Abstraction in Style: Beyond Texture and Color

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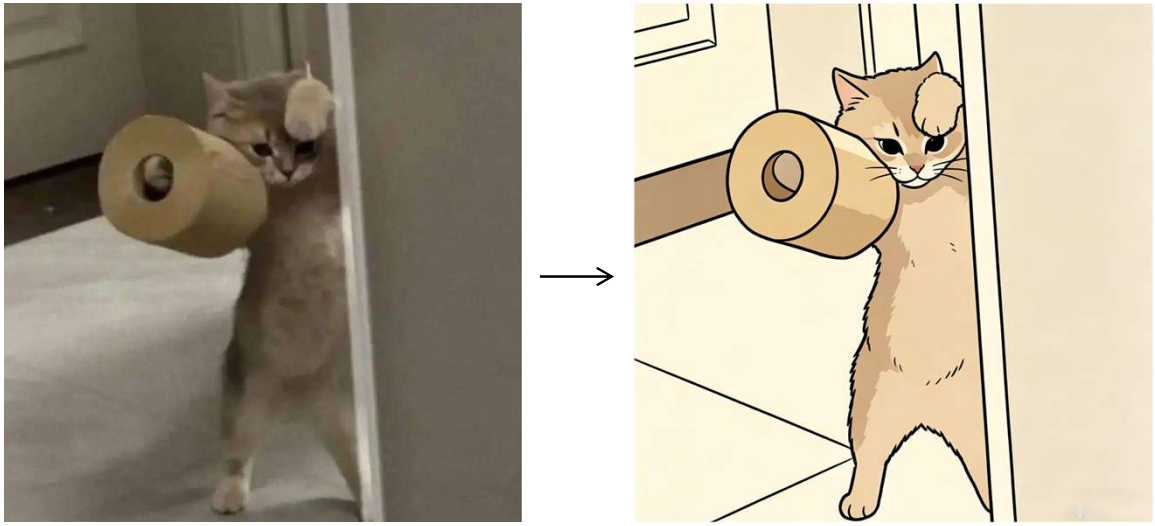
2026.04.19

Style and Abstraction



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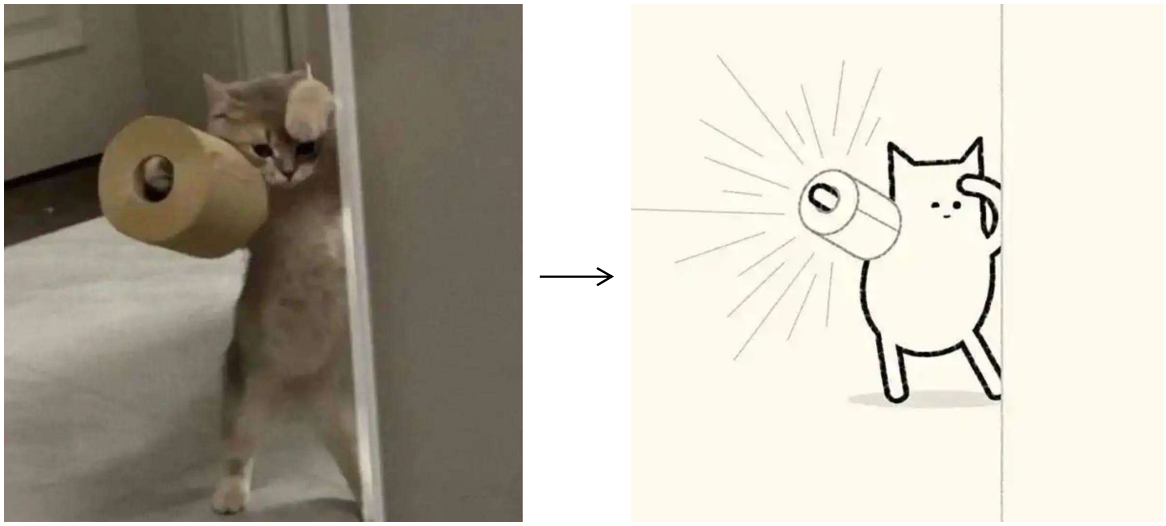
Style and Abstraction



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Style Transfer & Visual Abstraction

Style transfer

Neural Style Transfer

AdaIN

StyleAligned

B-LoRA

Style Transfer：Neural Style Transfer

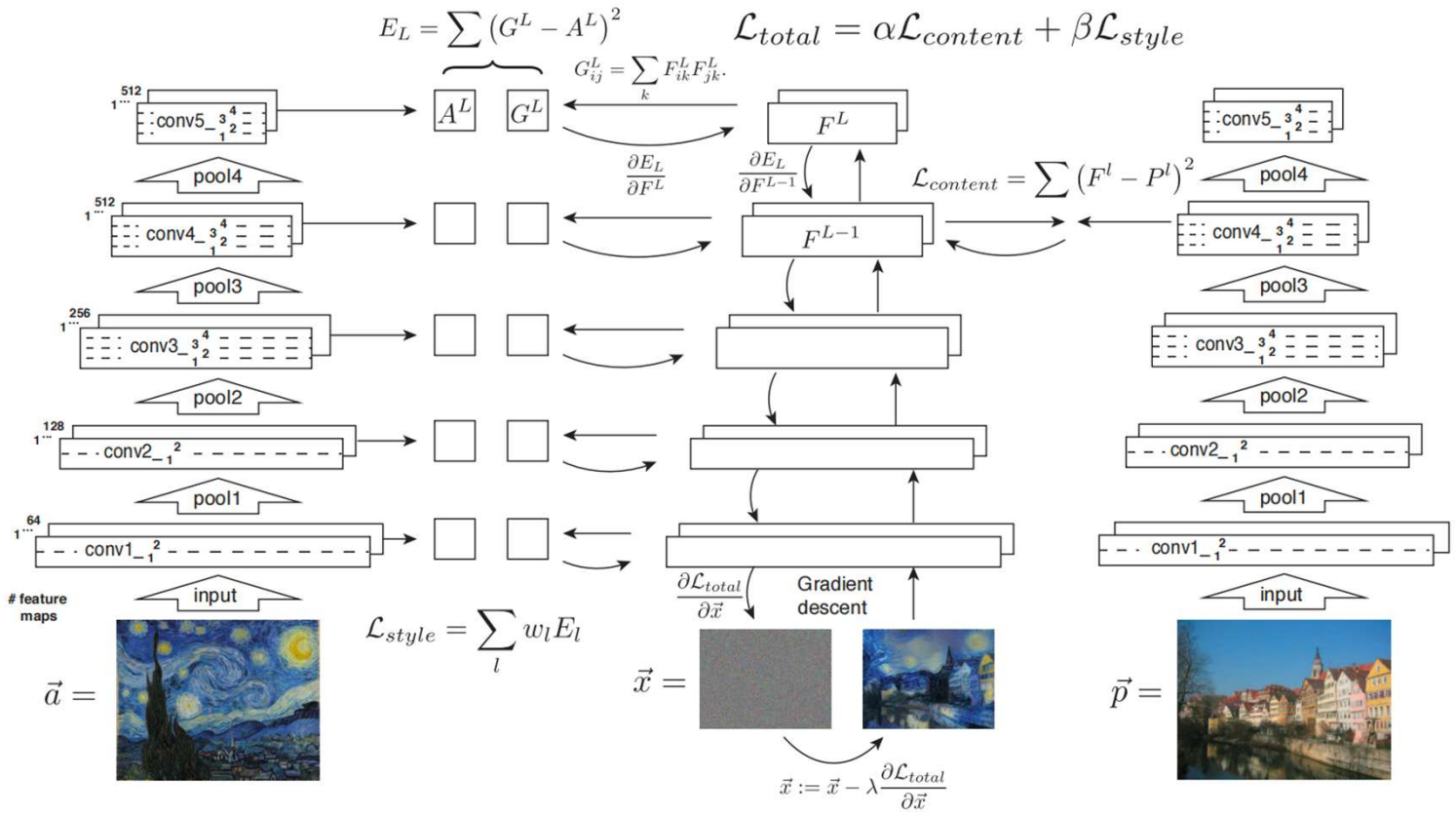
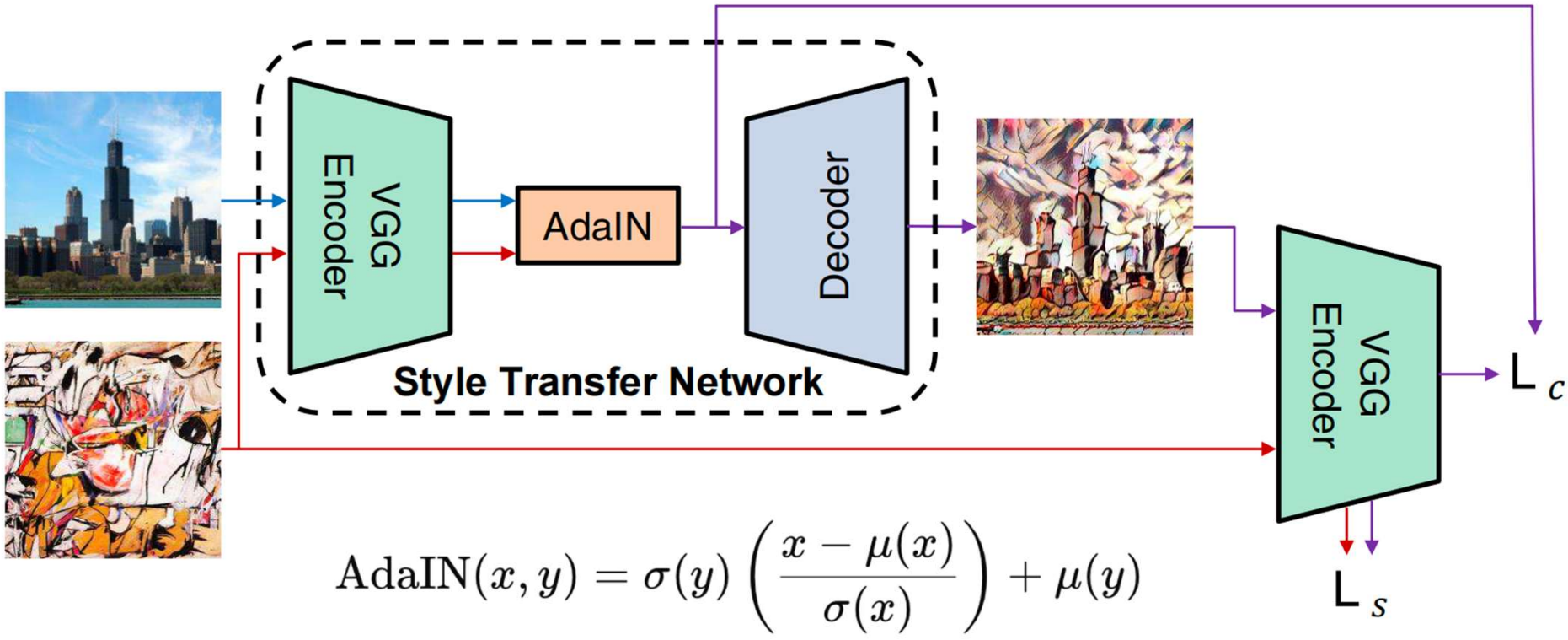


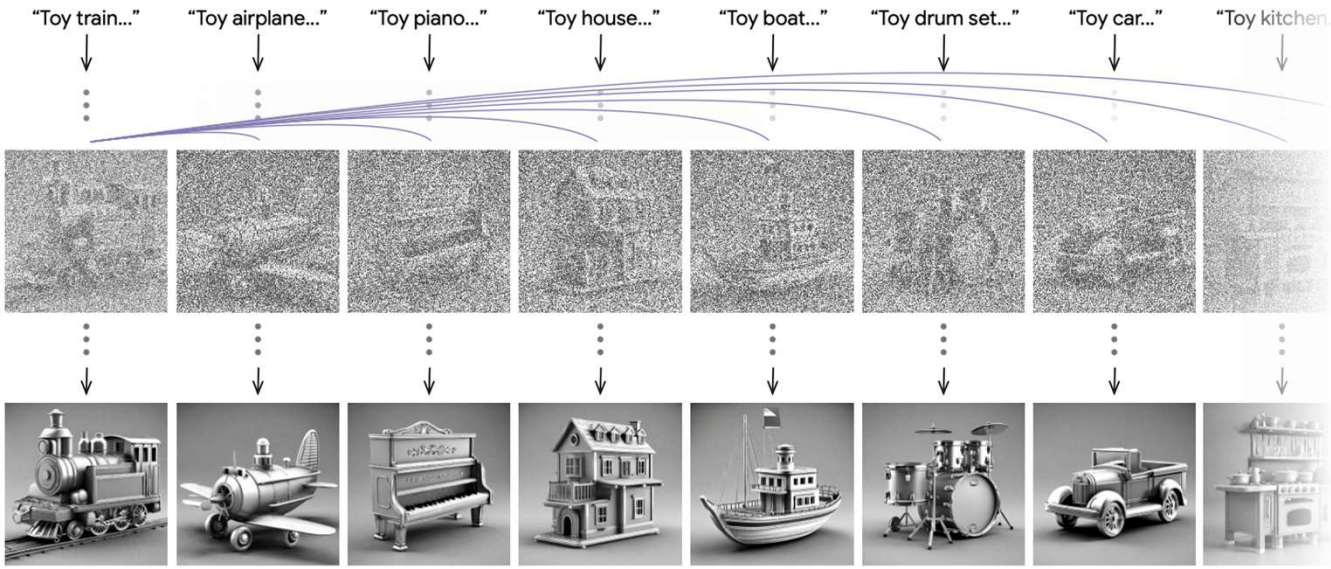
Image Style Transfer Using Convolutional Neural Networks 2016 CVPR

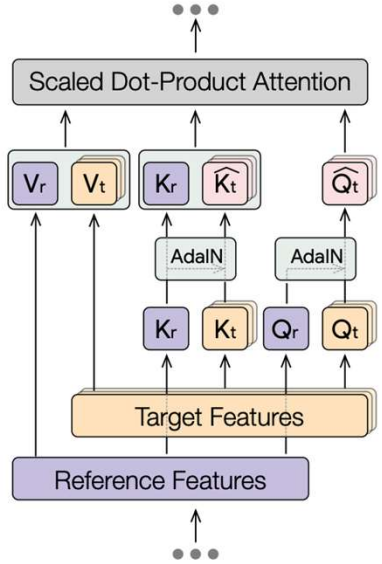
Style Transfer：AdaIN



Arbitrary Style Transfer in Real-Time with Adaptive Instance Normalization 2017 ICCV

Style Transfer：StyleAlign



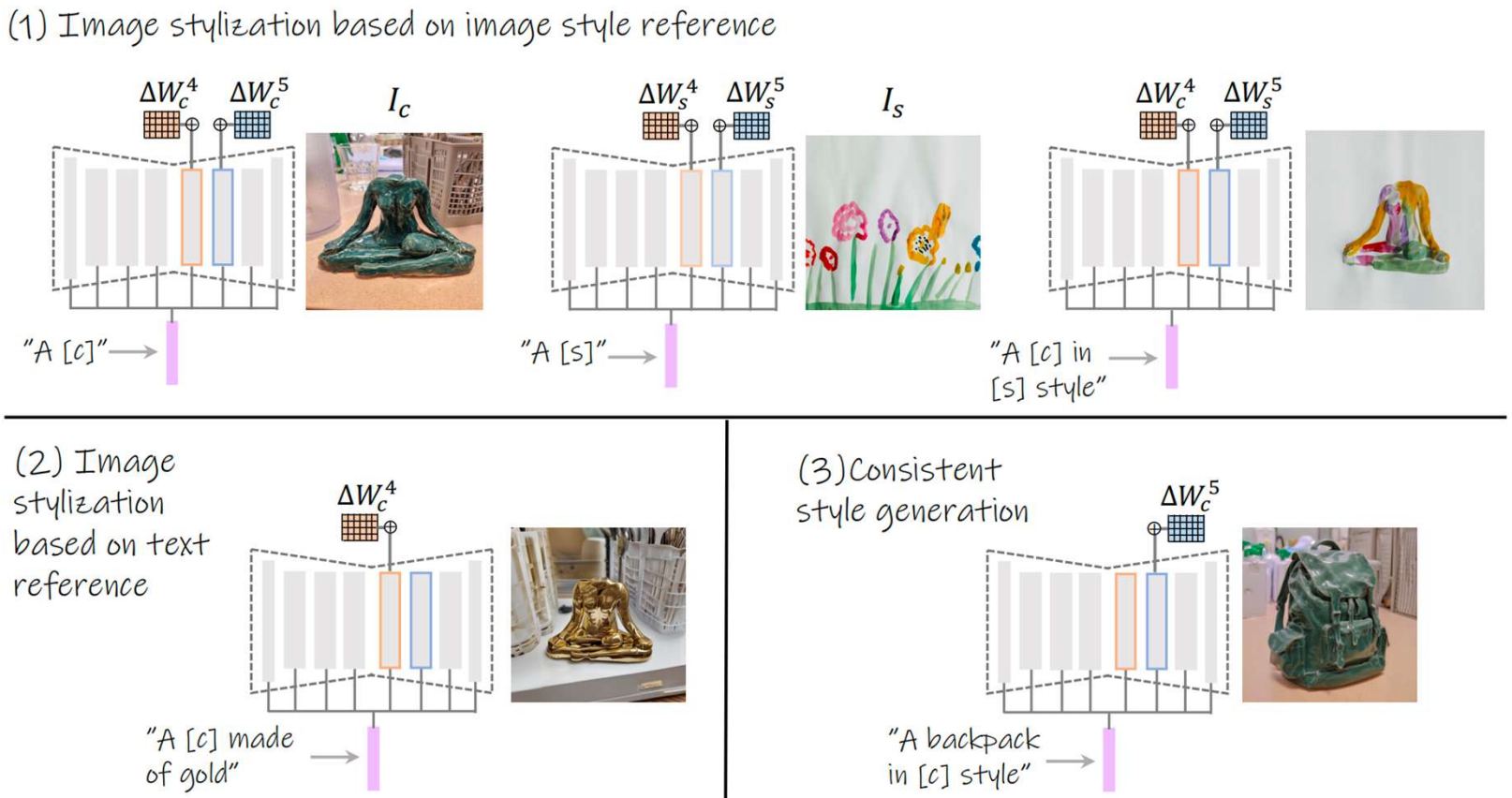


$$\hat{Q}_t = AdaIN(Q_t, Q_r),\ \hat{K}_t = AdaIN(K_t, K_r)$$

$$Attention(\hat{Q}_t, [K_r; \hat{K}_t]^T, [V_r; V_t])$$

Style Aligned Image Generation via Shared Attention 2024 CVPR

Style Transfer：B-LoRA



Visual Abstraction

non-photorealistic rendering

painterly and brush-based

CLIP-based semantic sketch abstraction

Stylization and Abstraction of Photographs 2002SIGGRAPH

Visual Abstraction：Eyetracking-Based Image Abstraction

(a) Original image

(b) Detected edges

(c) Color segmentation

(d) Color segmentation at a coarser scale

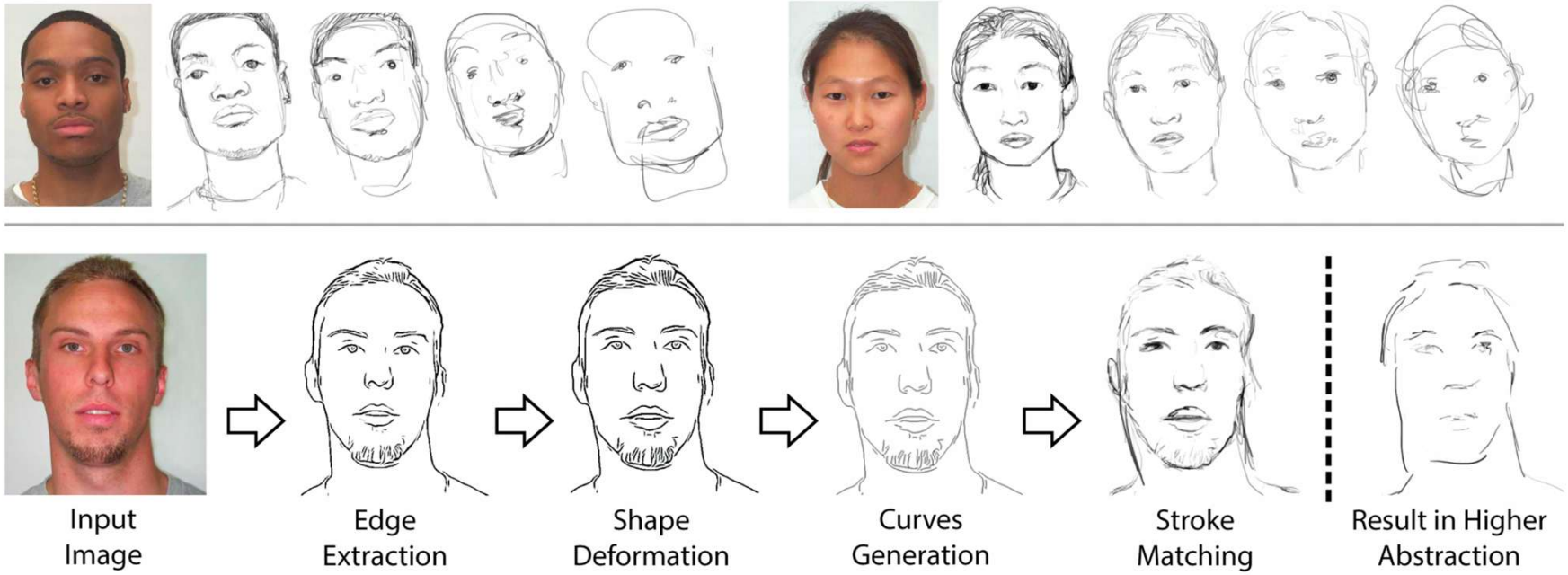
Stylization and Abstraction of Photographs 2002SIGGRAPH

Visual Abstraction：Eyetracking-Based Image Abstraction

Stylization and Abstraction of Photographs 2002SIGGRAPH

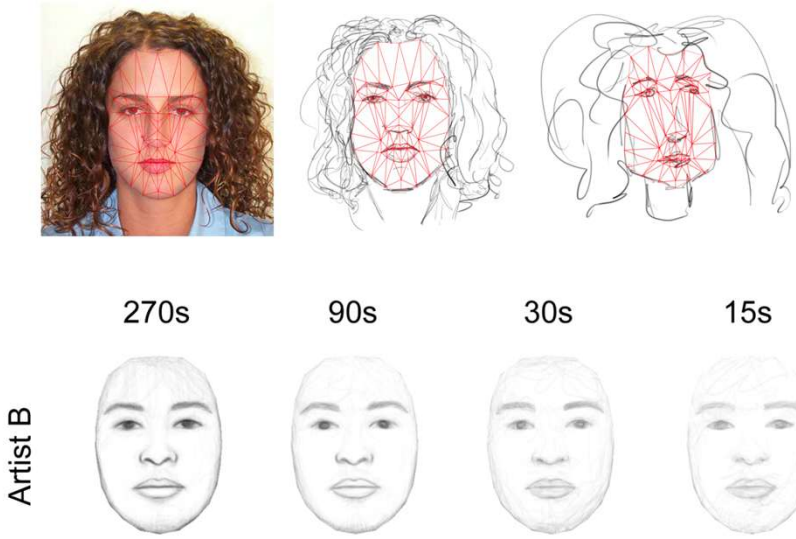
Background

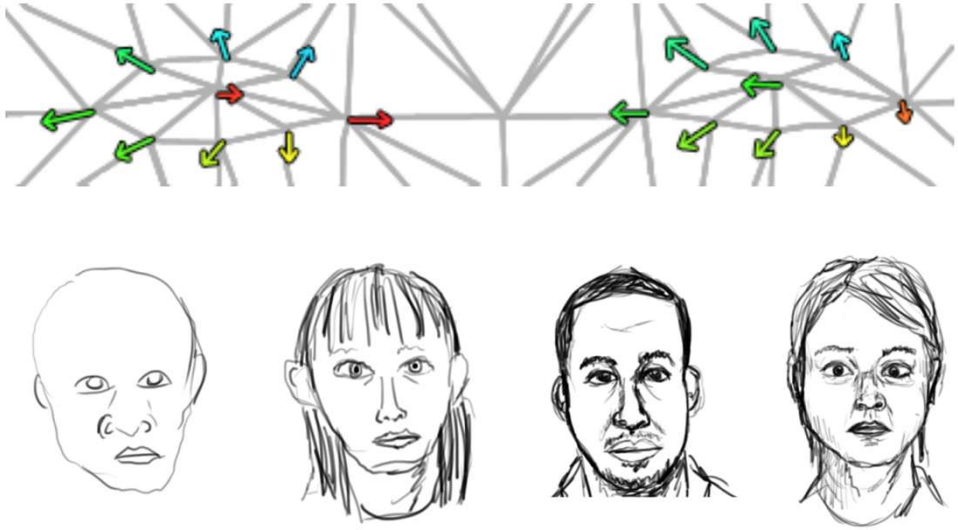
Visual Abstraction：Stylized Abstract Portrait Sketch Synthesis



Style and Abstraction in Portrait Sketching 2013 ACM TOG

Visual Abstraction：Stylized Abstract Portrait Sketch Synthesis

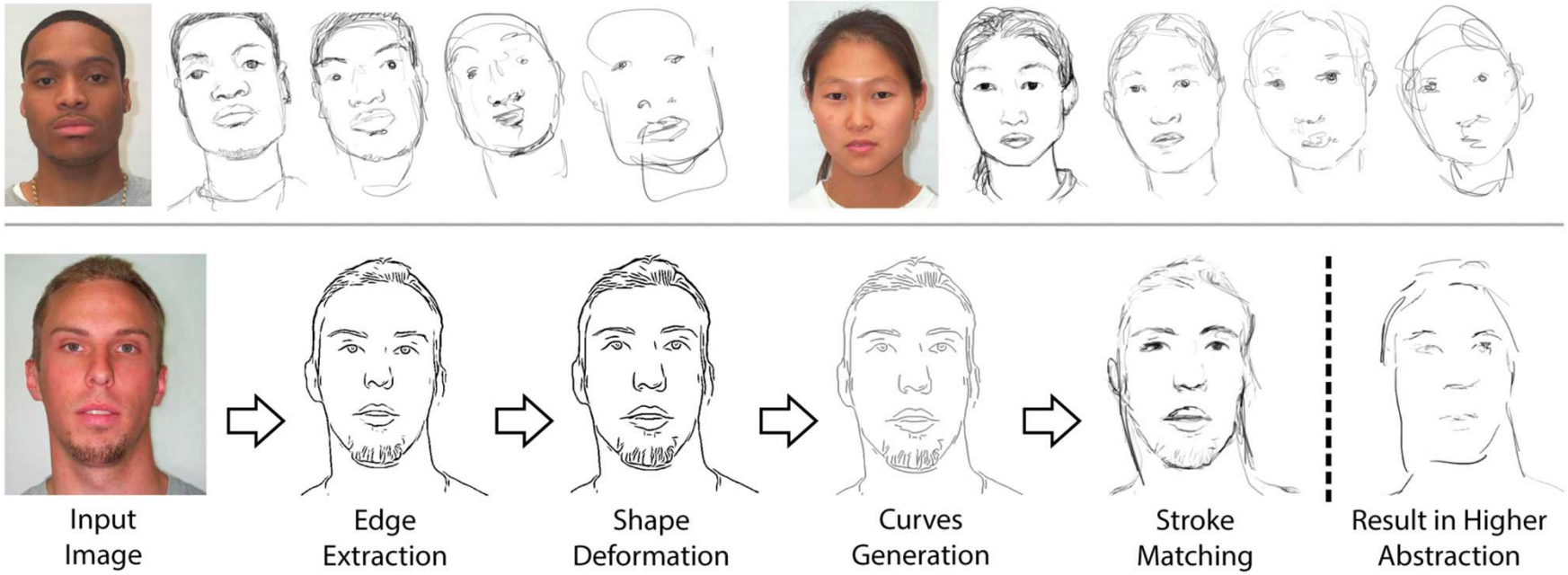




Style and Abstraction in Portrait Sketching 2013 ACM TOG

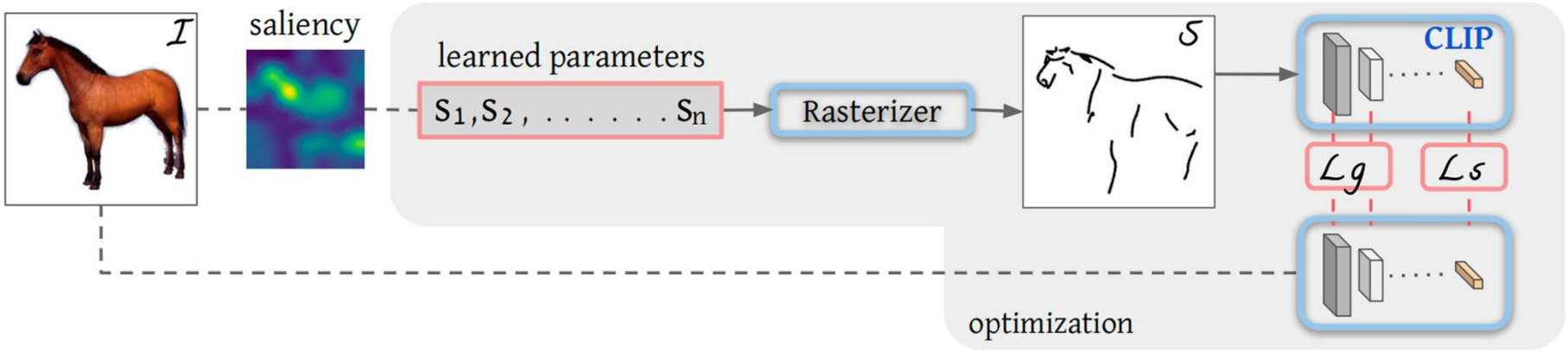
Background

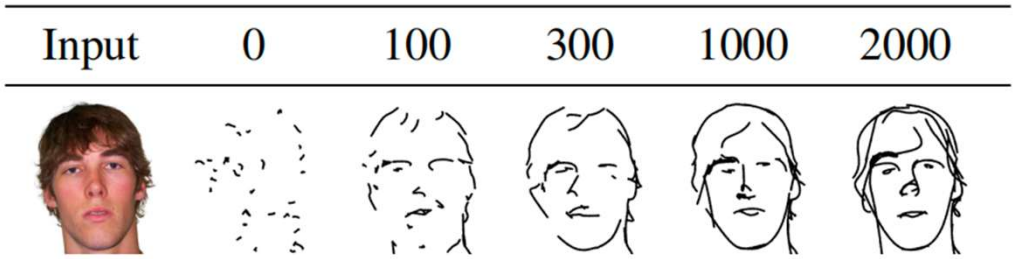
Visual Abstraction：Stylized Abstract Portrait Sketch Synthesis



Style and Abstraction in Portrait Sketching 2013 ACM TOG

Visual Abstraction：CLIPasso





CLIPasso: Semantically-Aware Object Sketching 2022 ACM TOG

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Style Transfer & Visual Abstraction

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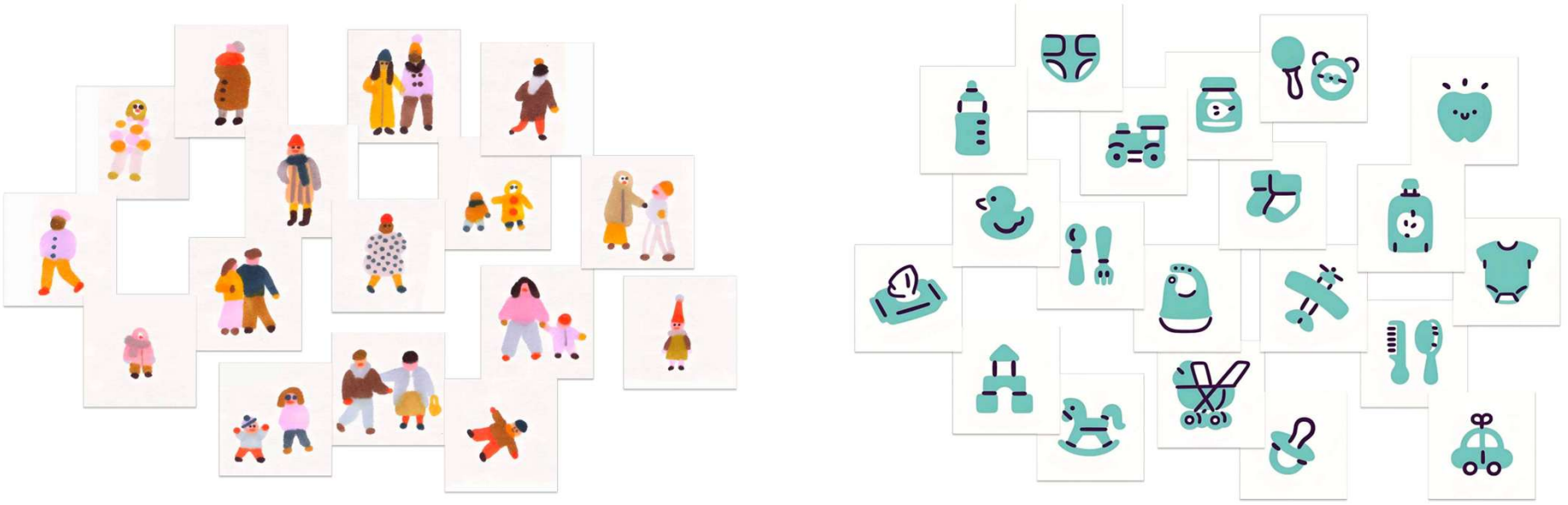
Setting



Style Reference

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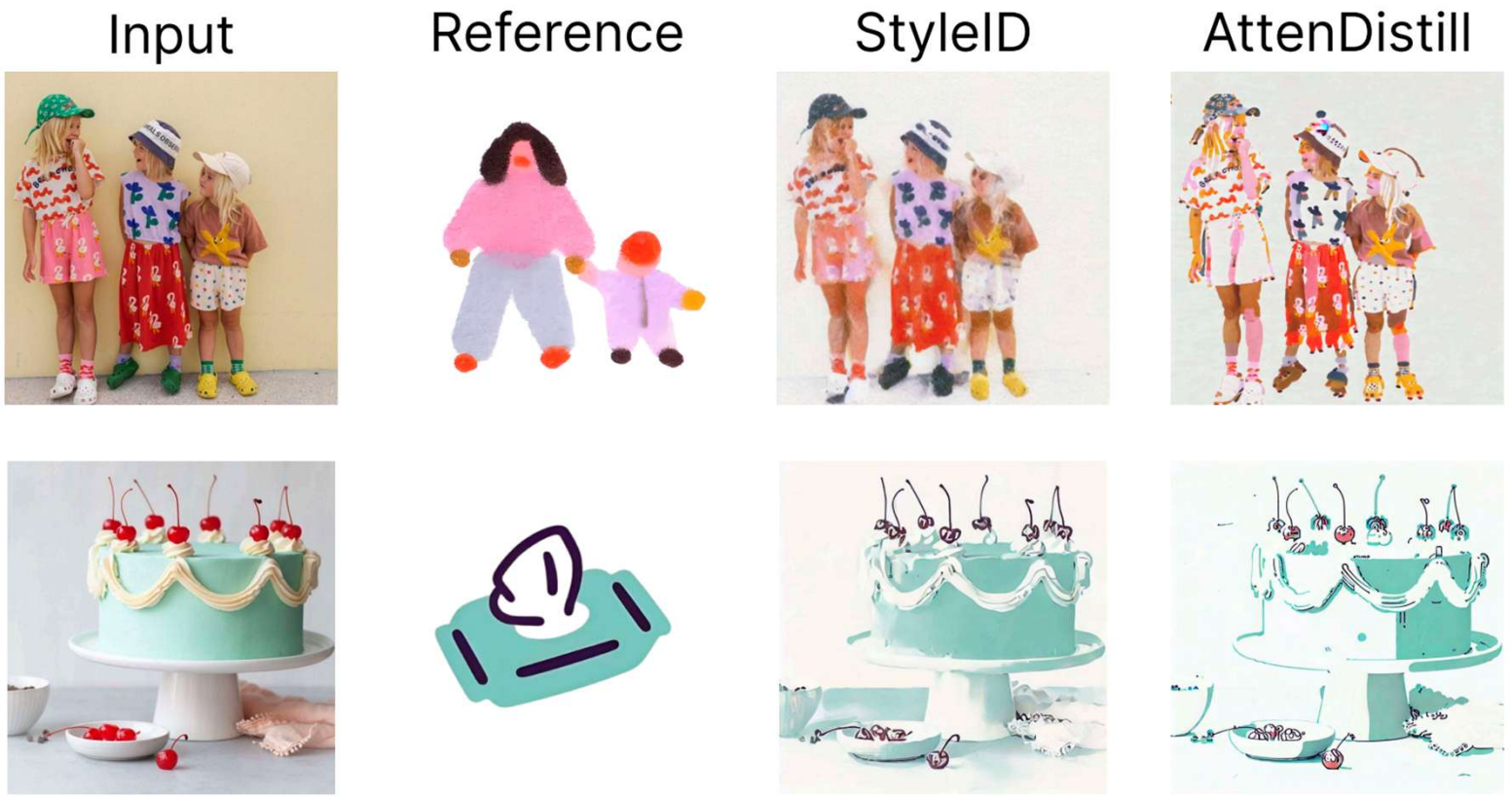
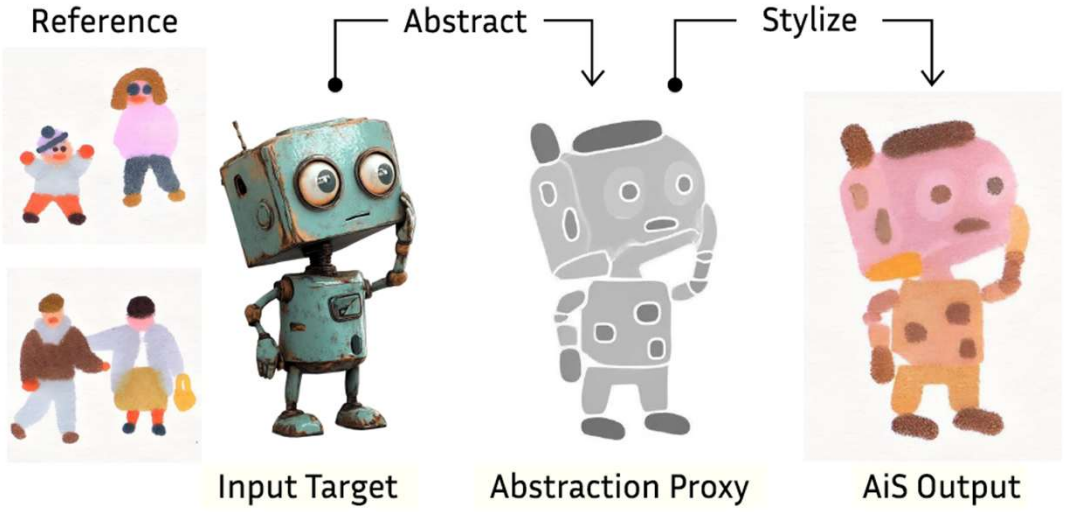
Setting



Overall Architecture: *Visual Analogy Transfer (VAT)*

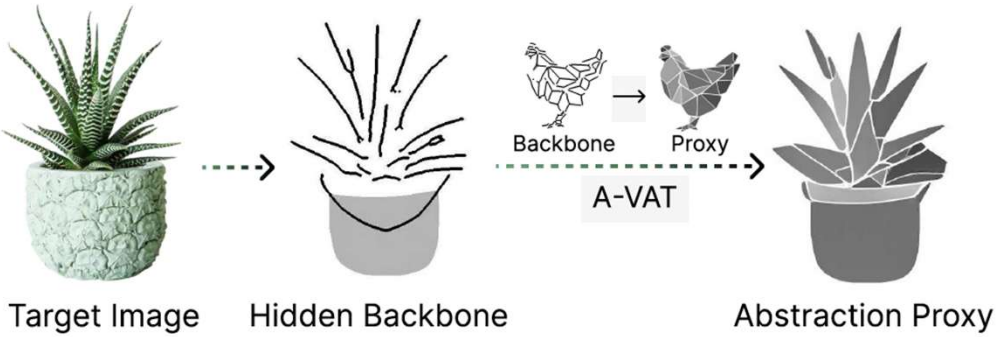


2 Stage generation for abstraction in Style

Stage I: Structural Abstraction

Stage II: Visual Stylization

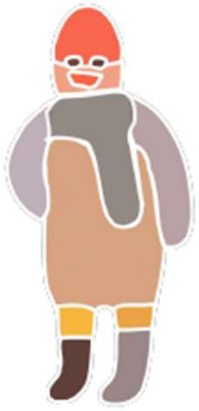
Stage I: Structural Abstraction



- **Work Directly in Image Space**
  - Step 1: Compute Hidden Backbone *with skeleton detection and area erosion*
  - Step 2: Generate Abstraction Proxy with *Abstraction VAT* (A-VAT)

Compute Hidden Backbone

Original Image



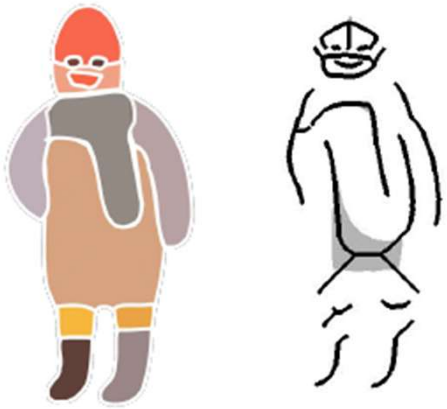
Simplified Flat-color Shapes

Original Image

Simplified Flat-color Shapes

Compute Hidden Backbone

Original Image

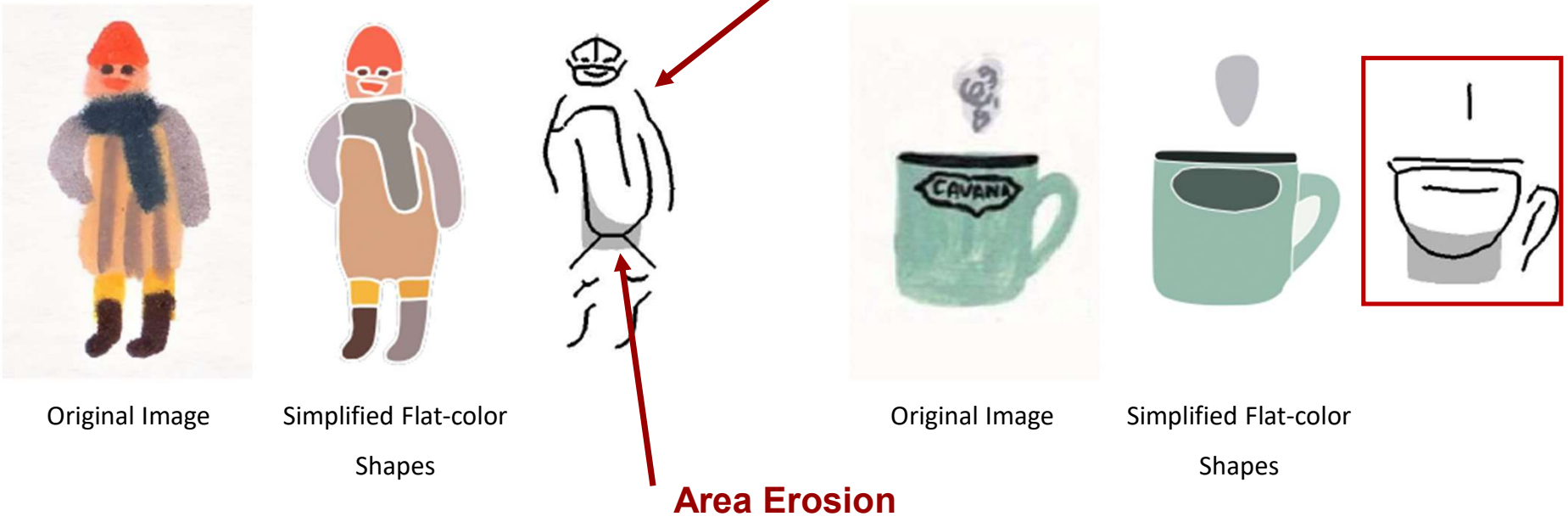


Simplified Flat-color Shapes

Original Image

Simplified Flat-color Shapes

Compute Hidden Backbone

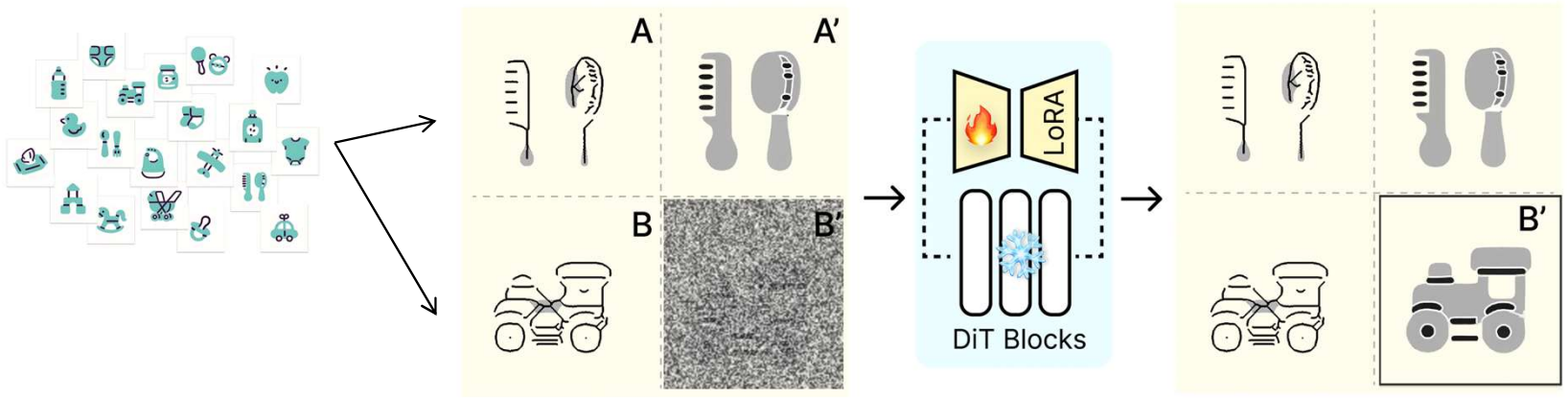


Compute Hidden Backbone

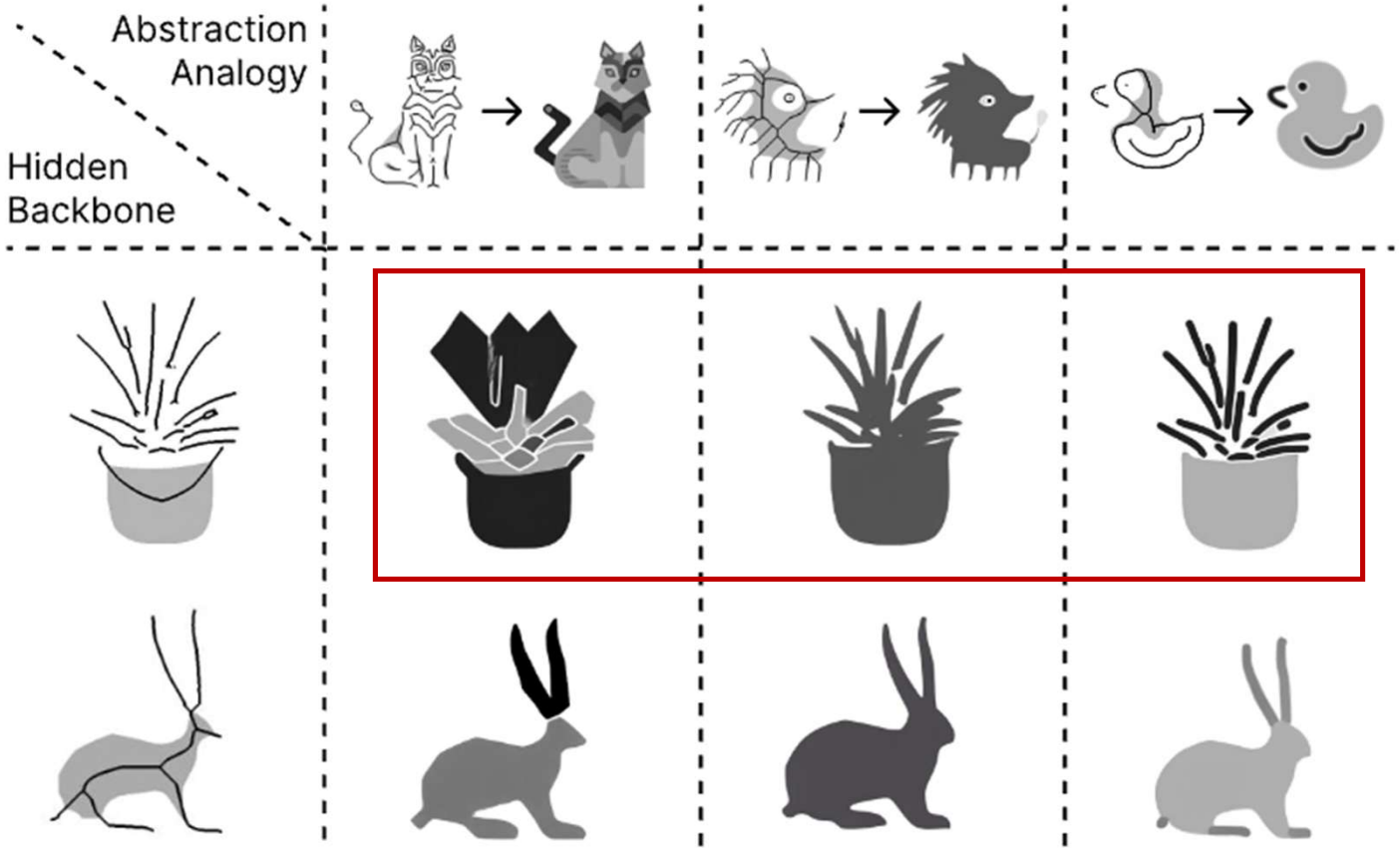
Training of A-VAT model

For each style,

- **LoRA** on DiT with **5 - 20 Samples**
- Training Target: 2 x 2 Grid with one Proxy to be Predicted



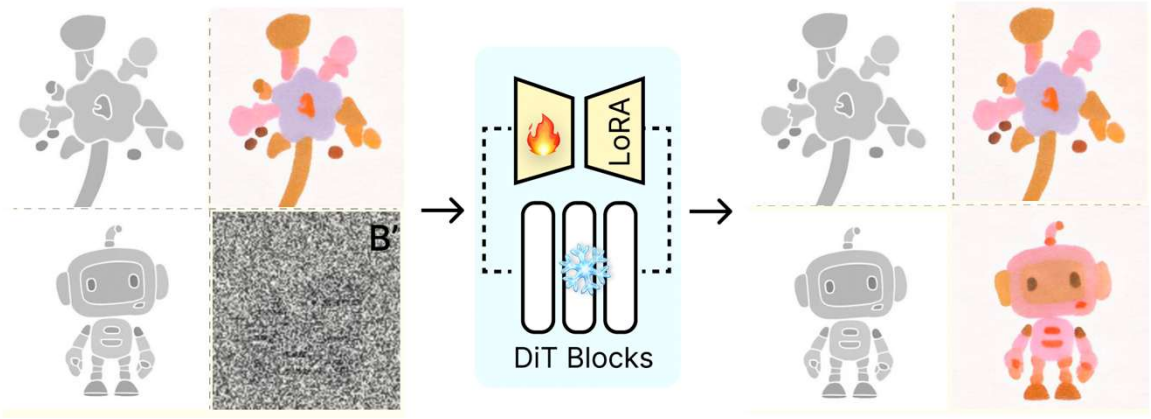
Same Hidden Backbone, Different Style Proxies



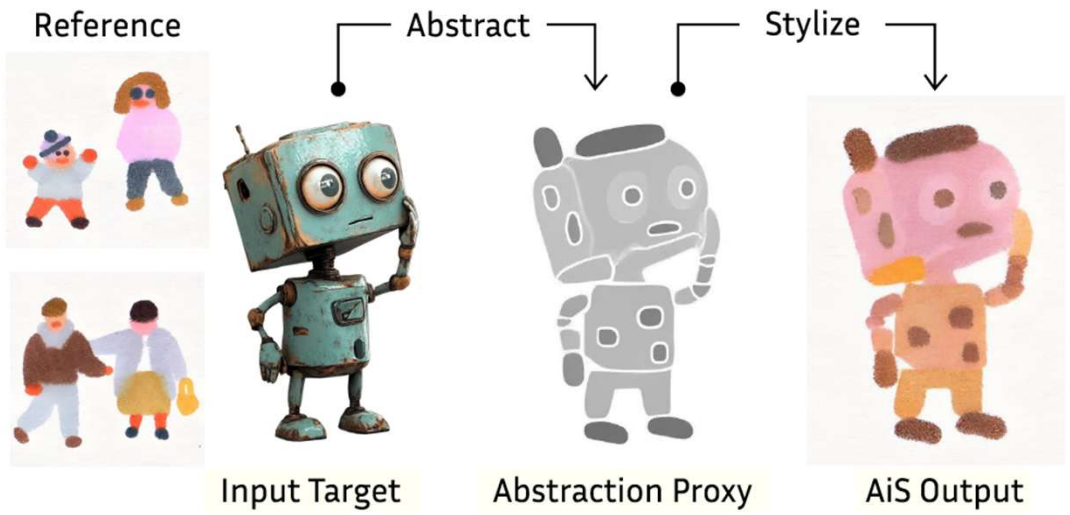
Training of S-VAT model

For each style,

- **LoRA** on DiT with **5 - 20 Samples**
- Training Target: 2 x 2 Grid with one Final Result to be Predicted



Overall



2 Stage generation for abstraction in Style

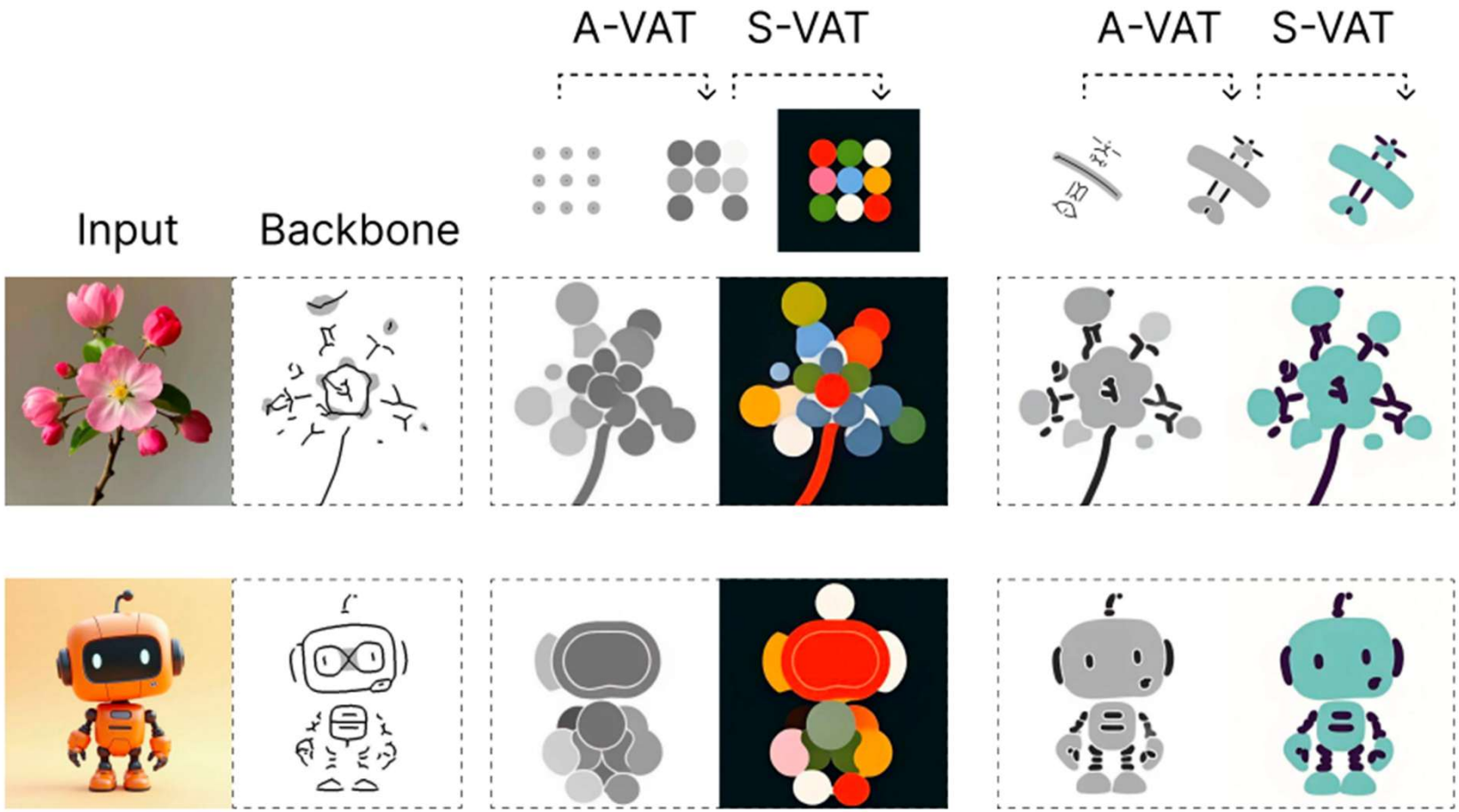
Stage I: Structural Abstraction

Stage II: Visual Stylization

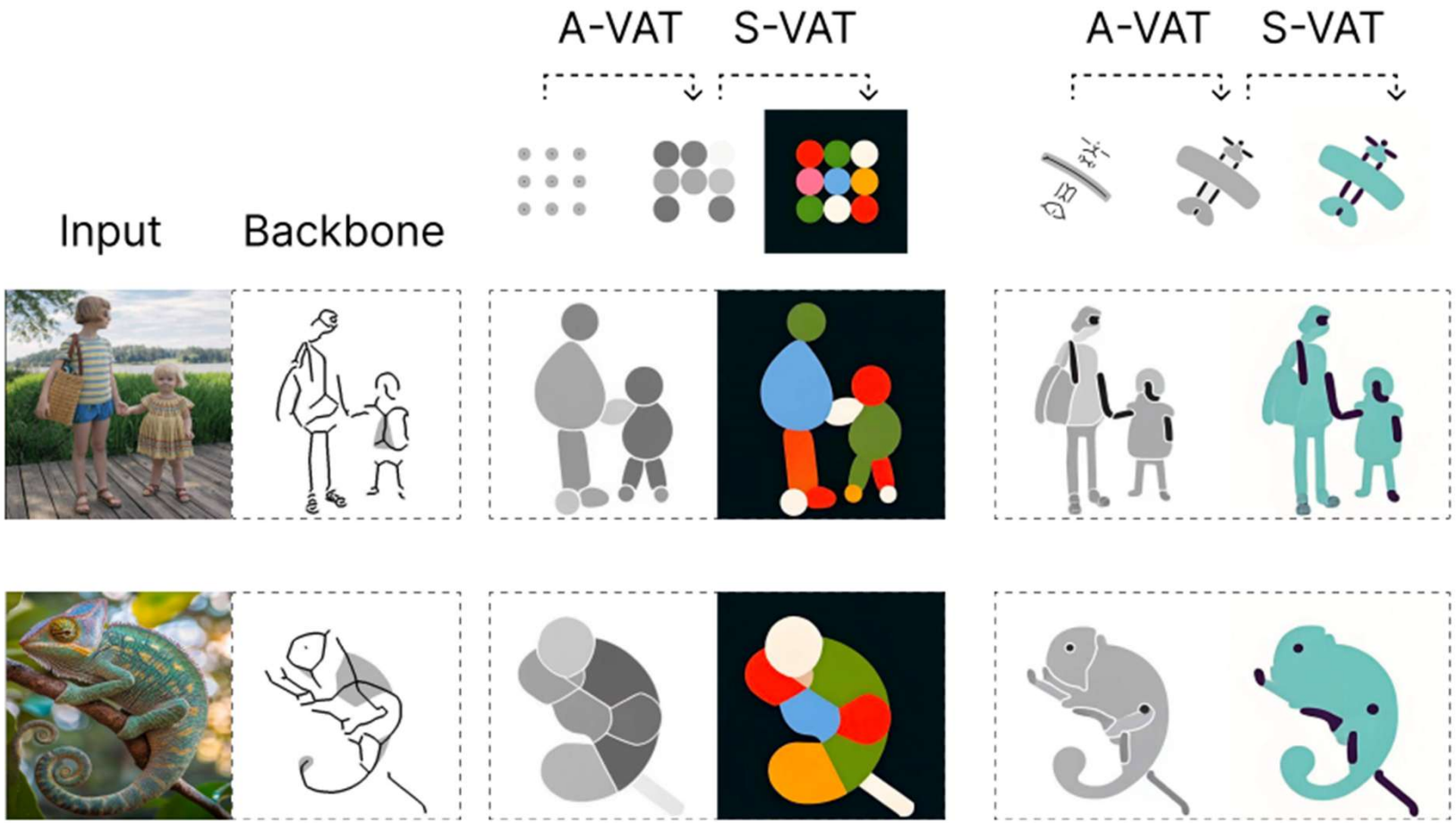
Setup

- **Backbone:** FLUX.1-Fill-dev
- **Resolutions:** 1024×1024 (2×2 analogy grid)
- **LoRA:** rank 16, batch 1, lr 1e-4, 1,000 steps
- **Training Pipeline:** A-VAT + S-VAT, two separate LoRAs; no joint training
- **Compute:** 1×A100 80GB / H100 80GB ***~10min***

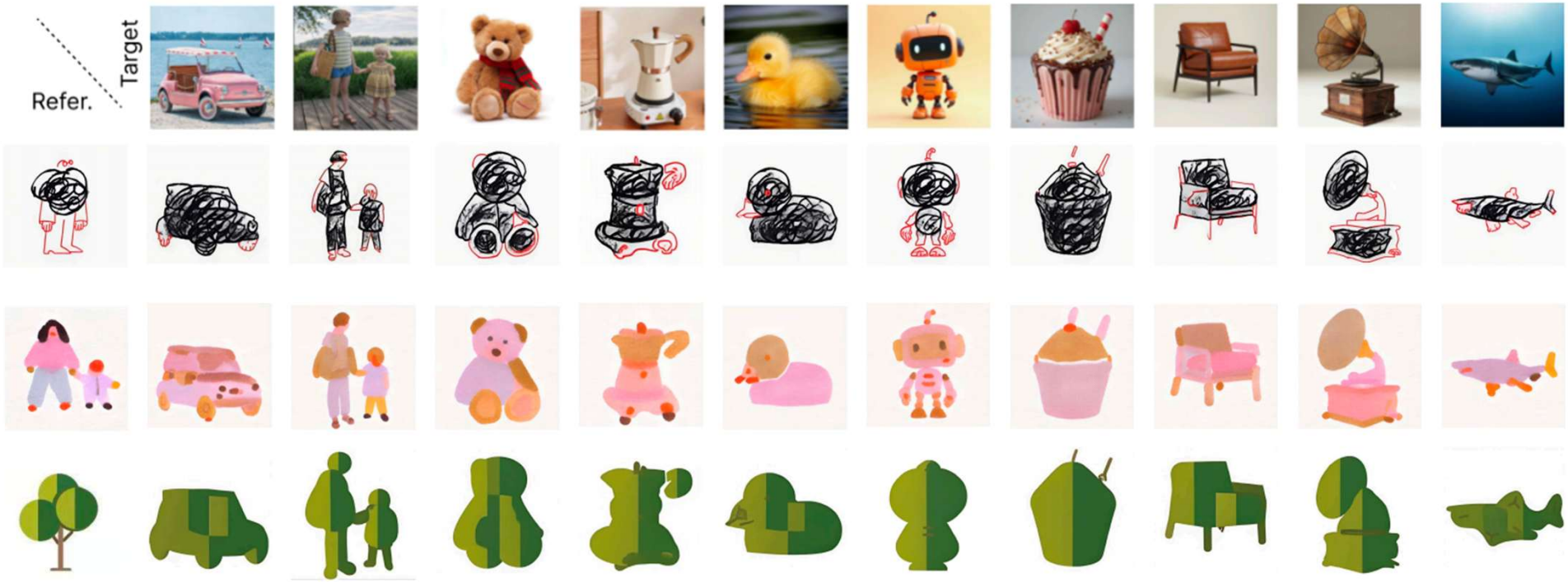
Experiments



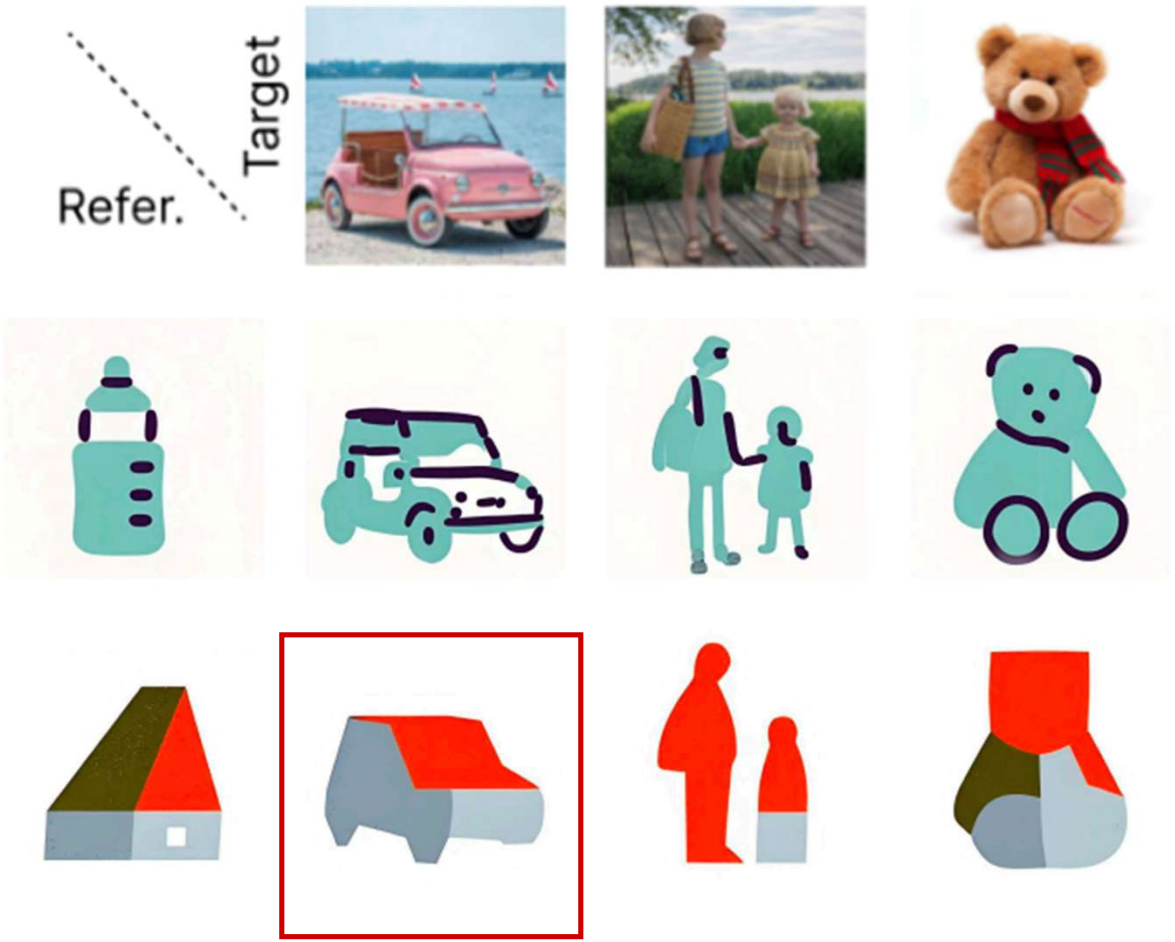
Experiments



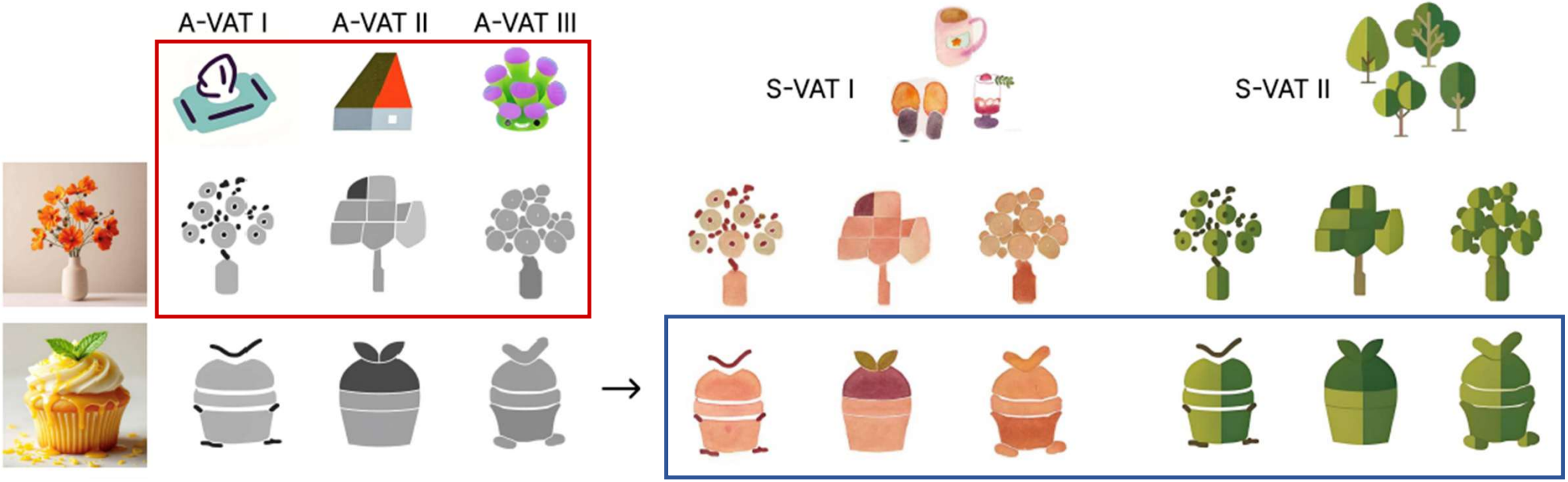
Experiments



Experiments



Method



Experiments

Comparison

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Comparison

Input

Reference

StyleID

AttenDistill

StyleAlign

B-LoRA

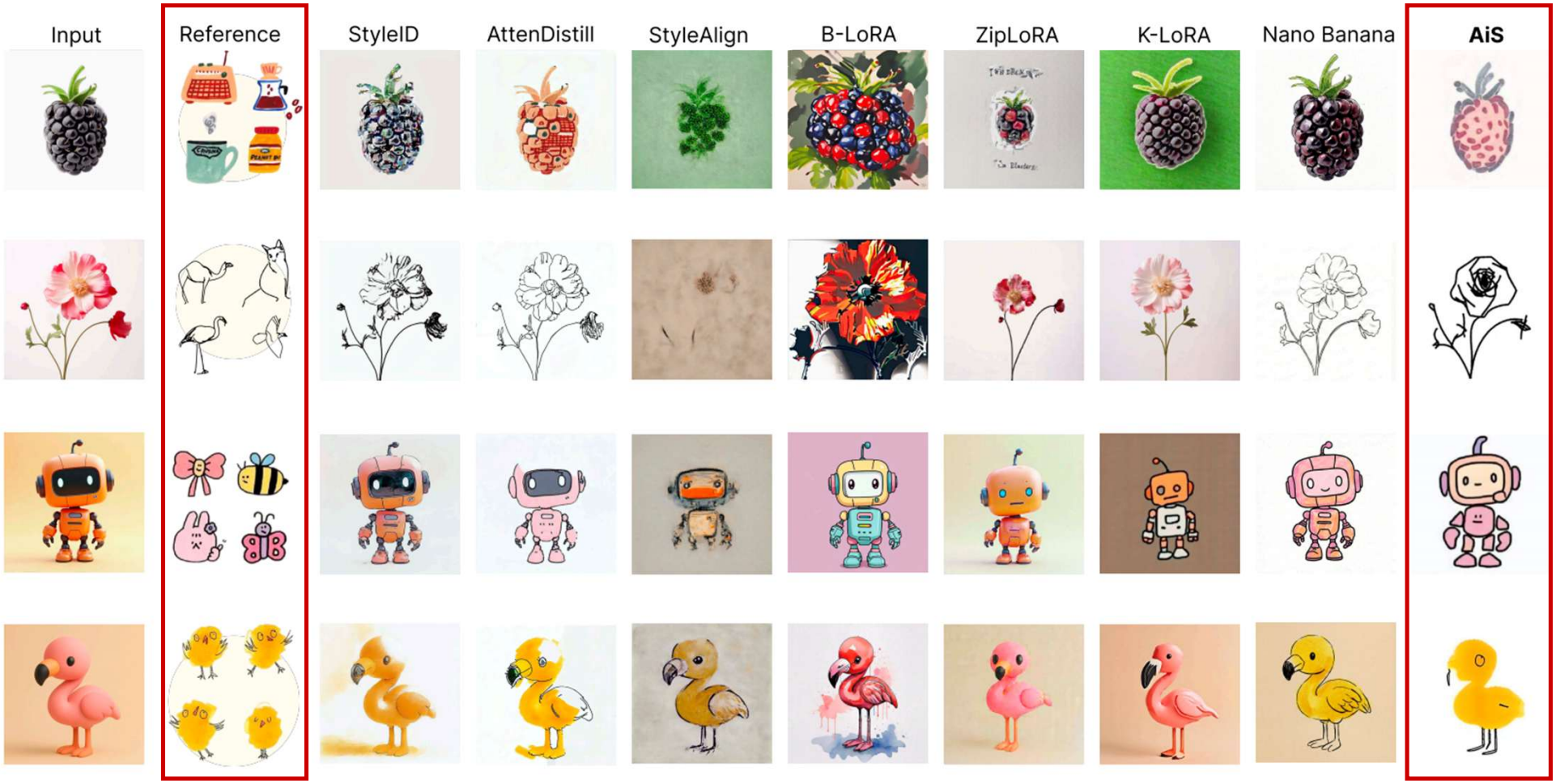
ZipLoRA

K-LoRA

Nano Banana

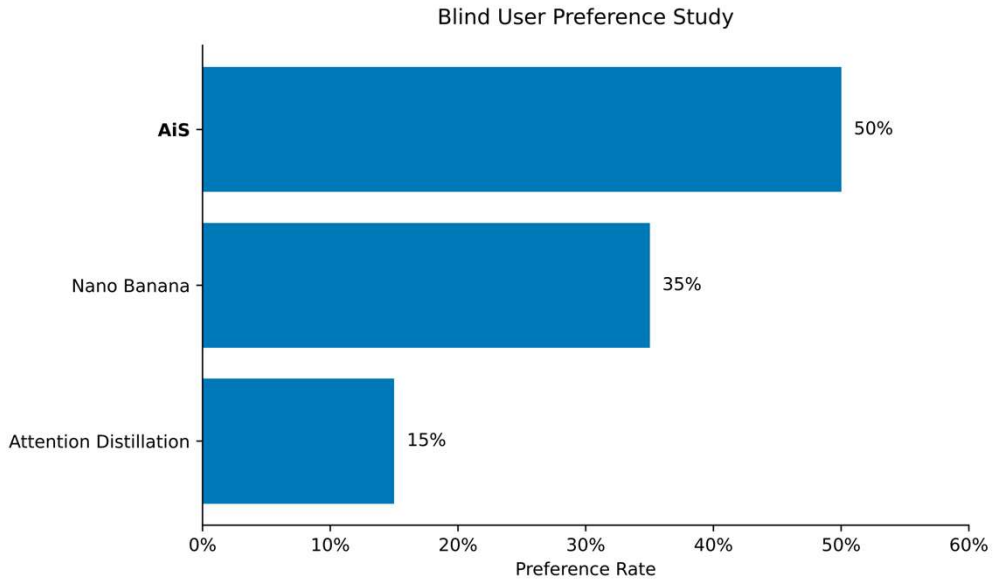
AiS

Experiments

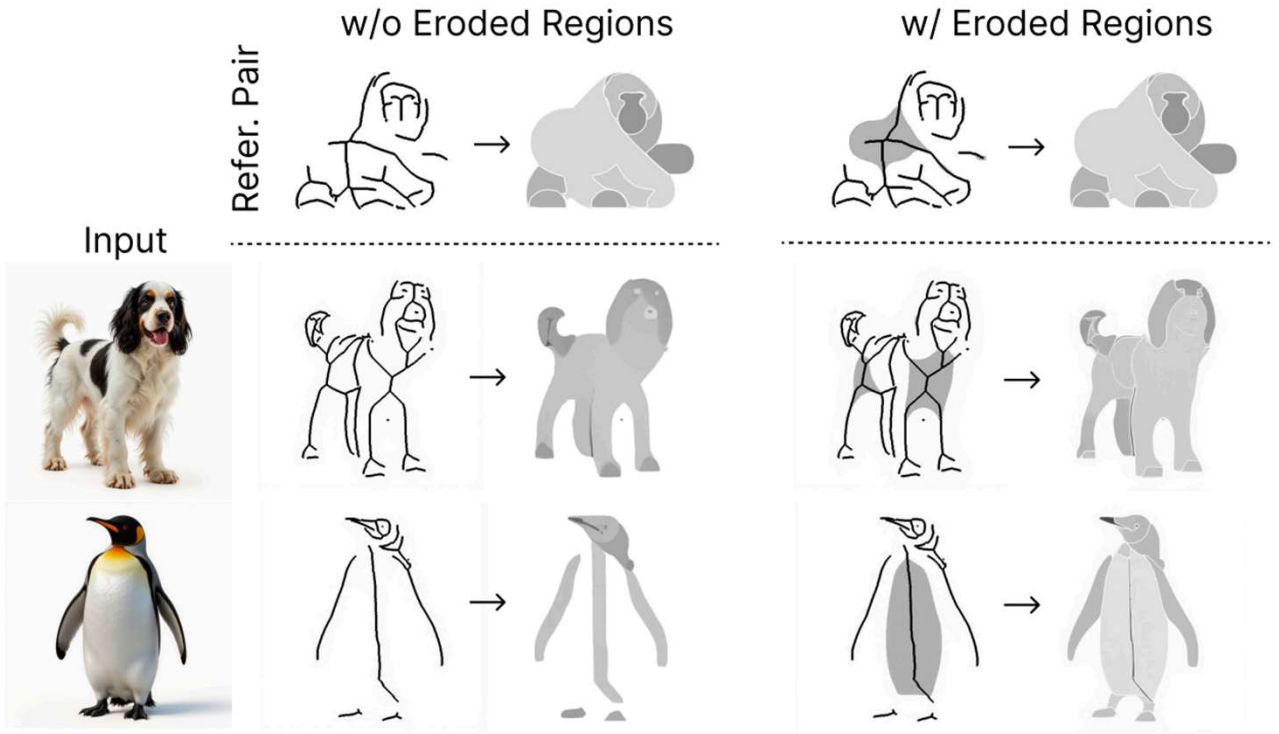


Quantitative Comparison

Metrics	StyleID	A.D.	StyleA.	B-LoRA	ZipLoRA	K-LoRA	Nano Ban.	**AiS (Ours)**
CSD	0.60	0.64	0.58	0.59	0.62	0.58	0.63	**0.72** ↑
LPIPS	0.53	0.53	0.70	0.73	0.56	0.65	0.56	**0.47** ↓

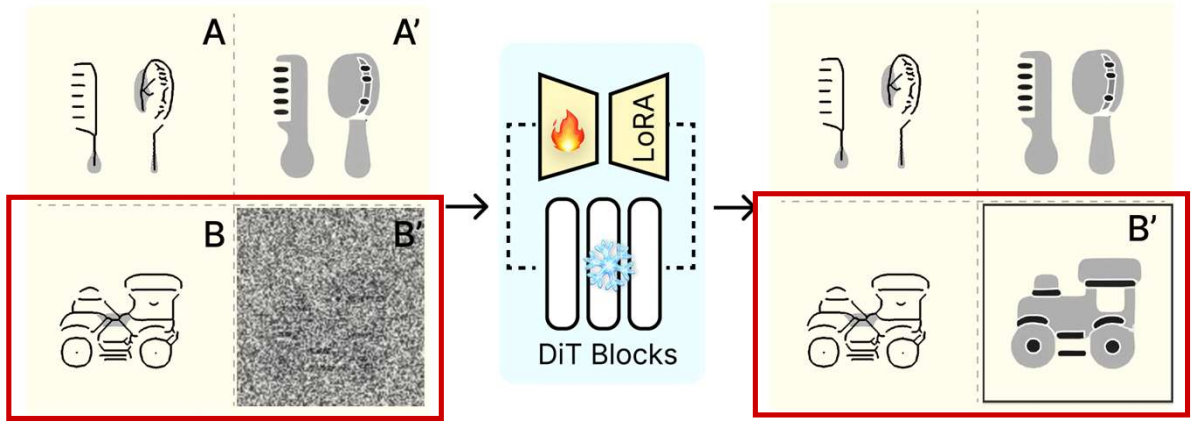


Ablation Study



w/o the eroded-region, the hidden backbone becomes overly sparse

Ablation Study



This is a four-panel image on a uniform solid-color background, hand-drawn in style, with the subjects highlighted and kept as simple as possible:

[TOP-LEFT]: Image of the structure of a subject.
[TOP-RIGHT]: An edited version of the [TOP-LEFT] image, transformed to *[styvec]* style.
[BOTTOM-LEFT]: Skeleton or structural image of another subject.
[BOTTOM-RIGHT]: An edited version of the [BOTTOM-LEFT] image, applying the same style transformation as used in [TOP-RIGHT].

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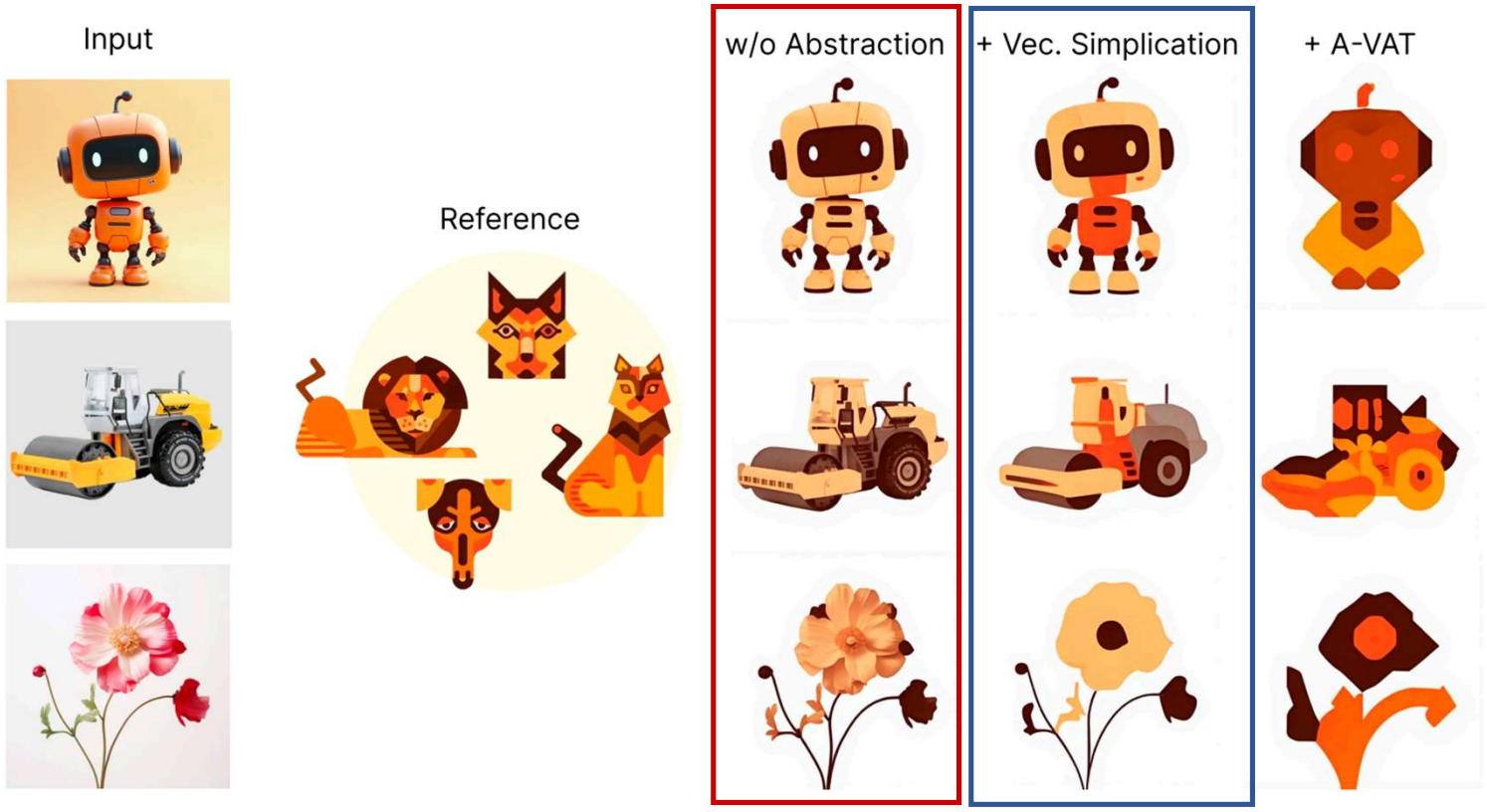
Ablation Study



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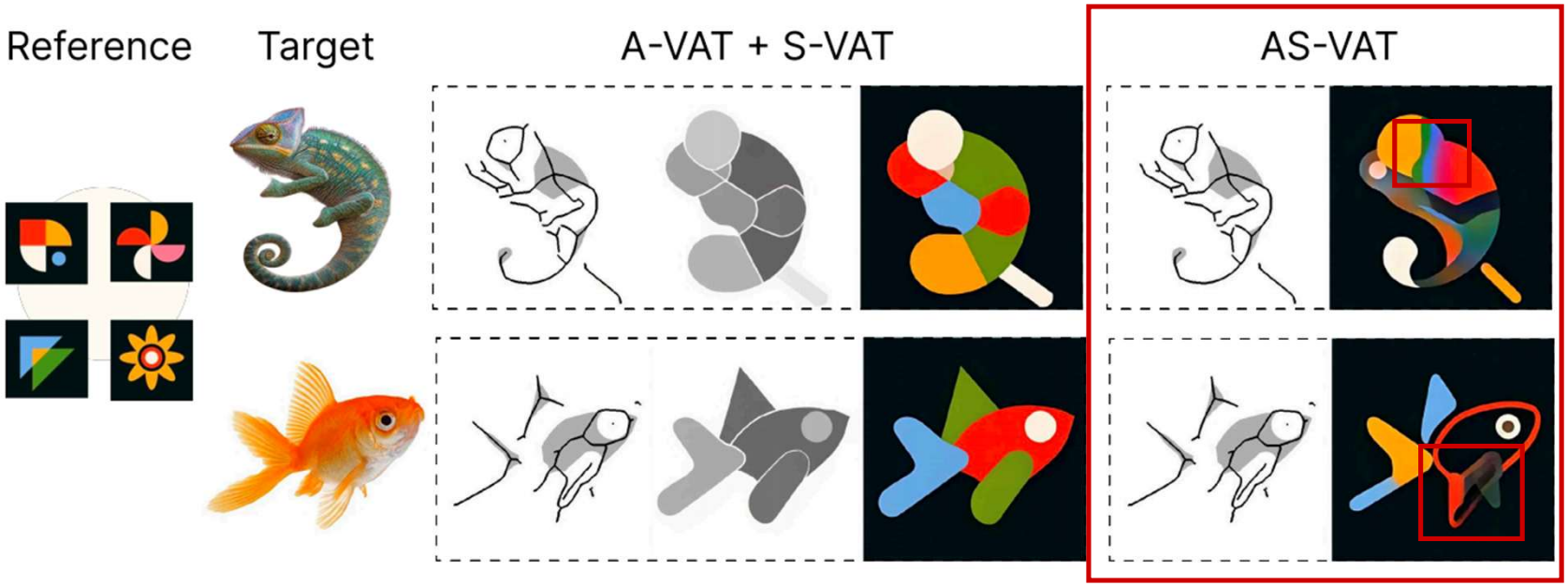

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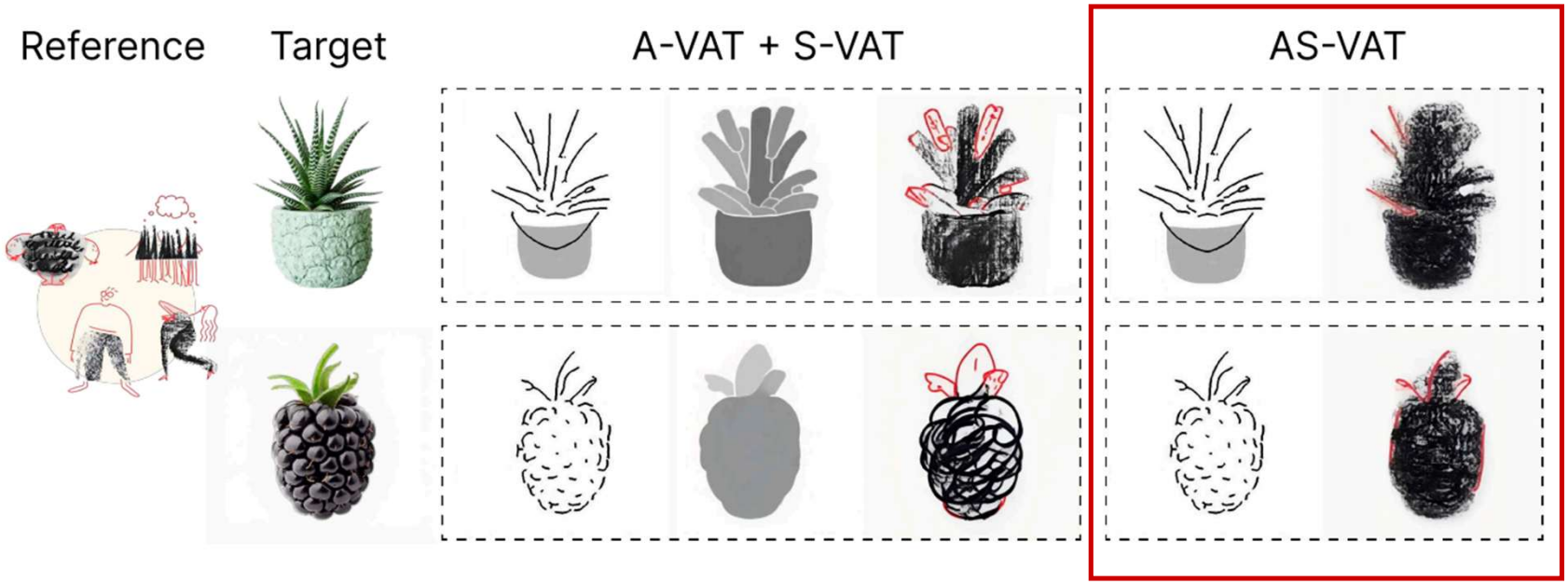

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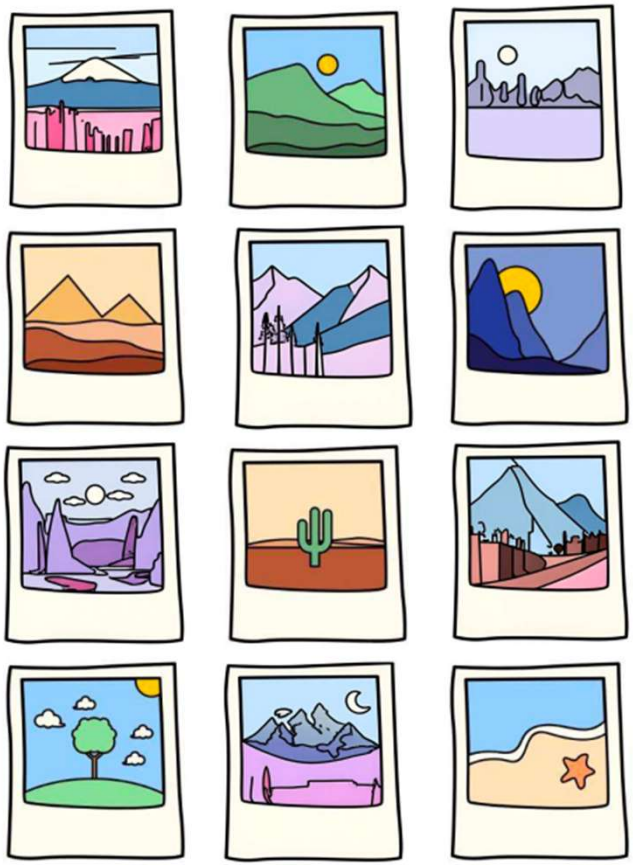
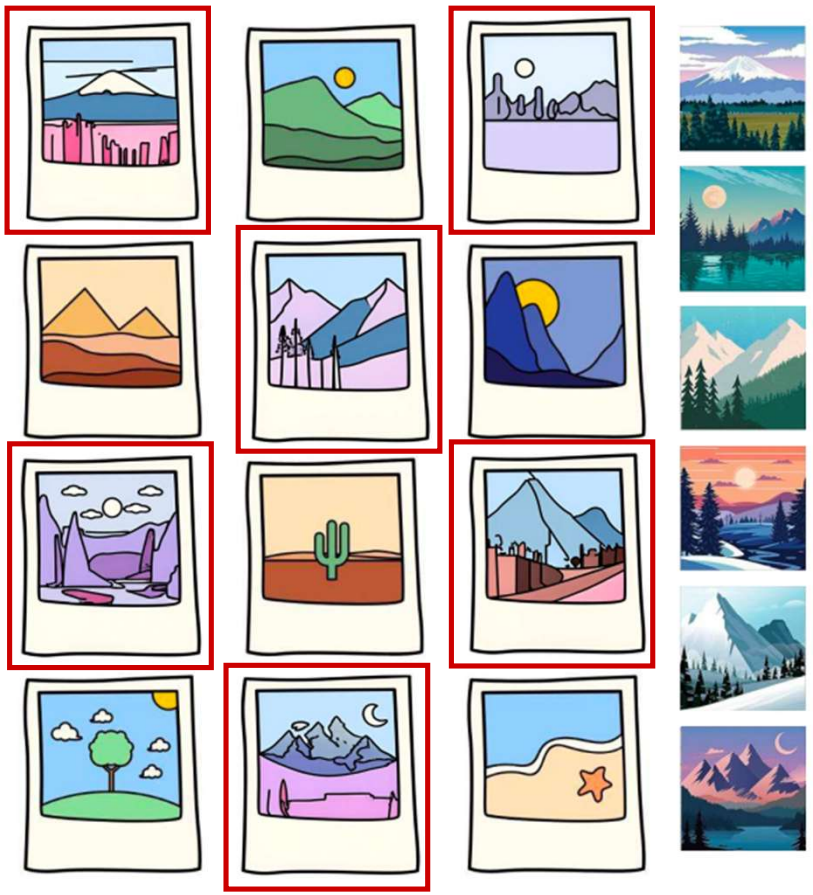
Let’s Guess



Experiments

Let’s Guess



Experiments

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Let's Guess

Experiments

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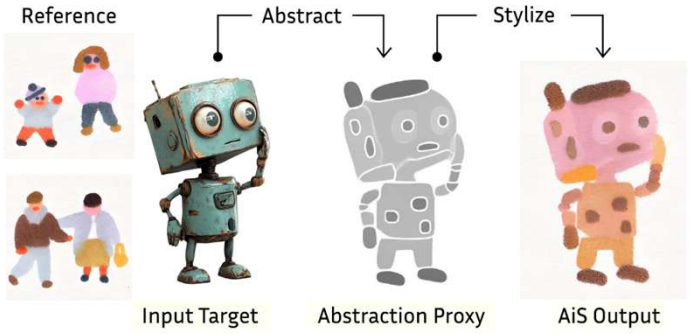
Let's Guess

Conclusion

- two-stage framework, decouples structural abstraction and visual stylization
- addressing limitation of that rigidly preserve input geometry
- without requiring explicit geometric supervision or manual annotations
- supporting combination of different structural abstractions and visual styles



Thanks for listening!

Presenter: Jiangyue Zeng
2026.04.19