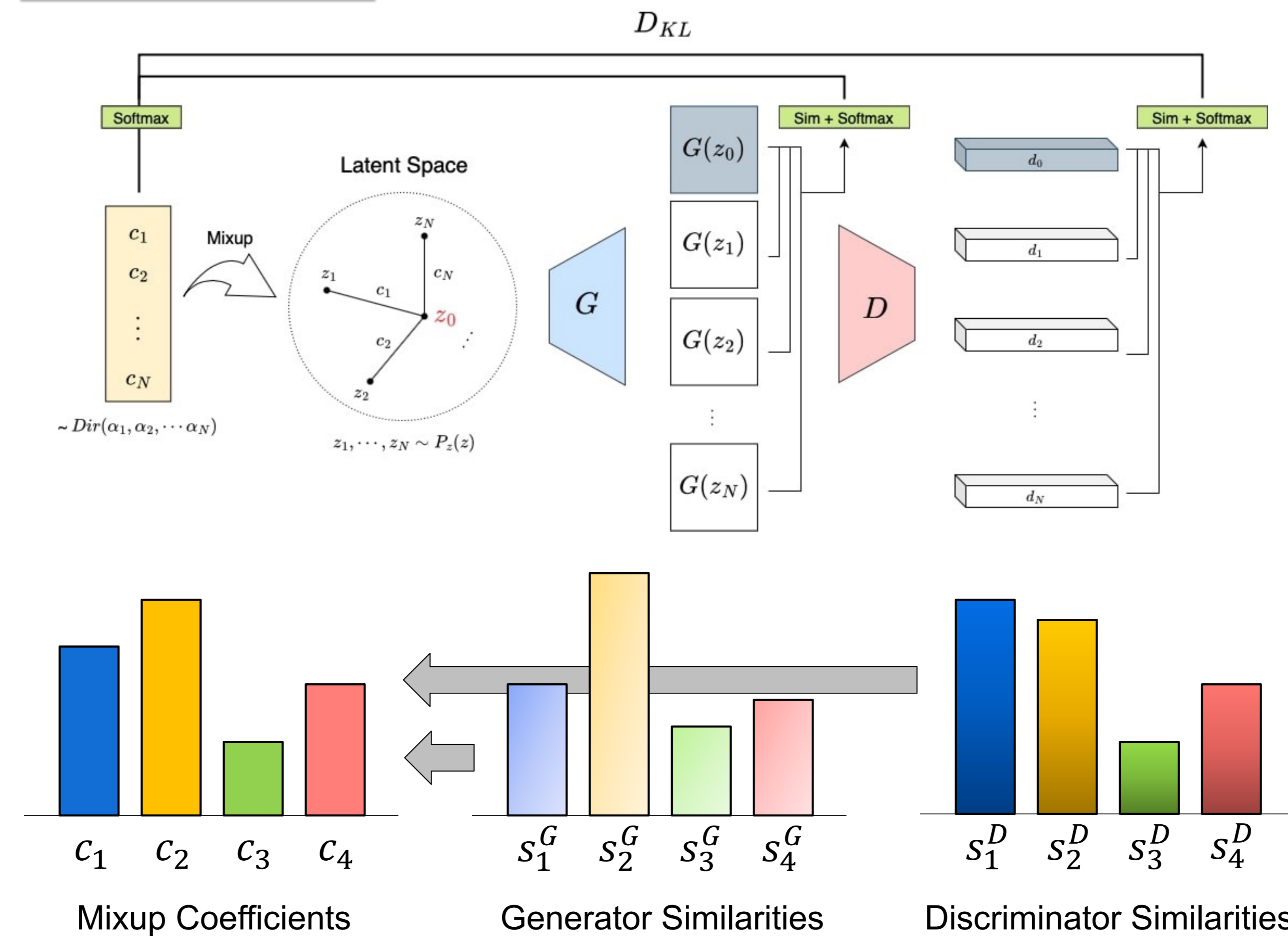
Smoothing the Generative Latent Space

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



- Desideratum: diverse *in-between* samples

Approach

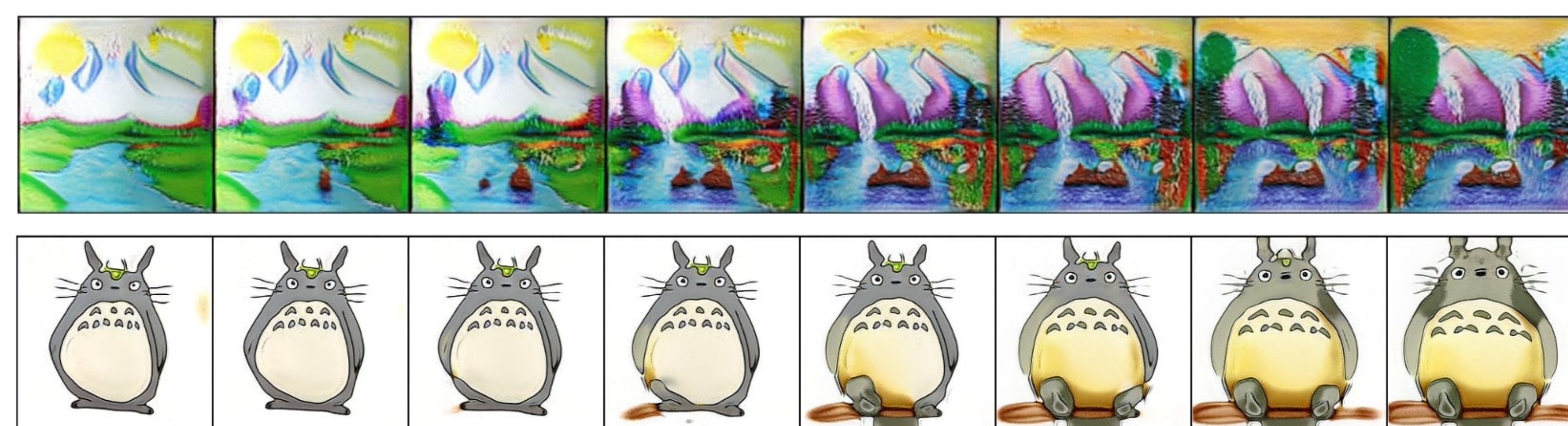


Qualitative

- 10-shot Image Synthesis



- Latent Interpolation

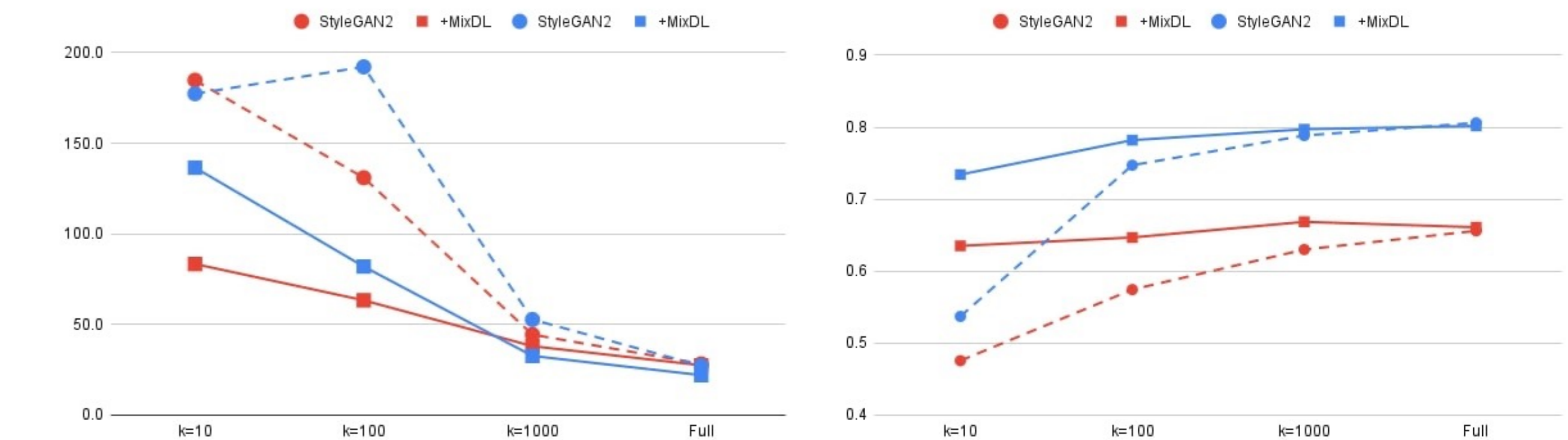


Quantitative & Analysis

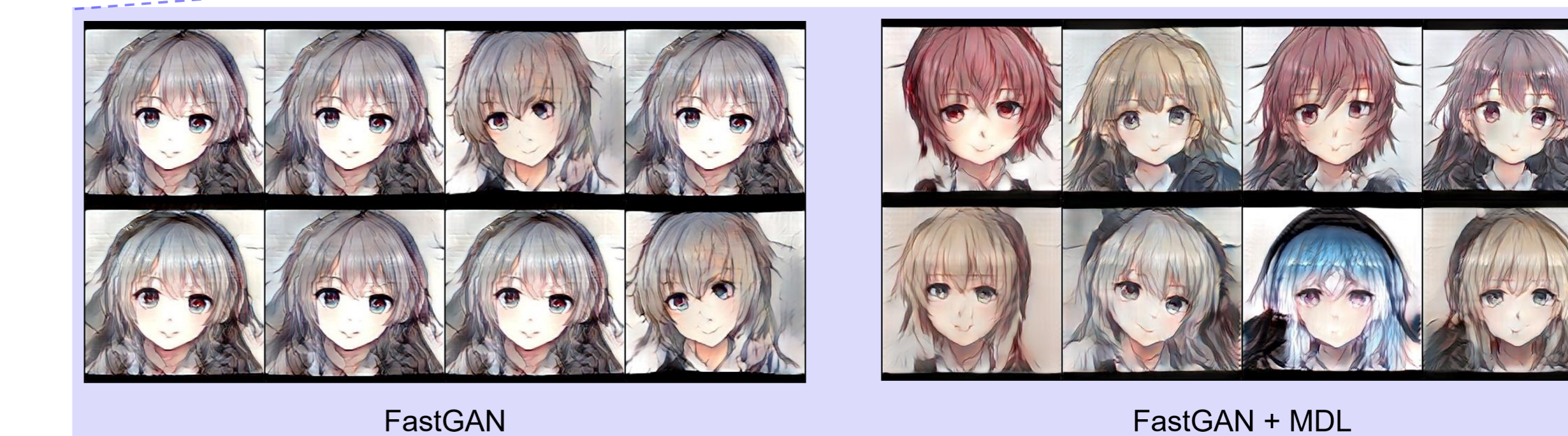
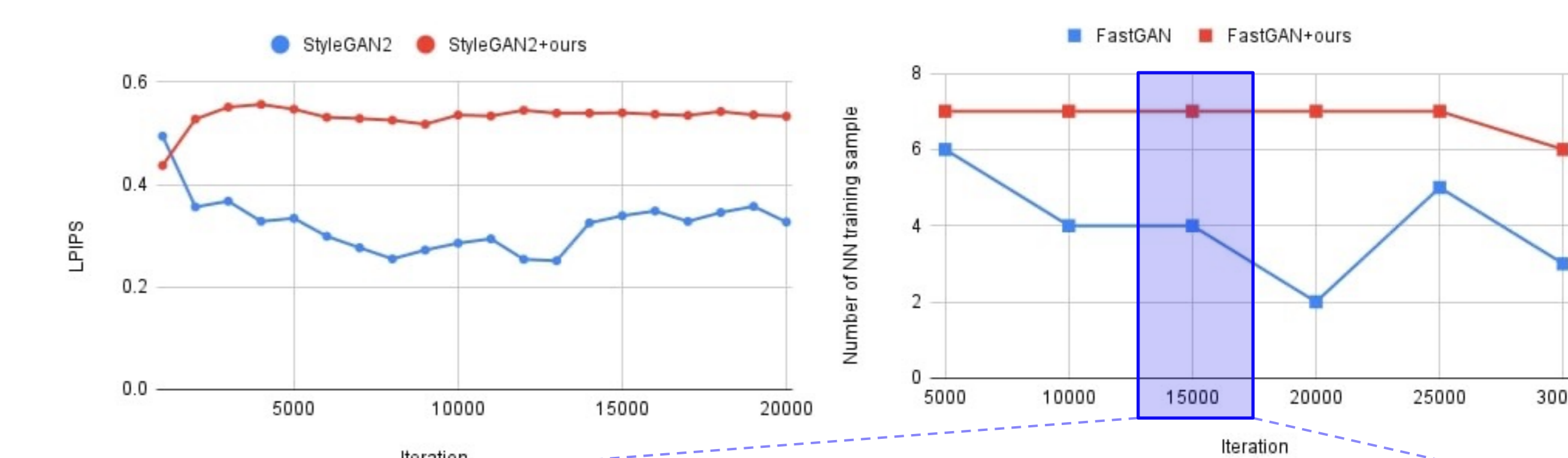
- 10-shot Image Synthesis

Method	Anime Face			Animal-Face Dog			Oxford Flowers			Face Sketches			Pokemon		
	FID ↓	sFID ↓	LPIPS ↑	FID ↓	sFID ↓	LPIPS ↑	FID ↓	sFID ↓	LPIPS ↑	FID ↓	sFID ↓	LPIPS ↑	FID ↓	sFID ↓	LPIPS ↑
FastGAN [27]	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 [23]	166.0	111.4	0.363	177.5	127.7	0.569	177.3	143.0	0.537	94.2	84.4	0.435	257.6	136.5	0.439
StyleGAN2 + DA [54]	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
StyleGAN2 + ADA [22]	130.2	108.0	0.288	236.5	126.2	0.636	167.8	83.5	0.719	62.8	67.3	0.399	214.3	95.5	0.496
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	35.6	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

