



浙江大學
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ICLR

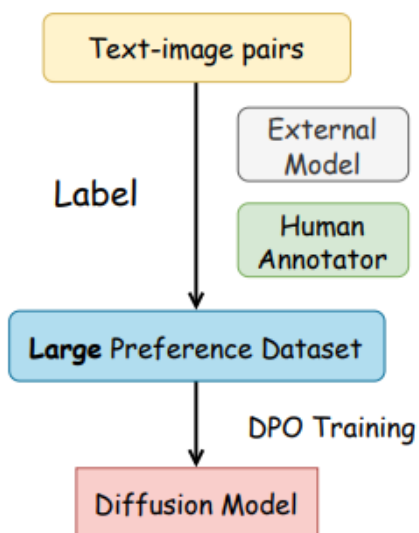
SAIL: Self-Amplified Iterative Learning for Diffusion Model Alignment with Minimal Human Feedback

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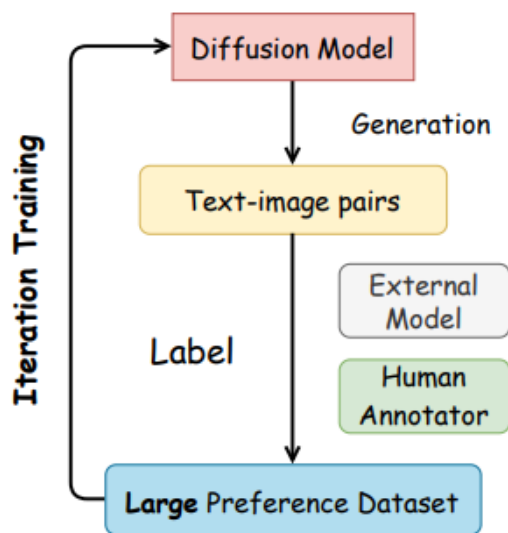
ICLR 2026 Presentation

Introduction

Traditional Offline DPO
(with Fixed Preferences)



Traditional Online DPO
(with External Reward/Annotation)



Our Method:
SAIL

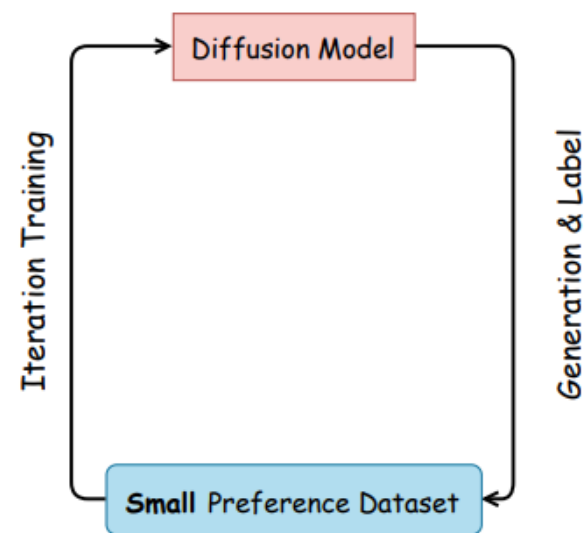


Figure 1: Comparison of three direct preference optimization methods. Different from Offline DPO and Online DPO, SAIL iteratively update without large preference dataset and external reward model.

Method

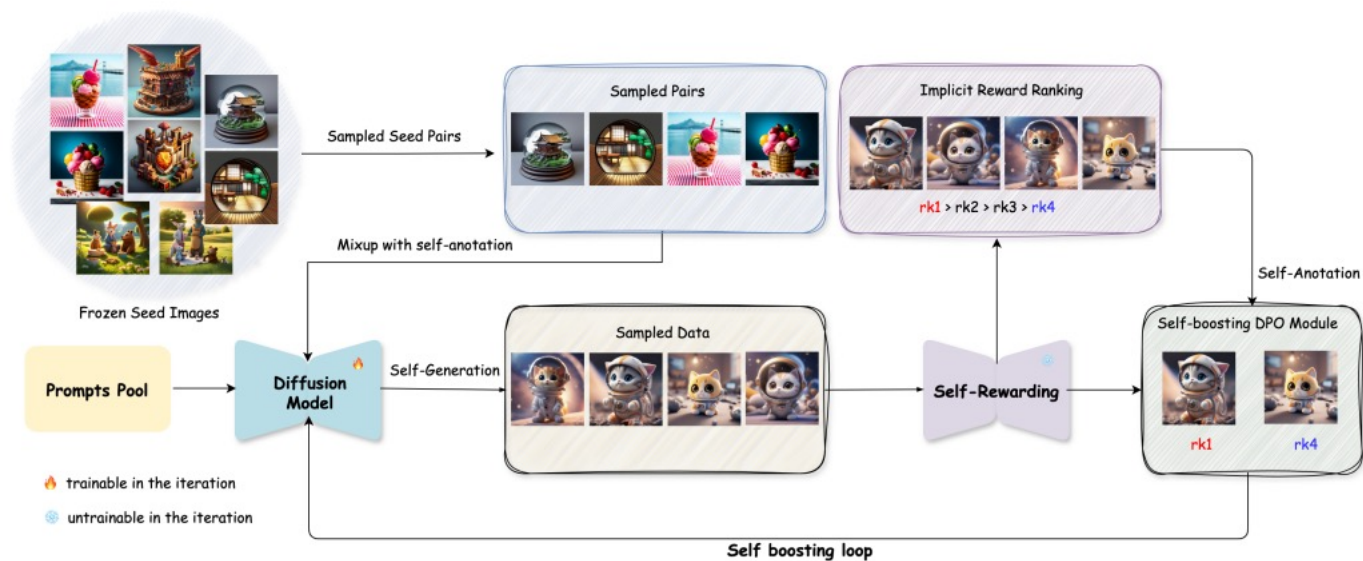


Figure 3: **Illustration of the proposed SAIL framework.** The SAIL framework incrementally refines the alignment of diffusion models through iterative cycles consisting of generating new preference data and conducting preference learning using mixup ranked preference data complemented by self-refinement mechanisms. This closed-loop self-boasting process operates with minimal initial data input, aiming to optimize performance by capitalizing on the intrinsic capabilities of the model, independent of external reward systems.

Analysis



Figure 2: Iterative performance improvement with generated data of SAIL on Pick-a-Pic validation dataset in Aesthetics, ImageReward, and HPSv2. During the iterative process, SAIL demonstrates steady improvement and ultimately surpassed DiffusionDPO (as indicated by the dashed line).

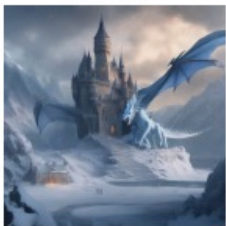
Results

Table 1: Comparison with other methods on SD1.5 and SDXL. For HPSv2, we report the score in Anime, Concept-Art, Painting and Photo. For Pick-a-Pic v2, we apply PickScore, ImageReward, Aesthetics and HPSv2 metrics to evaluate all methods. The best results are highlighted in **red** and the performance gain are highlighted in **boldface**.

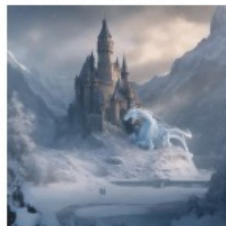
Model	Method	Data	HPSv2				Pick-a-Pic V2			HPSv2
			Ani.	Con.	Paint.	Photo	P.S.	I.R.	Aes.	
SD1.5	-	-	27.23	26.65	26.52	27.41	20.62	-0.0130	5.38	26.21
	DiffusionDPO	0.8M	27.64	26.97	26.90	27.56	21.07	0.2056	5.48	26.57
	DiffusionSPO	0.8M	28.05	27.49	27.61	27.55	21.20	0.1577	5.68	26.75
	SAIL (Iter0)	0.05M	27.41	26.75	26.72	27.50	20.80	0.0715	5.42	26.38
	SAIL (Iter1)	0.05M	27.56	26.88	26.83	27.59	20.89	0.1137	5.46	26.49
	SAIL (Iter2)	0.05M	27.75	27.06	27.03	27.74	20.95	0.1729	5.47	26.65
	SAIL (Iter3)	0.05M	27.88	27.16	27.15	27.79	21.00	0.2329	5.49	26.75
				+0.65	+0.51	+0.63	+0.38	+0.38	+0.2459	+0.11
SDXL	-	-	28.03	27.17	27.22	27.50	22.13	0.6891	6.04	26.80
	DiffusionDPO	0.8M	28.71	27.75	27.82	27.89	22.59	0.9336	6.02	27.27
	MaPO	0.8M	28.39	27.60	27.58	27.74	22.24	0.8227	6.16	27.05
	SAIL (Iter0)	0.05M	28.41	27.50	27.49	27.76	22.40	0.8705	6.04	27.08
	SAIL (Iter1)	0.05M	28.59	27.62	27.59	27.90	22.53	0.9355	6.08	27.21
	SAIL (Iter2)	0.05M	28.74	27.80	27.78	28.09	22.51	0.9844	6.16	27.32
			+0.71	+0.63	+0.56	+0.59	+0.38	+0.2953	+0.12	+0.52

Results

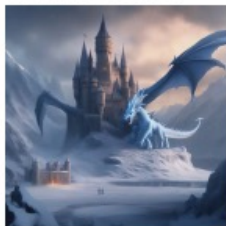
SDXL



SAIL-Iter0



SAIL-Iter1



SAIL-Iter2



ice dragon, castle, medieval fantasy, winter, digital illustration, 8k

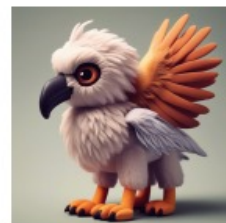
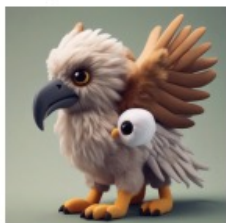
SDXL



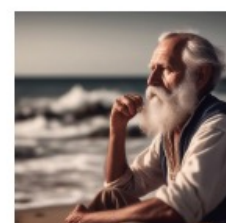
SAIL-Iter2



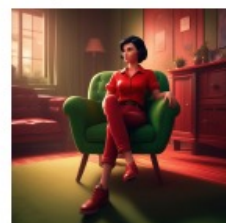
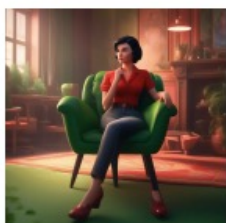
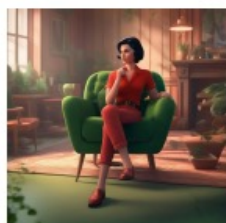
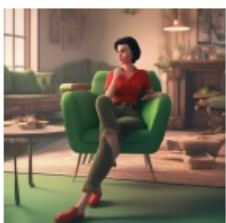
An aircraft carrier perfectly encased within a glass bottle



griffon with a seagull head and lion body



old sailor with beard sitting on..



Art illustration, strong beautiful woman sit down relaxing on green fancy couch, ww2 we can do it poster, black short hair, ...



Two cats watering roses in a greenhouse



THANKS