SIGGRAPH ASIA 2025 HONG KONG 香港

Conference	15 – 18 December 2025
Exhibition	16 – 18 December 2025
Venue	Hong Kong Convention and Exhibition Centre

B4M: Breaking Low Rank Adapter for Making Content-Style Customization

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SIGGRAPH ASIA 2025 HONG KONG 香港

B4M: Breaking Low-Rank Adapter for Making Content-Style Customization

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Institutes of Computing Technology, Chinese Academy of Sciences
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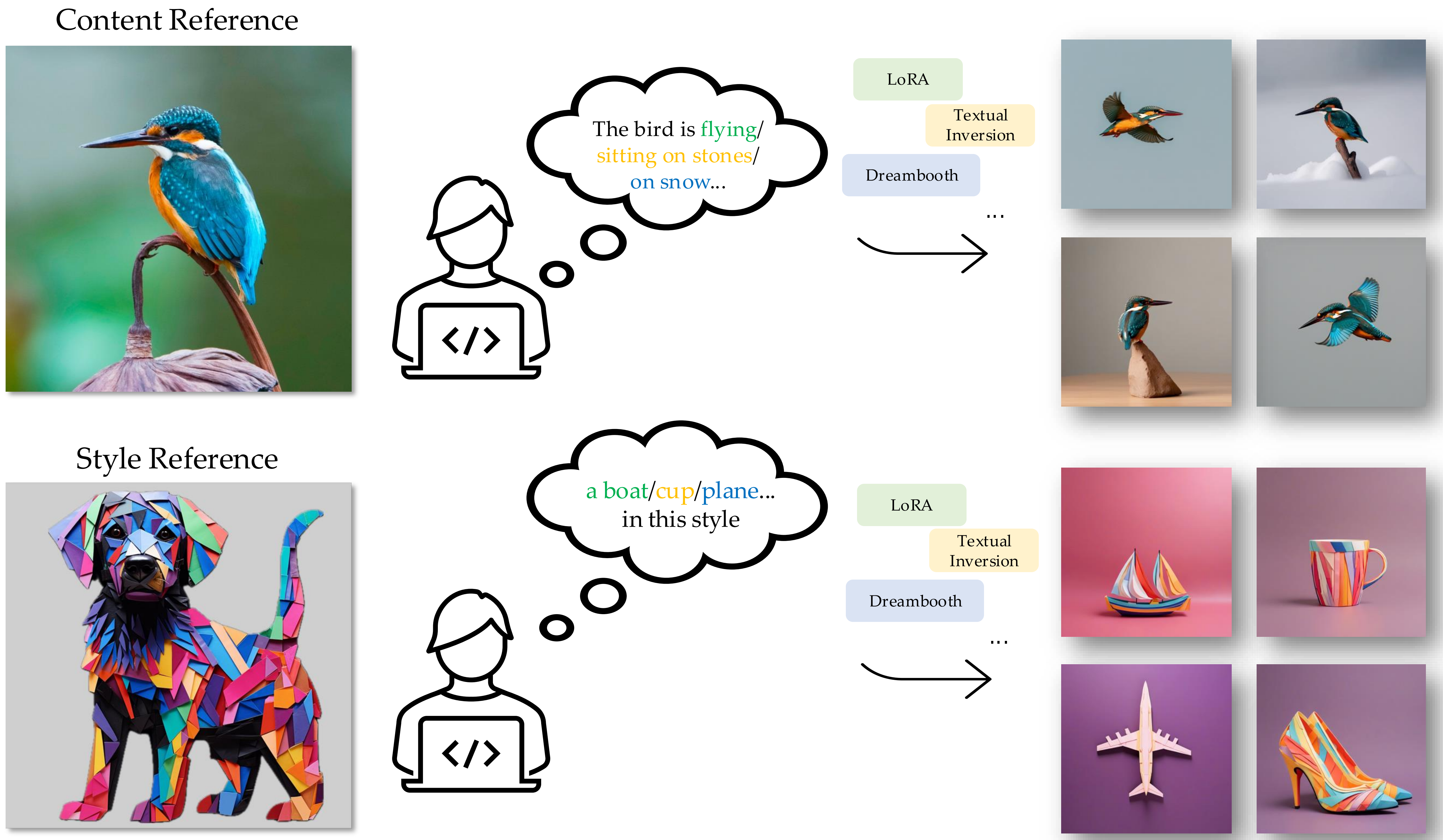
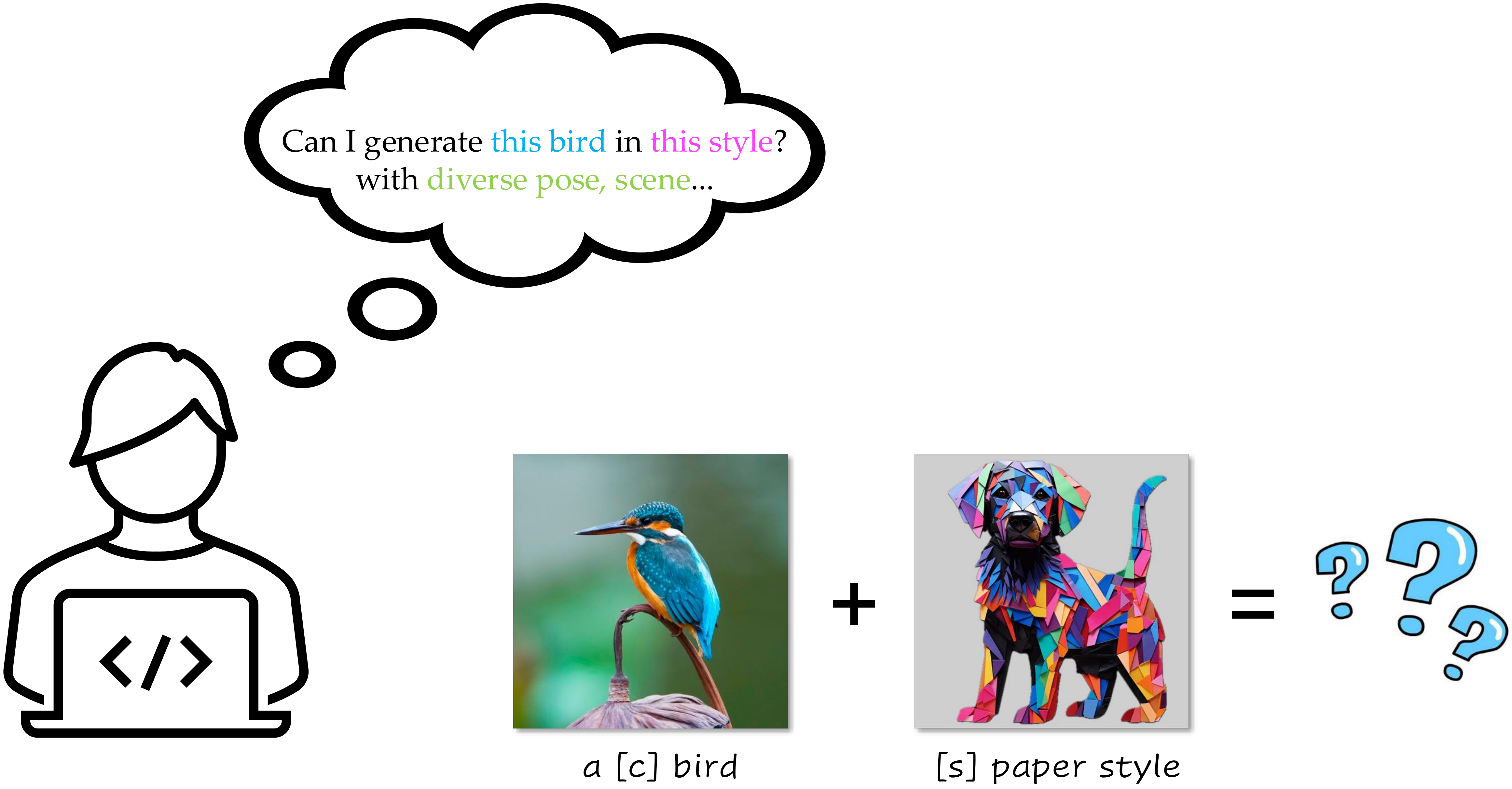
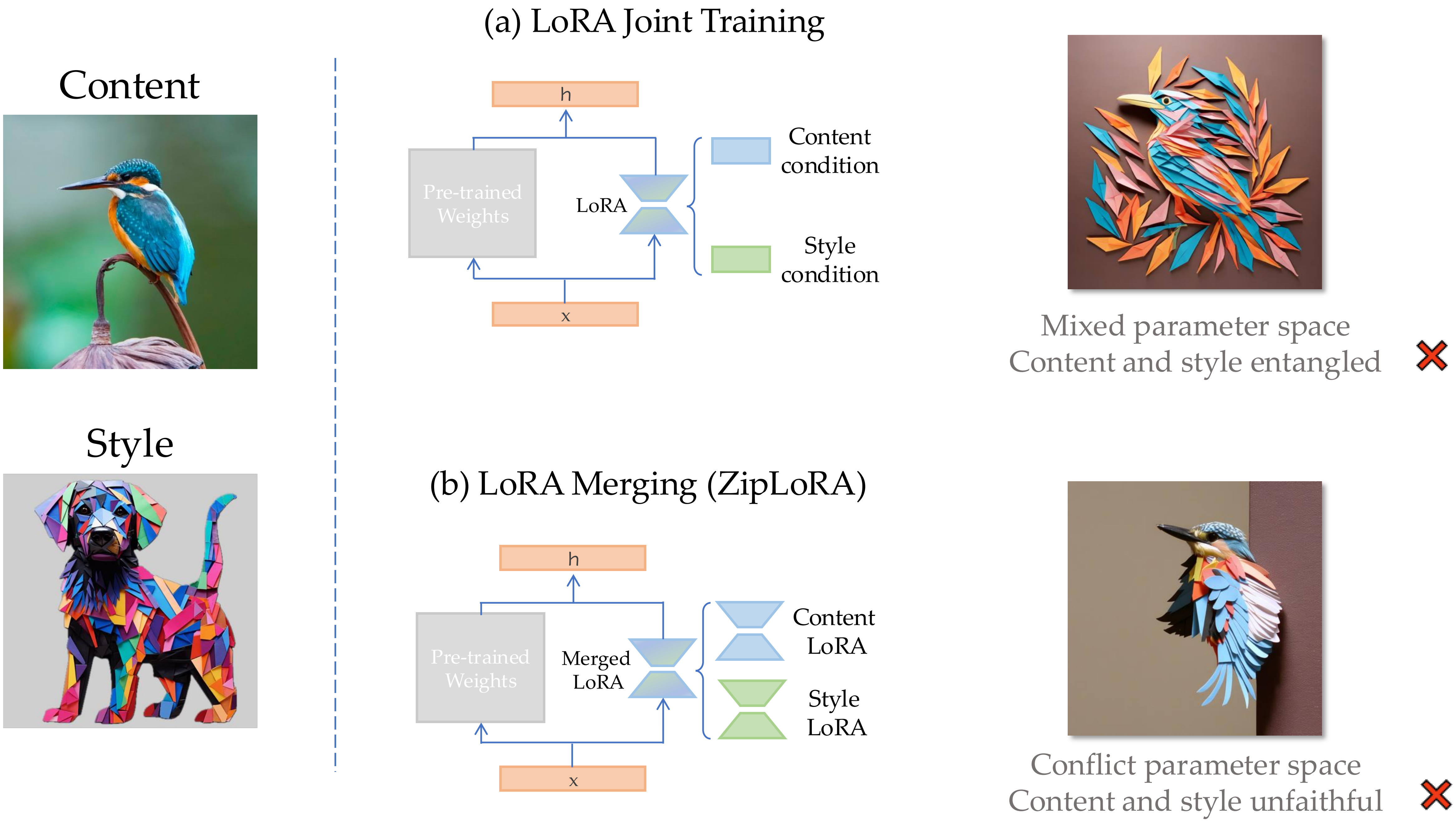
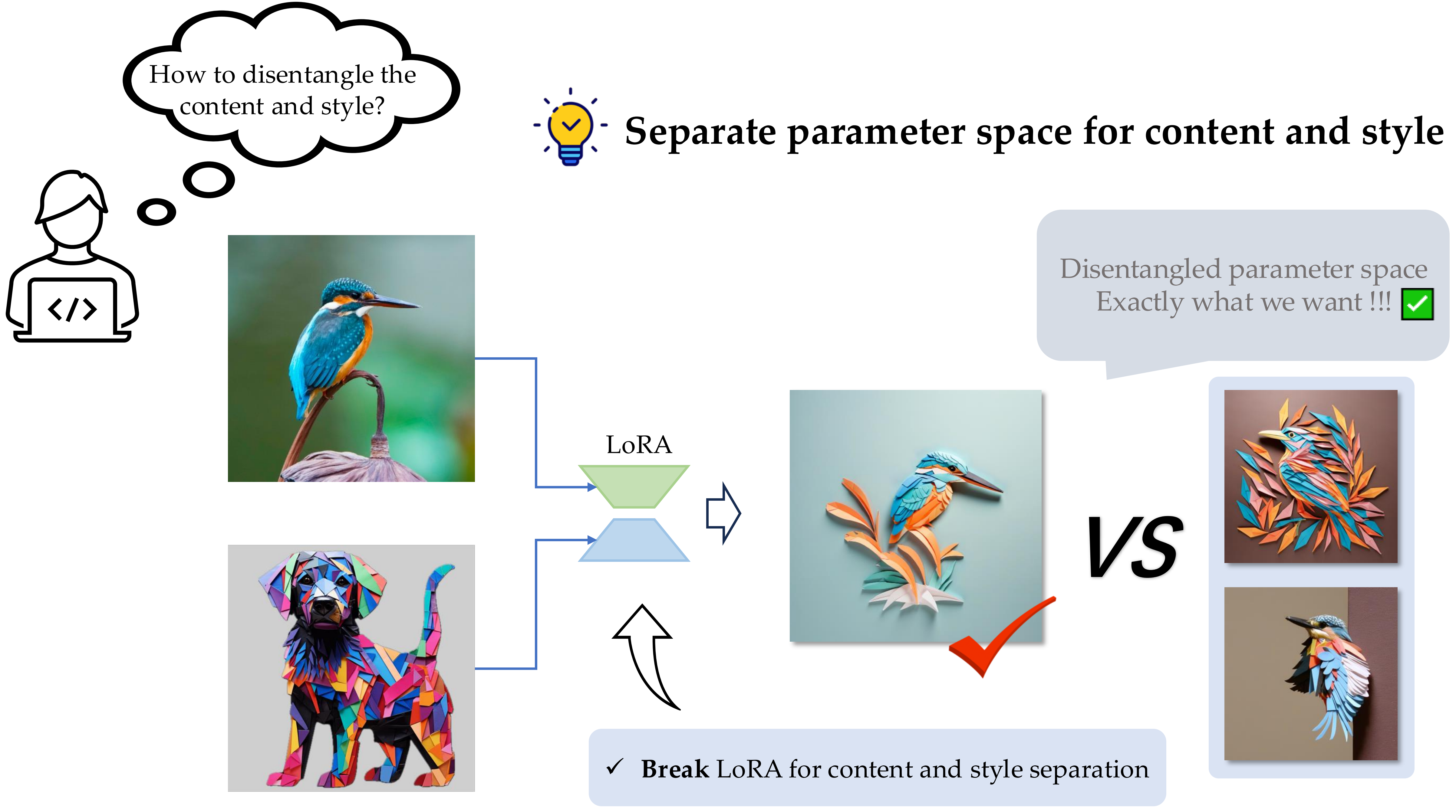
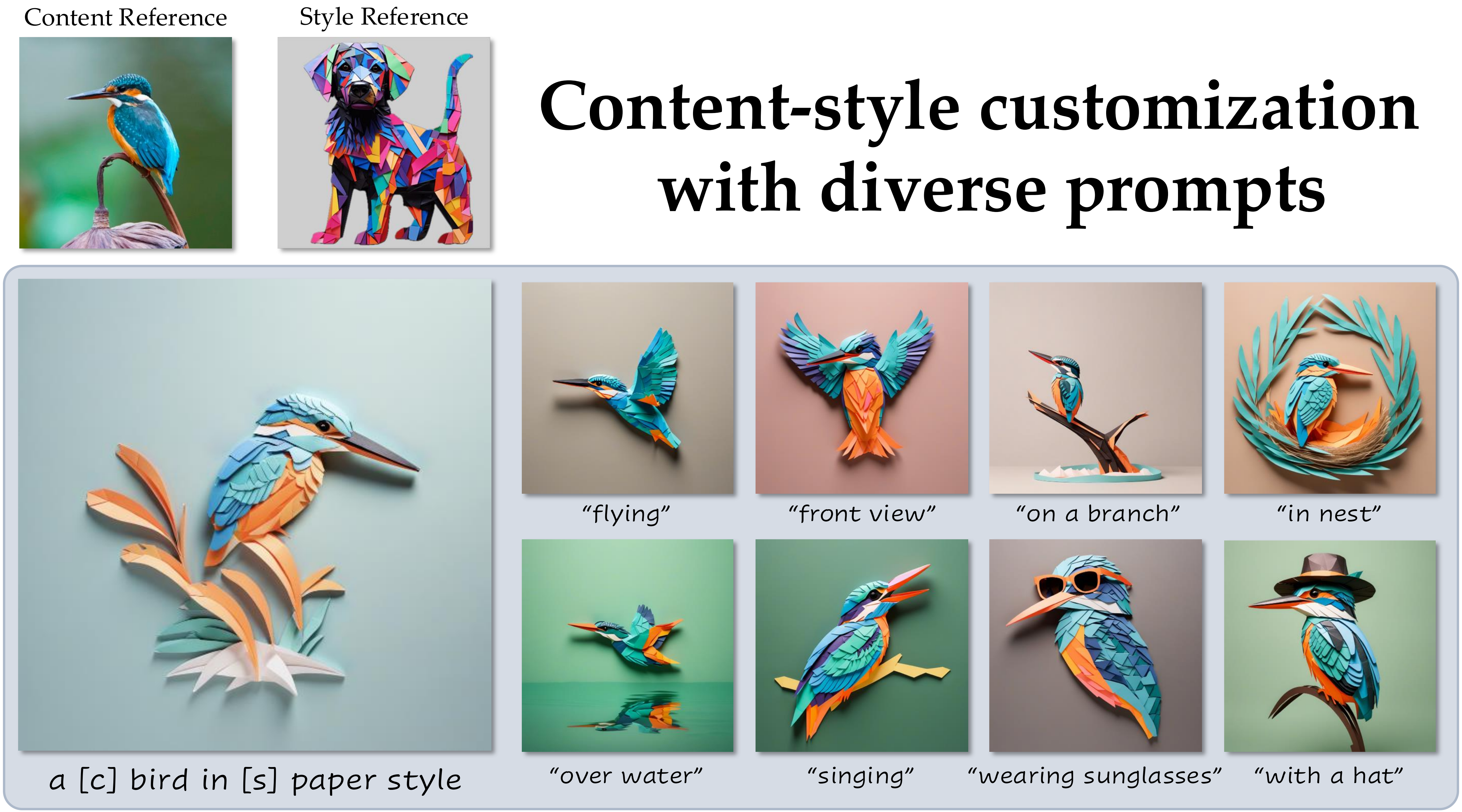

Content Reference
The bird is flying/
sitting on stones/
on snow...
LoRA
Textual Inversion
Dreambooth
...
Style Reference
a boat/cup/plane...
in this style
LoRA
Textual Inversion
Dreambooth
...


Can I generate this bird in this style?
with diverse pose, scene...
a [c] bird
[s] paper style


Content
Style
(a) LoRA Joint Training
h
Pre-trained Weights
LoRA
x
Content condition
Style condition
Mixed parameter space
Content and style entangled
(b) LoRA Merging (ZipLoRA)
h
Pre-trained Weights
Merged LoRA
x
Content LoRA
Style LoRA
Conflict parameter space
Content and style unfaithful

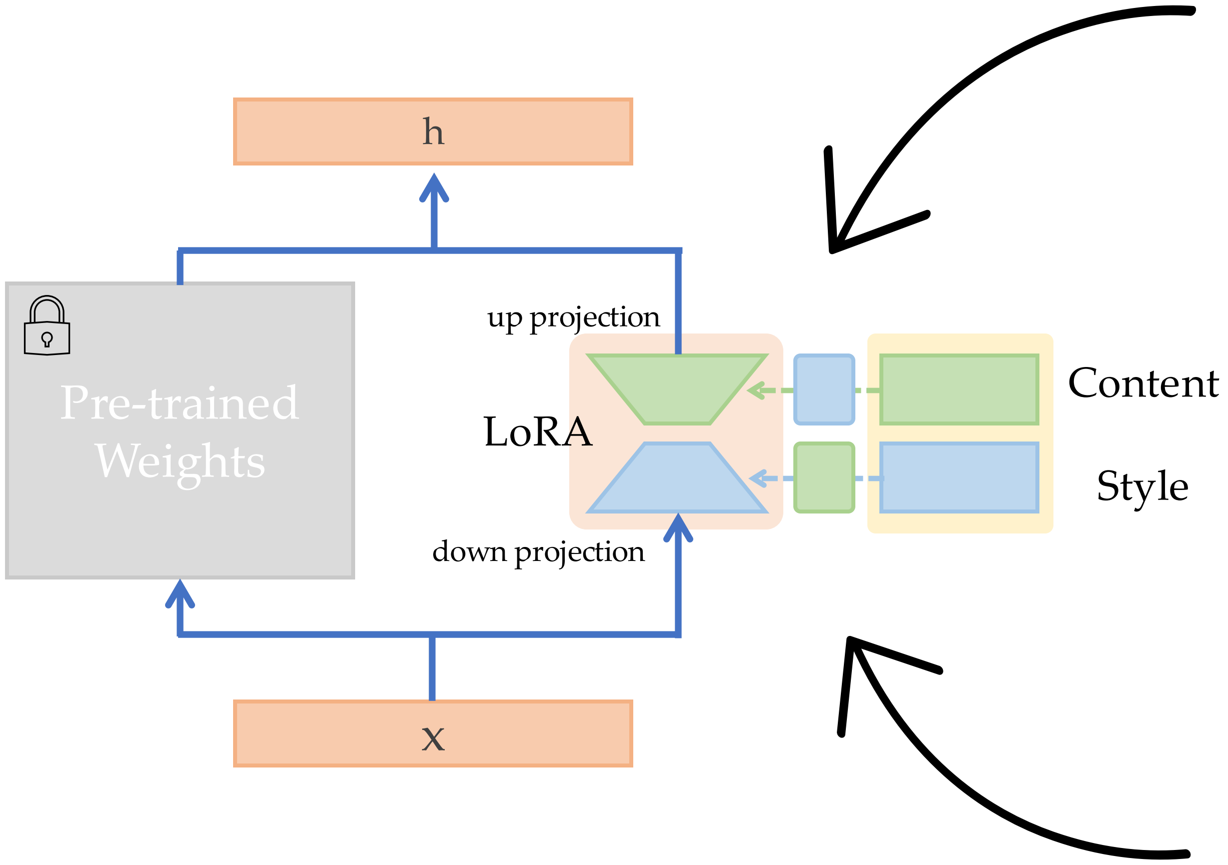

How to disentangle the content and style?
Separate parameter space for content and style
Disentangled parameter space
Exactly what we want !!!
LoRA
VS
✓ Break LoRA for content and style separation



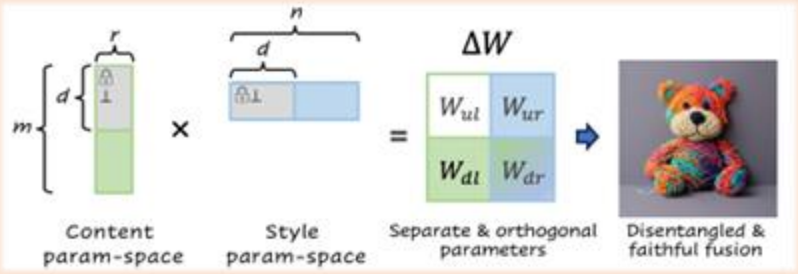
Content Reference
Style Reference
Content-style customization with diverse prompts
a [c] bird in [s] paper style
“flying”
“front view”
“on a branch”
“in nest”
“over water”
“singing”
“wearing sunglasses”
“with a hat”

Method

Overview



Partly Learnable Projection



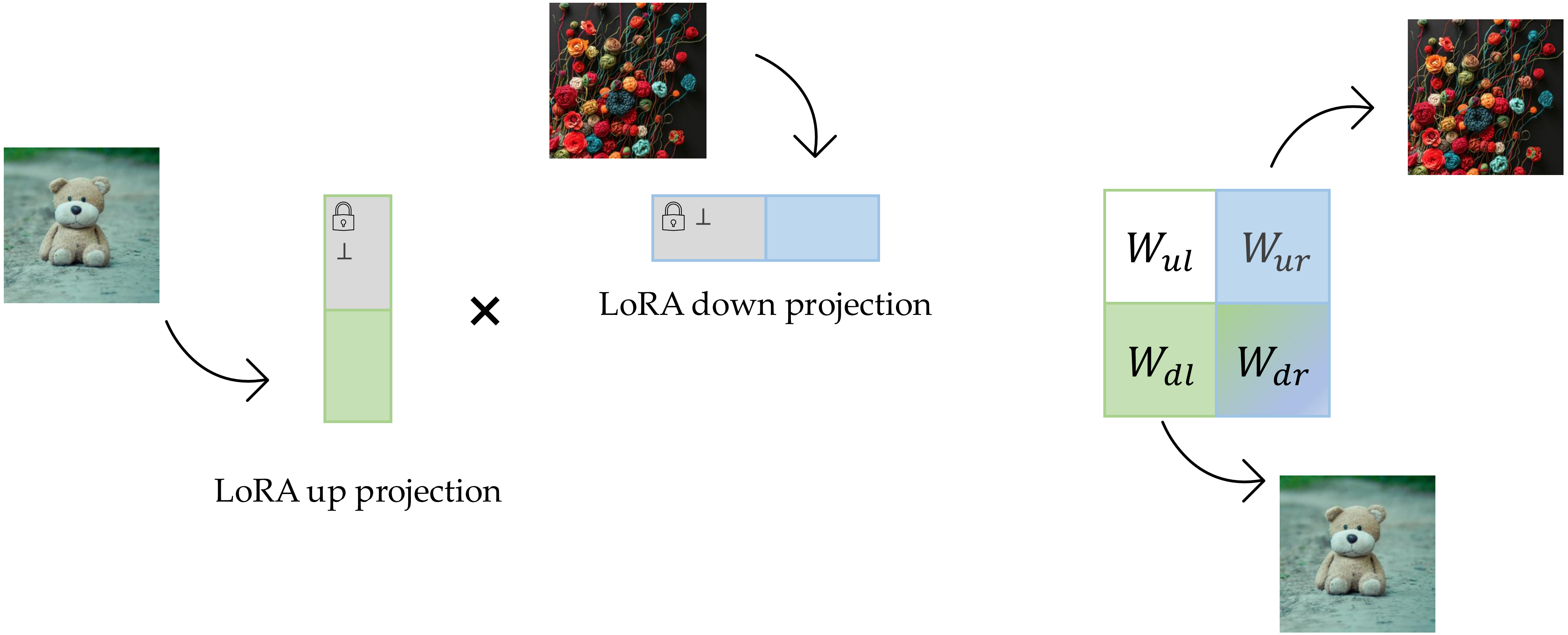
Multi-Correspondence Projection

Riemannian Precondition

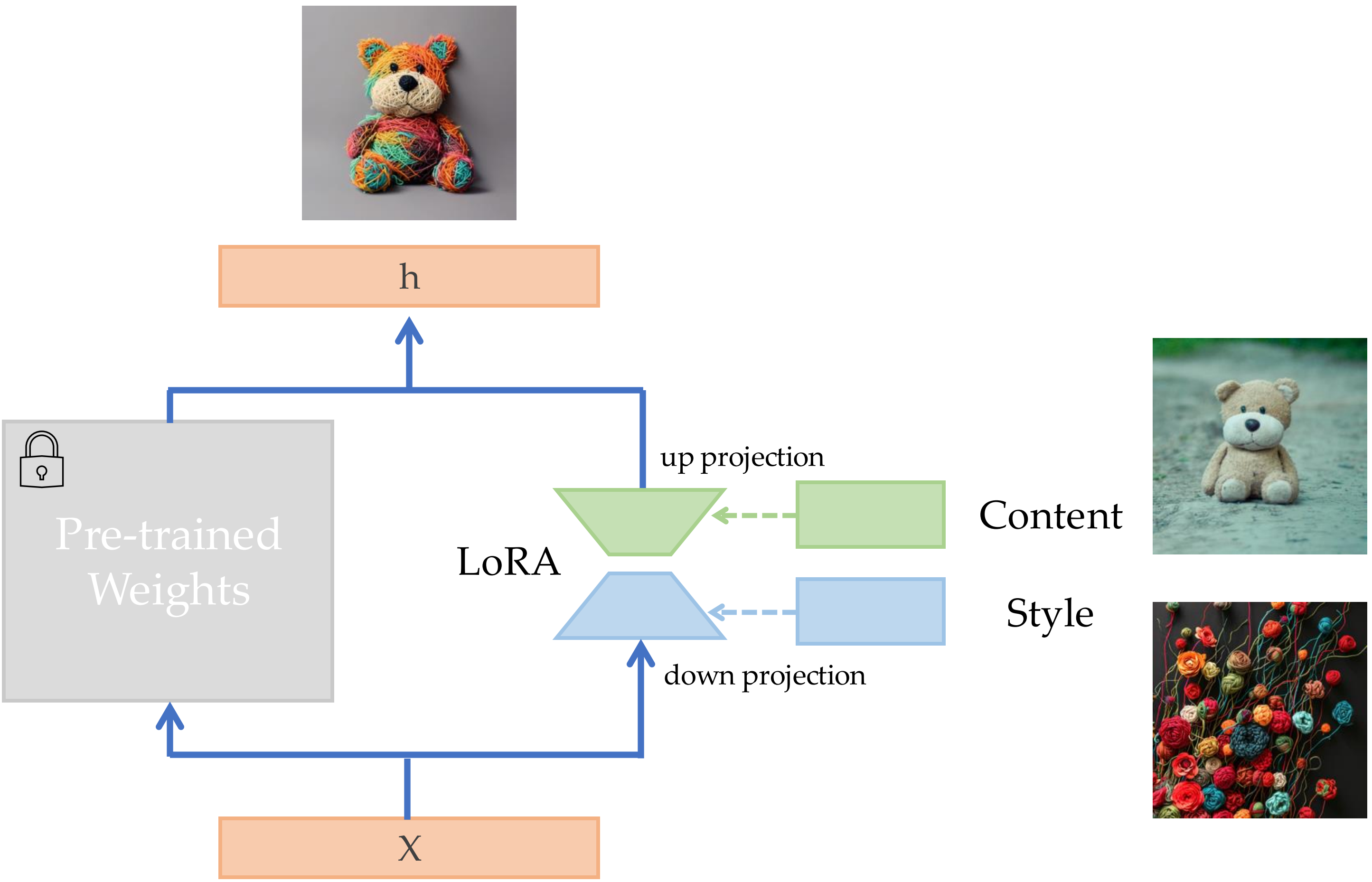
$$M_{t+1} = M_t - \alpha(N_t^T N_t)^{-1}(\nabla_{M_t}\mathcal{L}),$$

$$N_{t+1} = N_t - \alpha(\nabla_{N_t}\mathcal{L})(M_t M_t^T)^{-1},$$

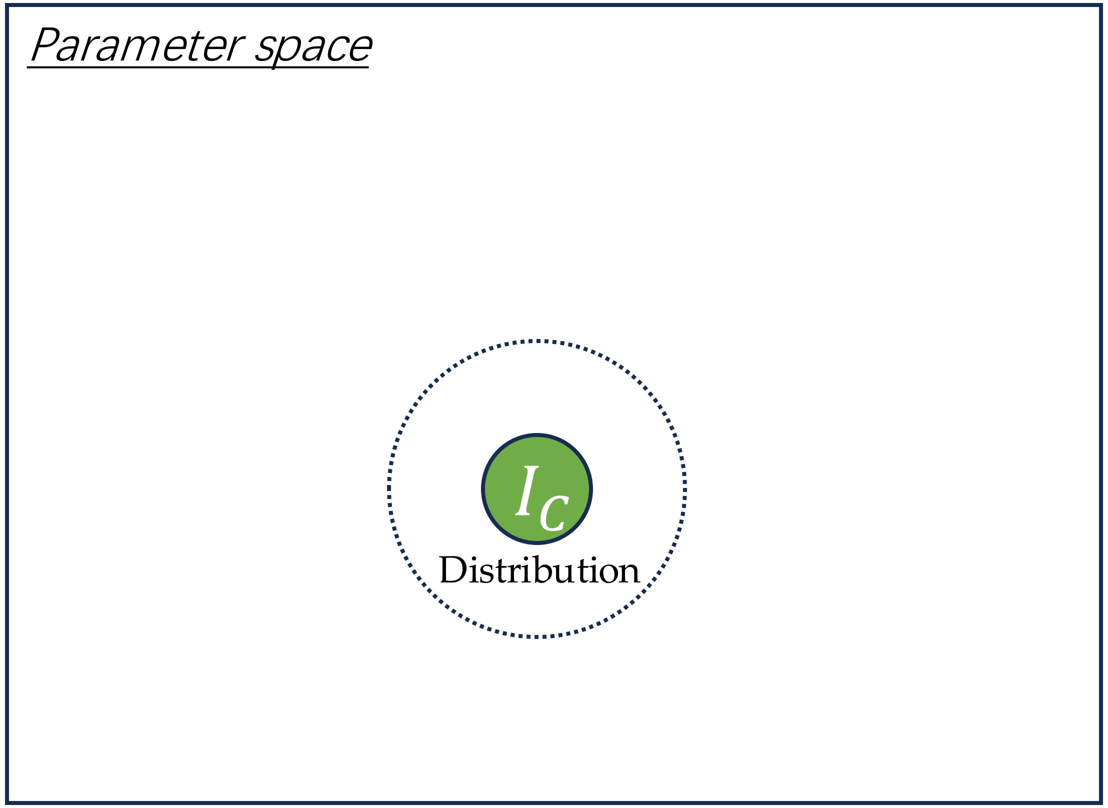
Partly Learnable Projection (PLP)



Low rank adaptation training with PLP

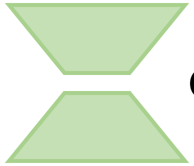


Multi-Correspondence Projection

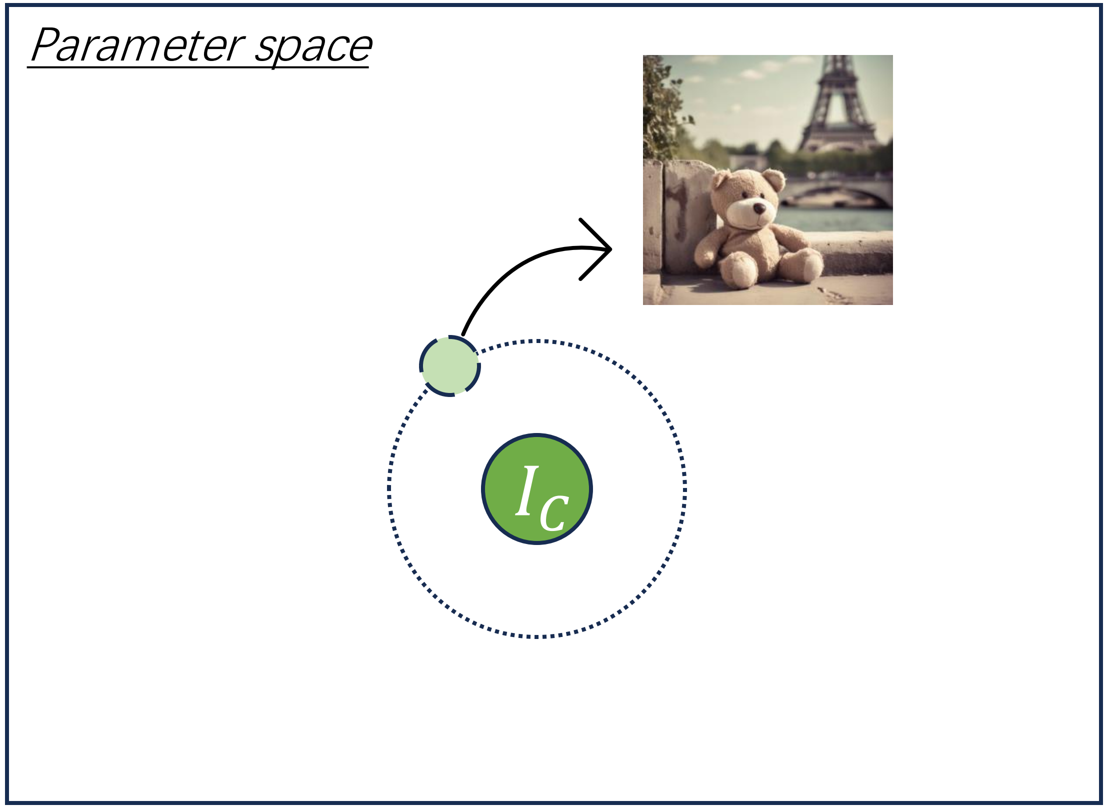


I_C

Multi-Correspondence Projection



Content LoRA



I_C

Distribution of a customized content I_C

A sample within the I_C distribution

Multi-Correspondence Projection

I_C
(content reference)

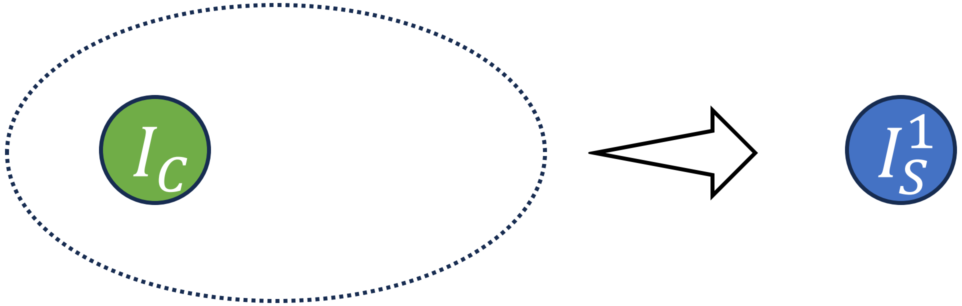
I_S^1
(style reference)

Multi-Correspondence Projection

I_C

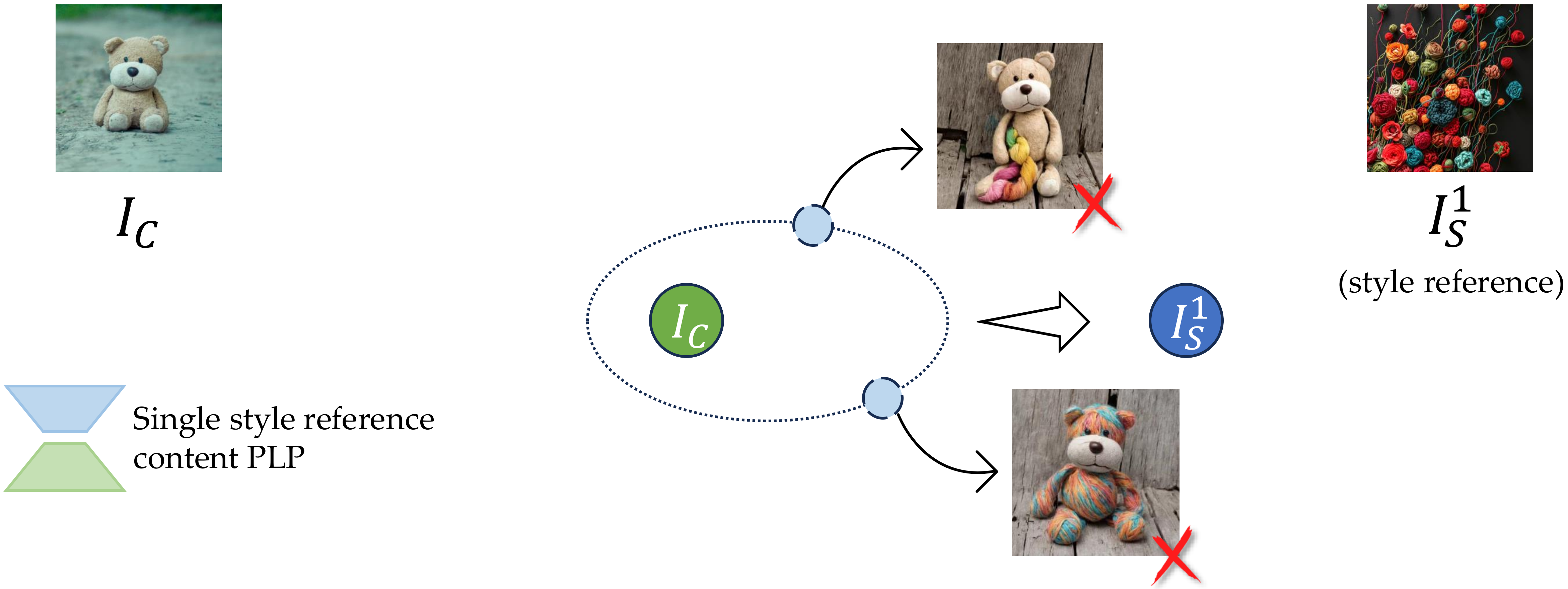
I_S^1

(style reference)



Distribution of I_C W/o “Multi-Correspondence Projection”

Multi-Correspondence Projection

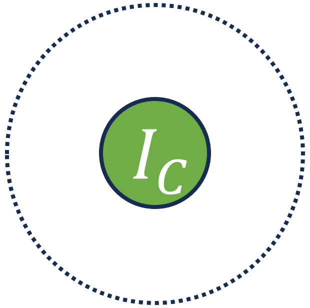


Distribution of I_C W/o "Multi-Correspondence Projection"

Samples are overfitting to specific style

Multi-Correspondence Projection

I_C



Multi-Correspondence Projection

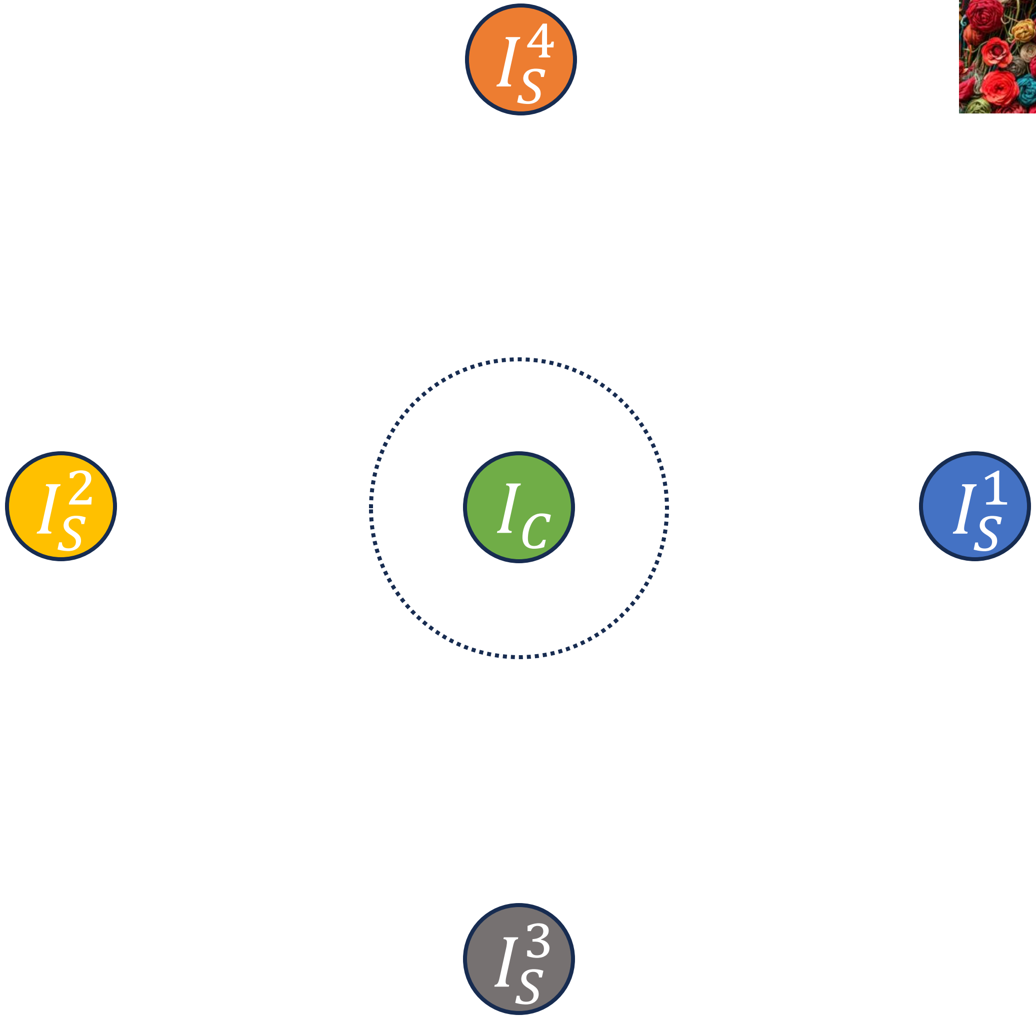
I_C

I_S^1

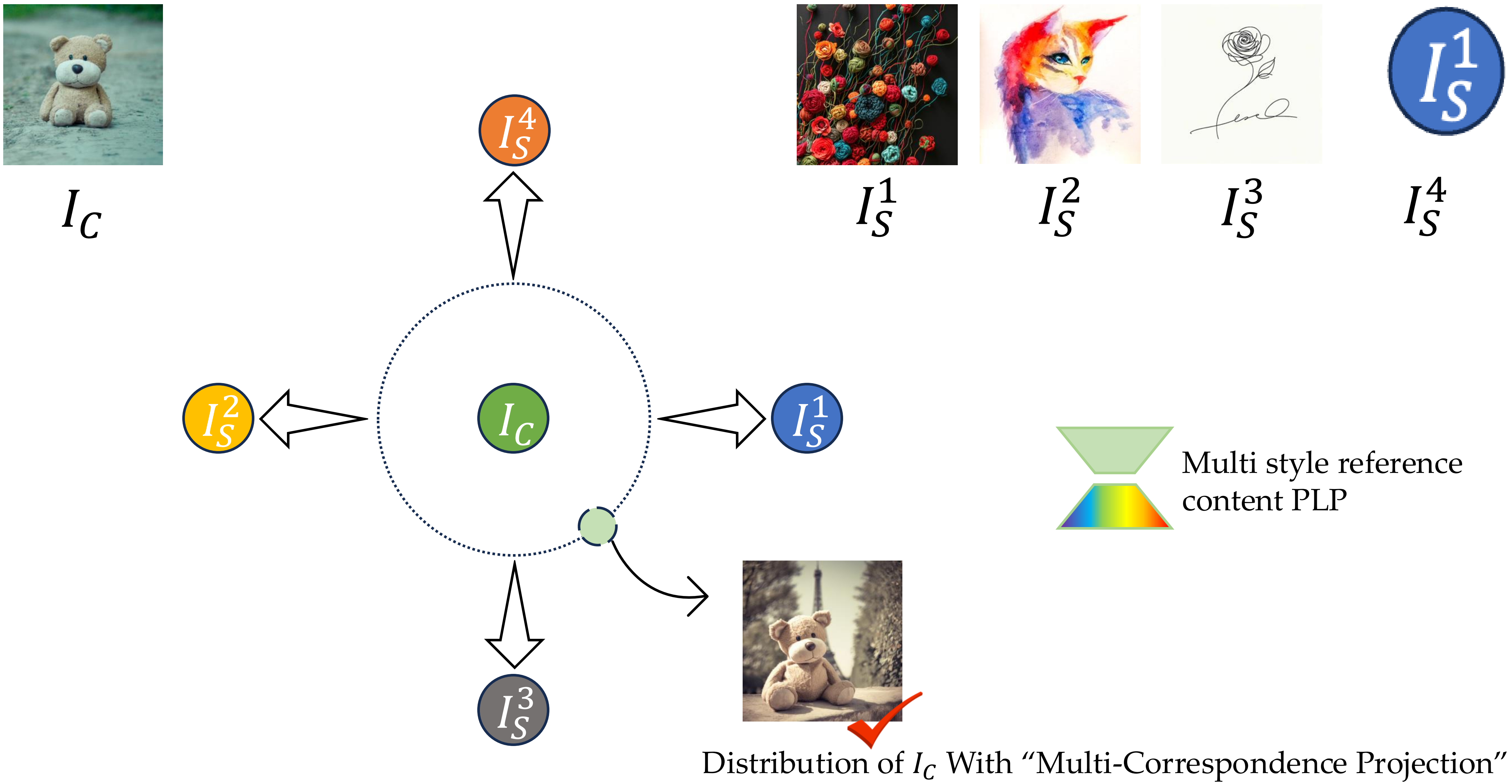
I_S^2

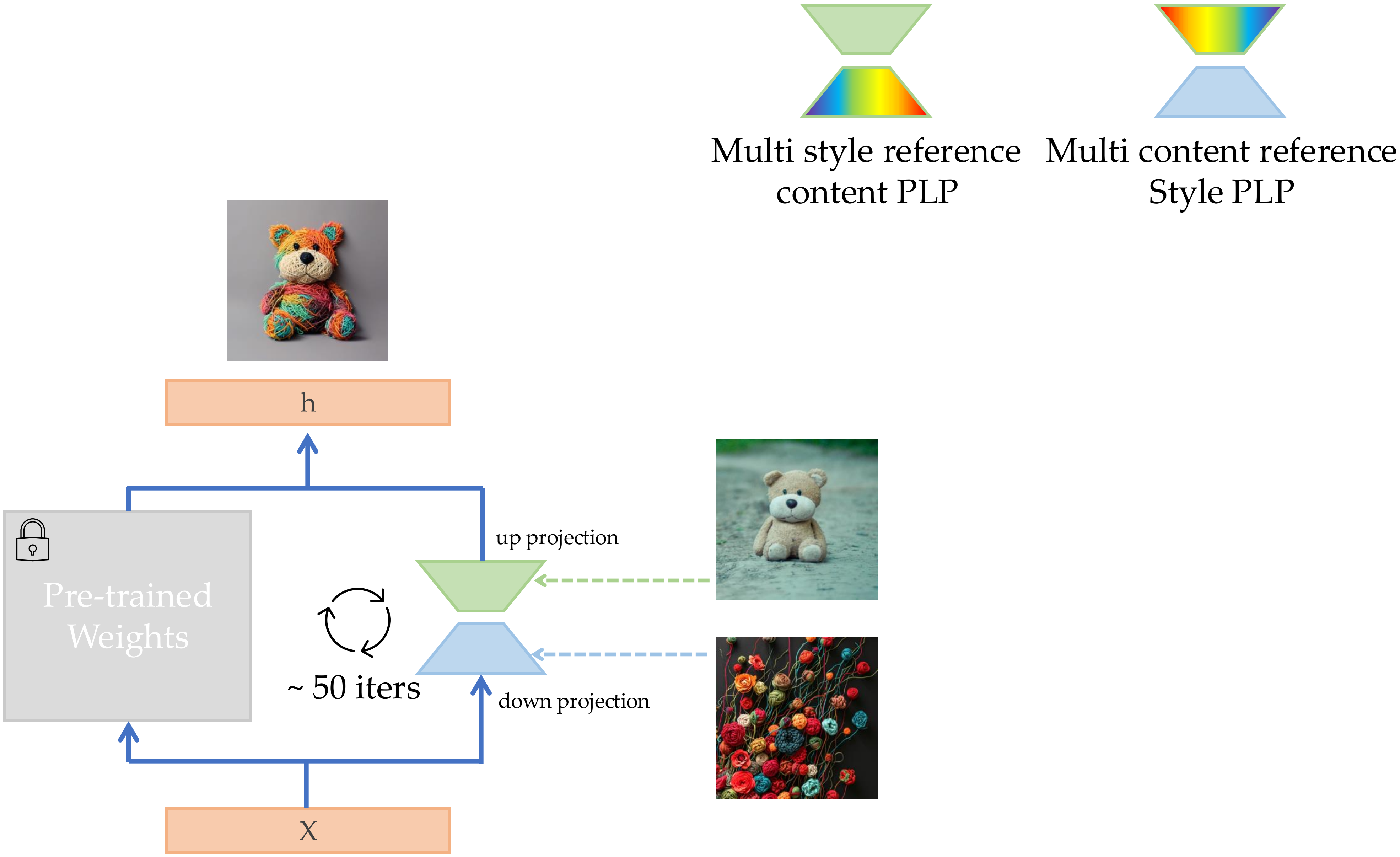
I_S^3

I_S^4



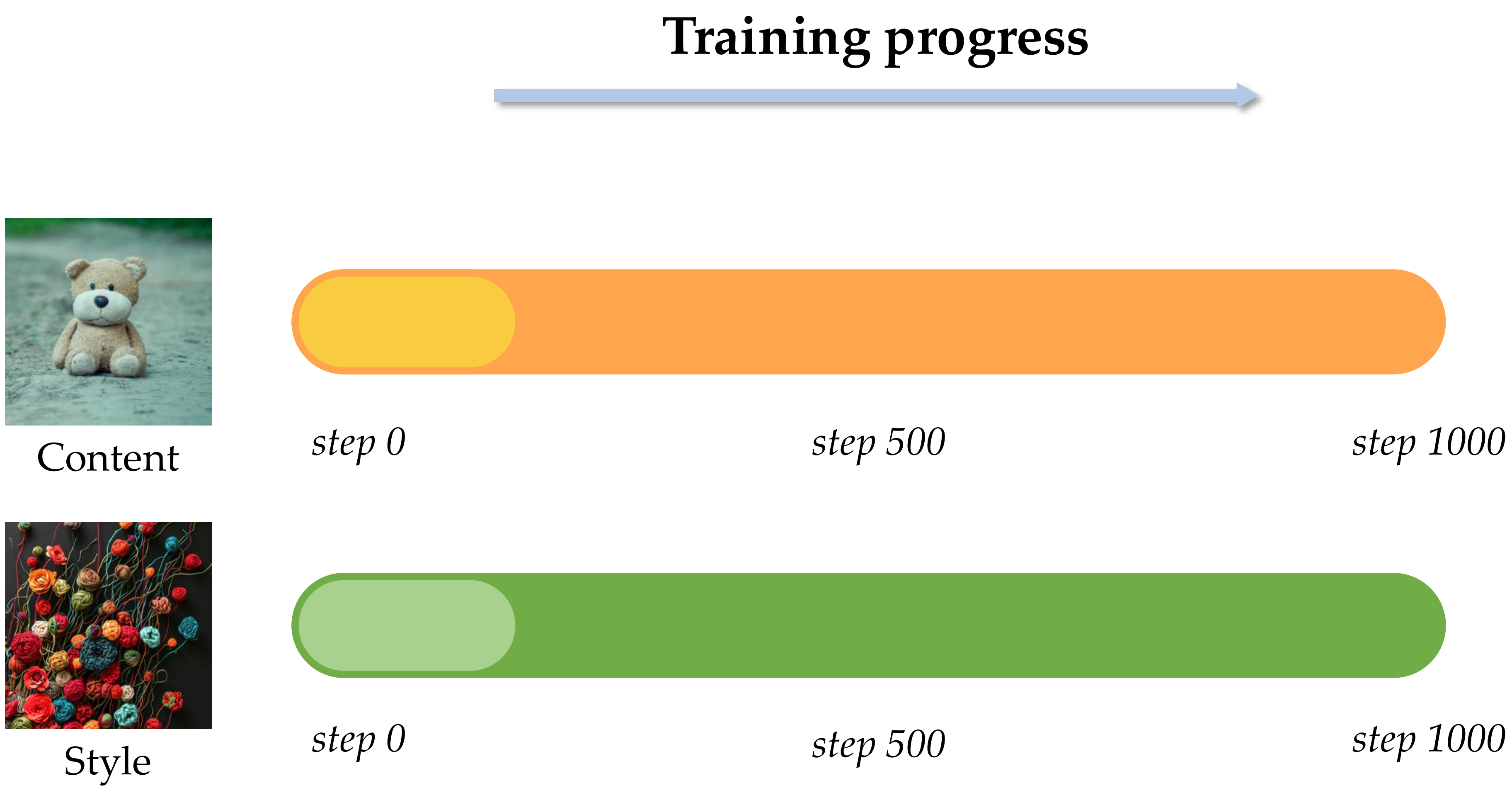
Multi-Correspondence Projection

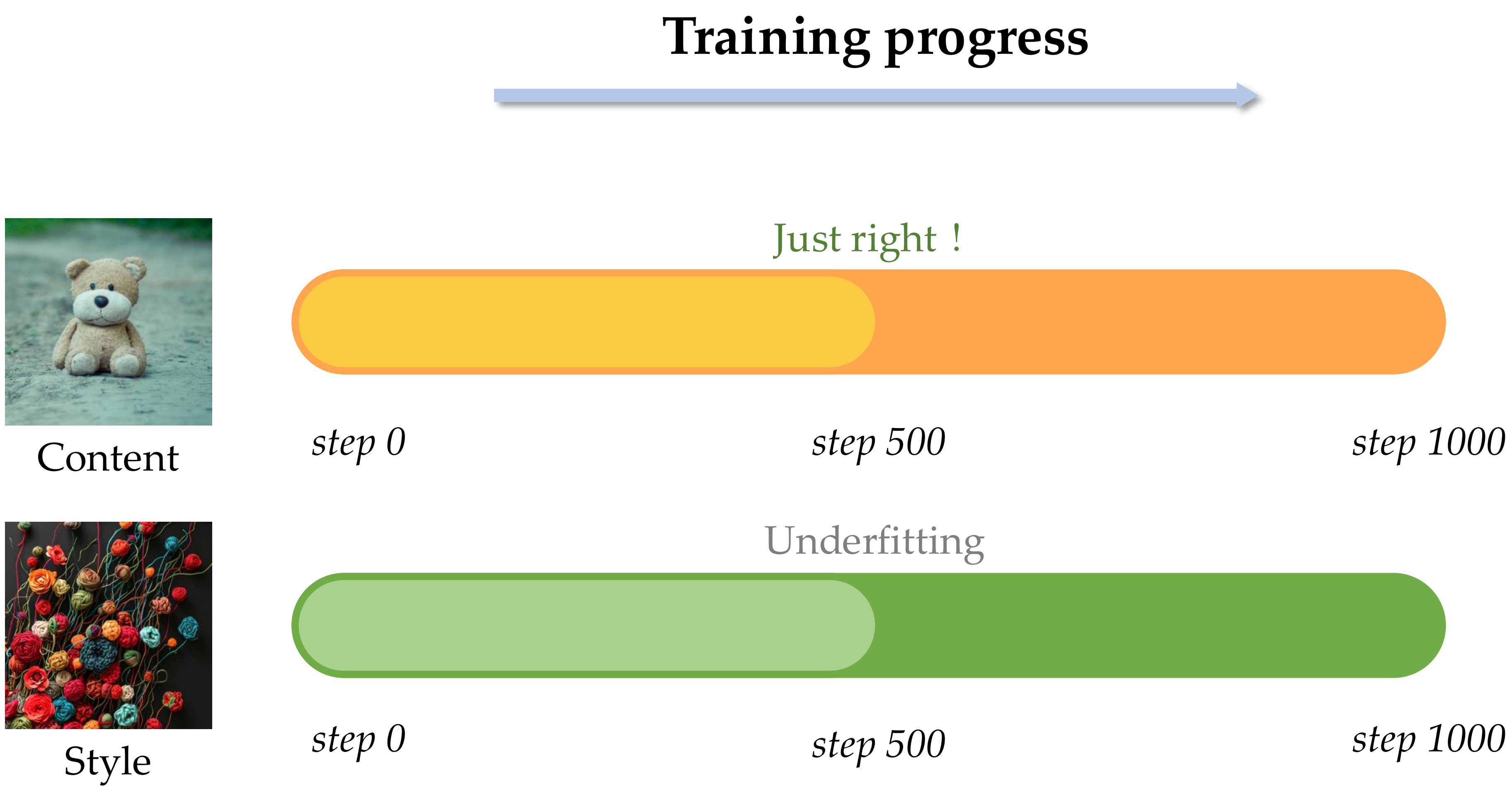


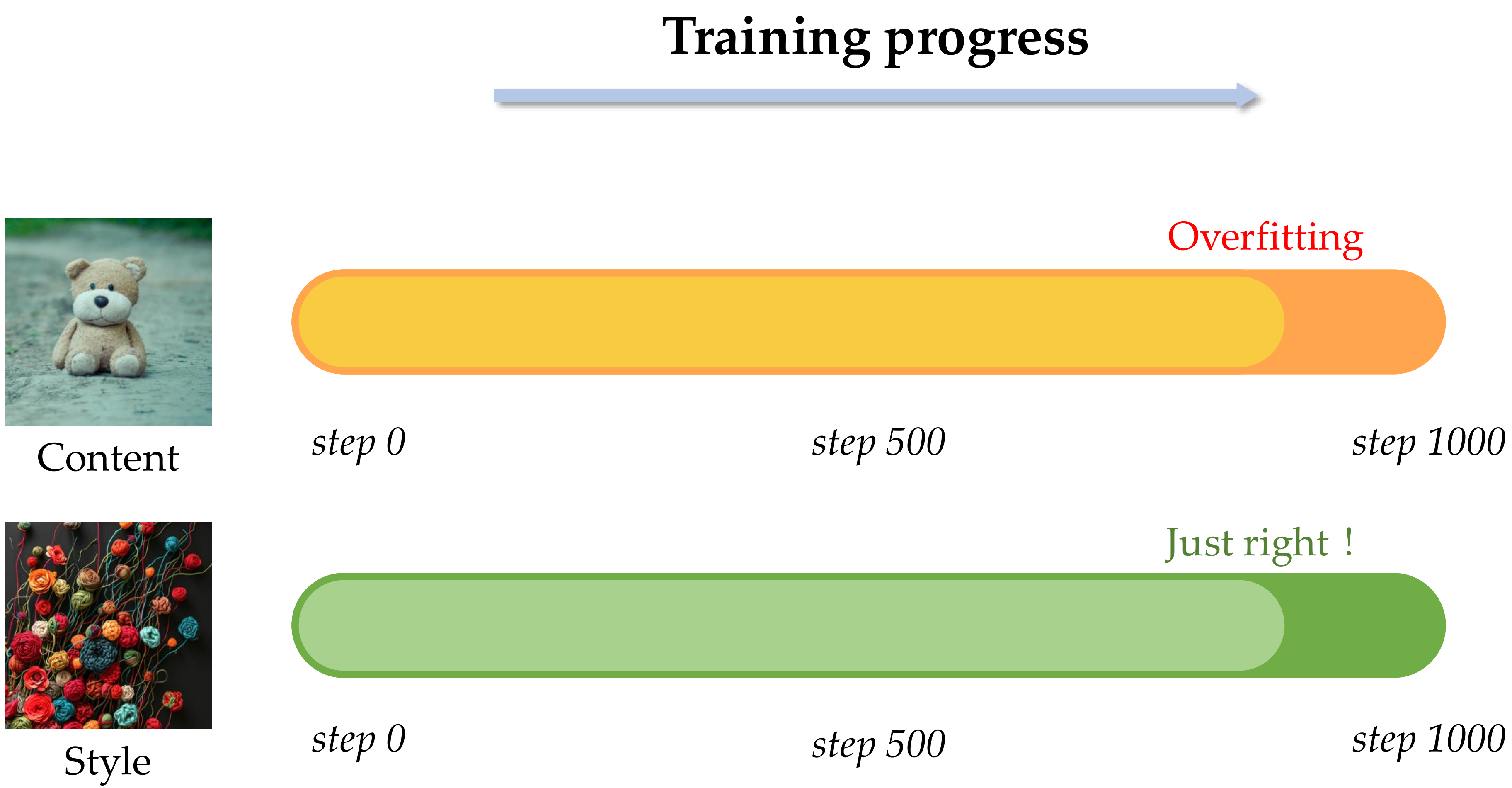


Multi style reference
content PLP
Multi content reference
Style PLP
h
up projection
Pre-trained
Weights
~ 50 iters
down projection
X

Riemannian Precondition


Training progress
Content
step 0
step 500
step 1000
Style
step 0
step 500
step 1000

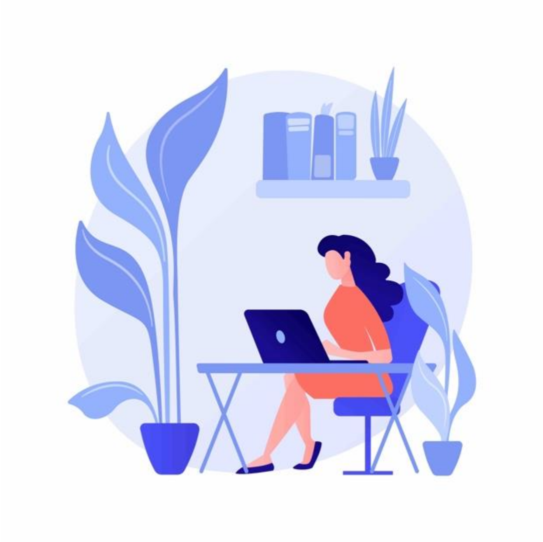

Training progress
Content
Just right !
step 0
step 500
step 1000
Style
Underfitting
step 0
step 500
step 1000


Training progress
Overfitting
Content
step 0
step 500
step 1000
Just right !
Style
step 0
step 500
step 1000

Overfitting to references

skateboarding

Content

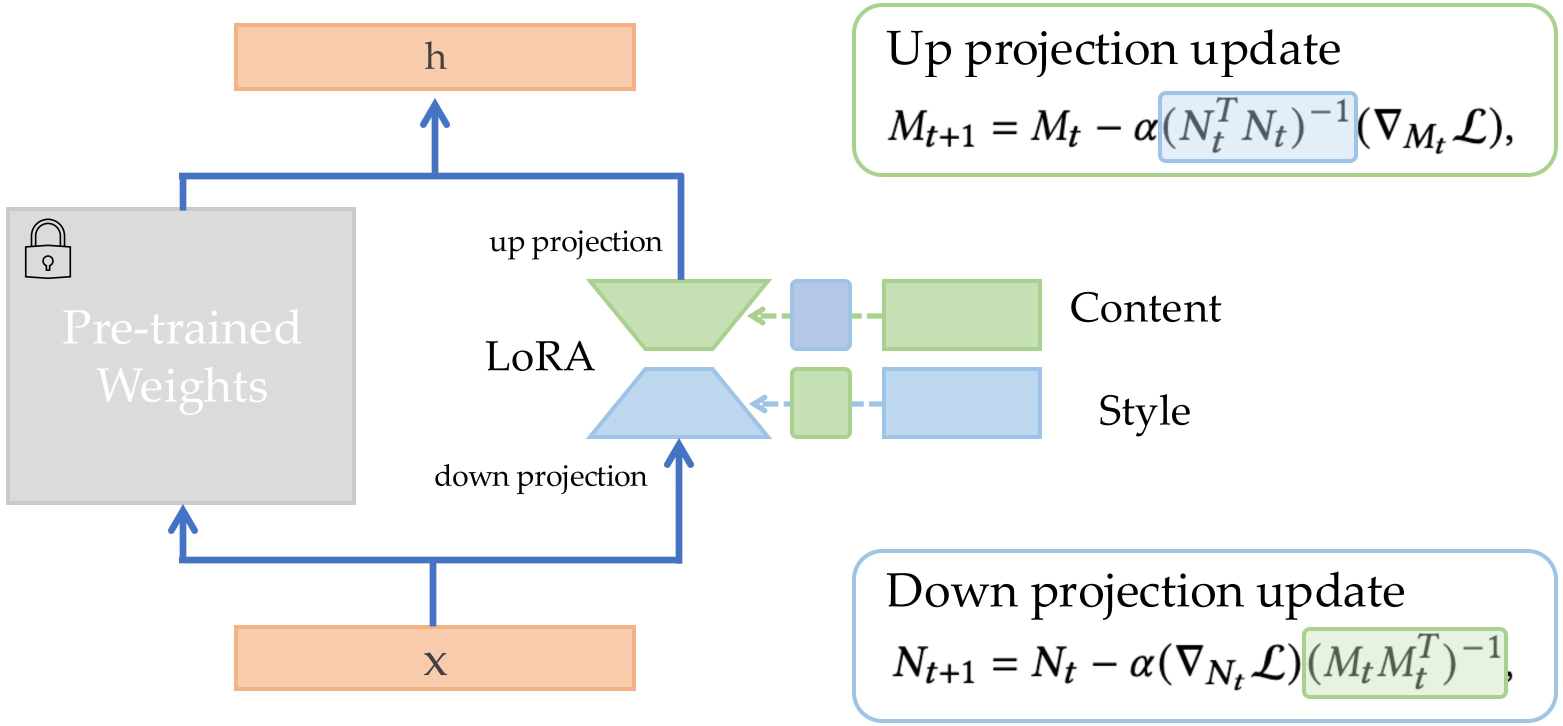


Style

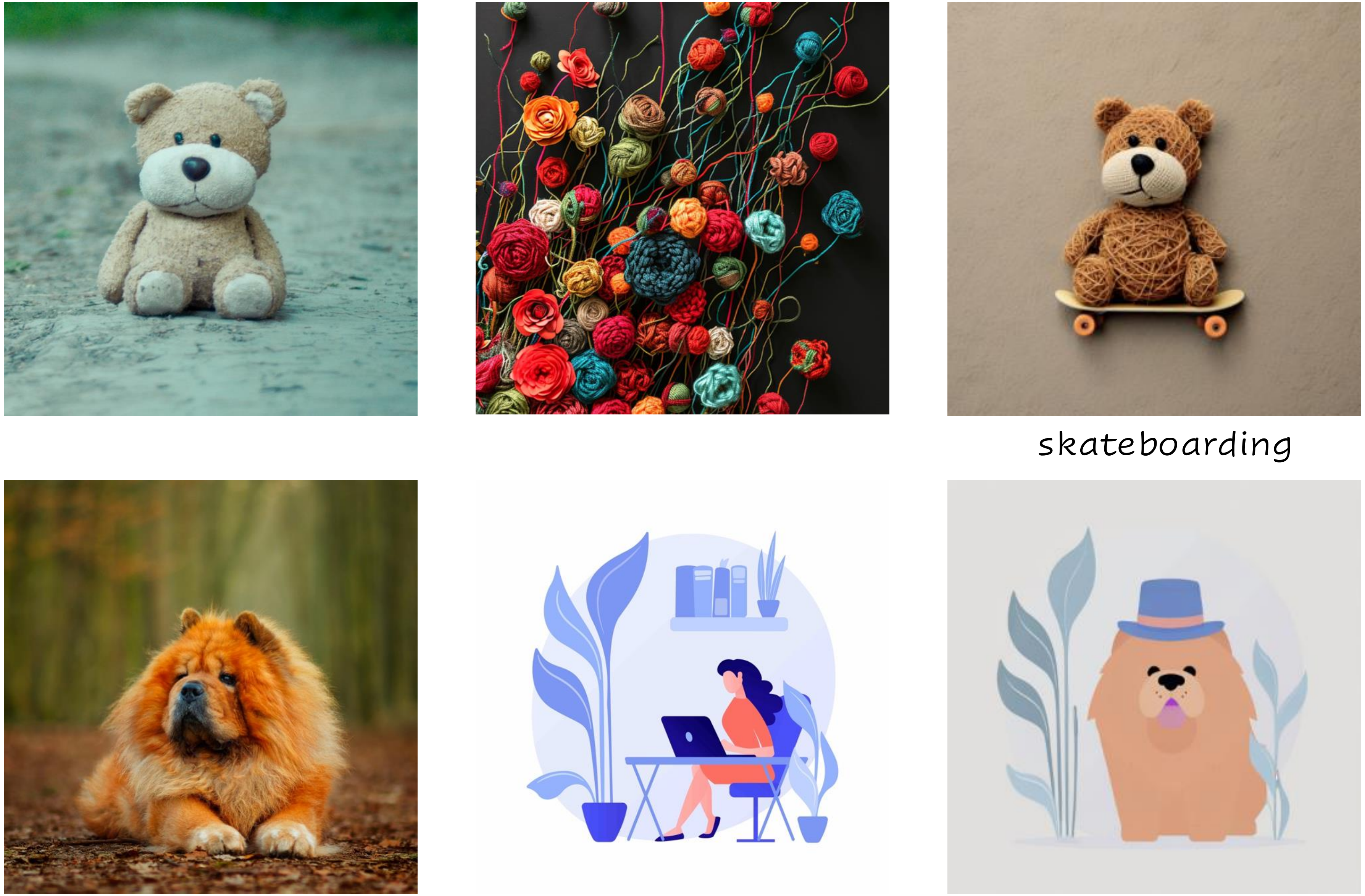
with a hat

Riemannian Precondition

for balance training



Without Riemannian Precondition



Content

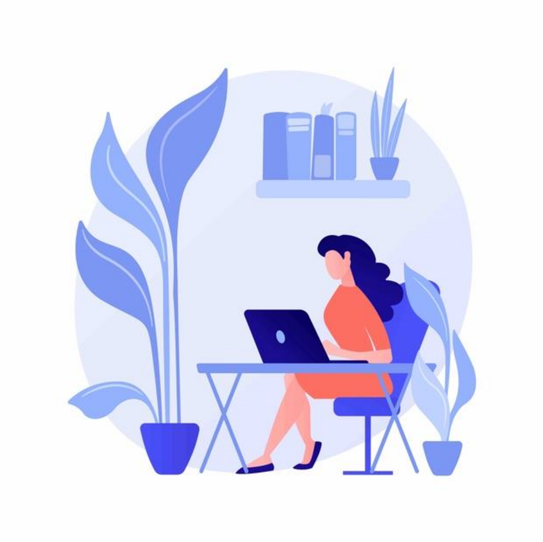
Style

with a hat

With Riemannian Precondition

skateboarding

Content



Style

with a hat

Comparison with related works

Qualitative comparison

Content reference

Style reference

Ours

✓ Content
✓ Style

Joint training

✓ Content
✗ Style

Textual Inversion

✗ Content
✓ Style

ProSpect

✗ Content
✗ Style

Custom Diffusion

✗ Content
✗ Style

ZipLoRA

✓ Content
✗ Style

Qualitative comparison

Content reference

Style reference

Ours	Joint training	Textual Inversion	ProSpect	Custom Diffusion	ZipLoRA
					
✅ Content	✅ Content	❌ Content	❌ Content	❌ Content	❌ Content
✅ Style	❌ Style	✅ Style	✅ Style	✅ Style	✅ Style

Qualitative comparison

Content reference

Style reference

Ours

✓ Content
✓ Style

Joint training

✓ Content
✗ Style

Textual Inversion

✗ Content
✗ Style

ProSpect

✗ Content
✗ Style

Custom Diffusion

✓ Content
✗ Style

ZipLoRA

✓ Content
✗ Style

Qualitative comparison

Content reference

Style reference

Ours

✅ Content
✅ Style

Joint training

✅ Content
❌ Style

Textual Inversion

❌ Content
❌ Style

ProSpect

❌ Content
❌ Style

Custom Diffusion

✅ Content
❌ Style

ZipLoRA

✅ Content
❌ Style

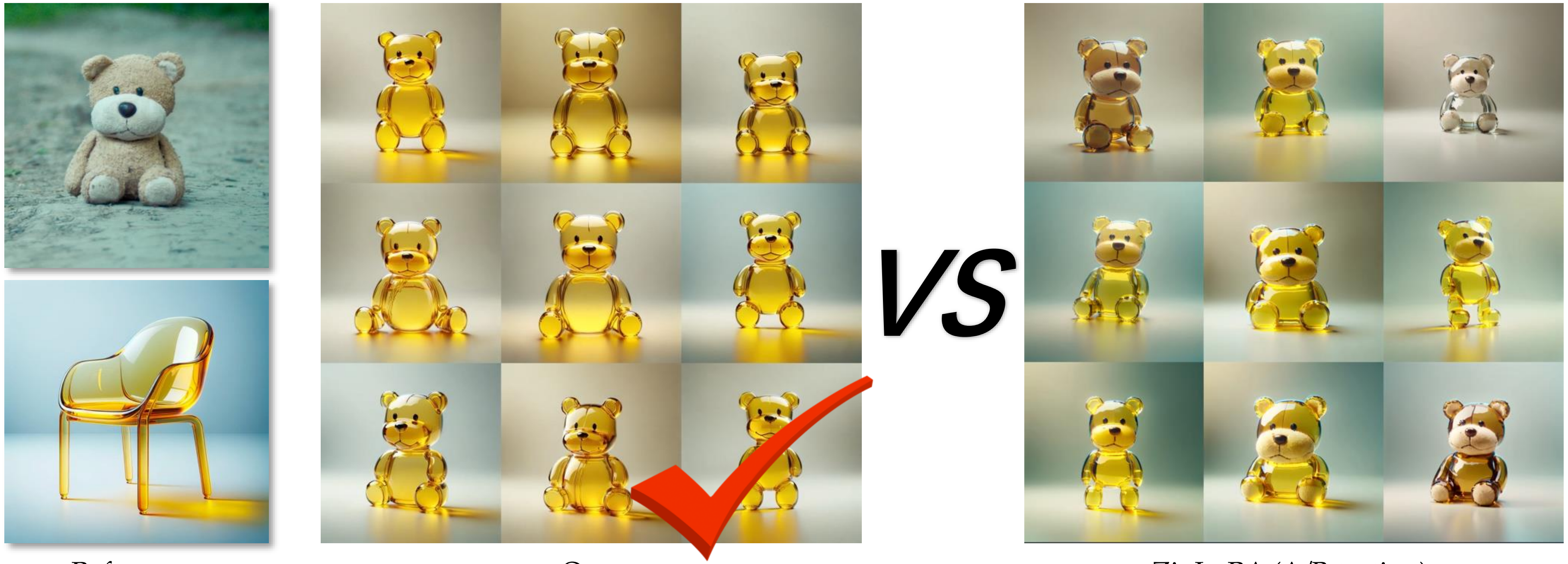
Quantitative comparison

Methods	JTtrain	TI	ProSpect	CD	ZipLoRA	Ours
Content alignment (↑)	0.5221	0.4942	0.4816	0.5181	**0.5319**	0.5288
Style-alignment (↑)	0.5438	0.6092	0.6165	0.6345	0.6403	**0.6754**
Prompt-alignment (↑)	0.3038	0.2836	0.3156	0.2778	0.3319	**0.4107**
Average (↑)	0.4566	0.4623	0.4712	0.4768	0.5014	**0.5383**

+ 7.36 %

We leverage DINOv2 [Oquab et al. 2023] to evaluate content and style alignment, and CLIP [Ilharco et al. 2021] to evaluate prompt alignment.

User study

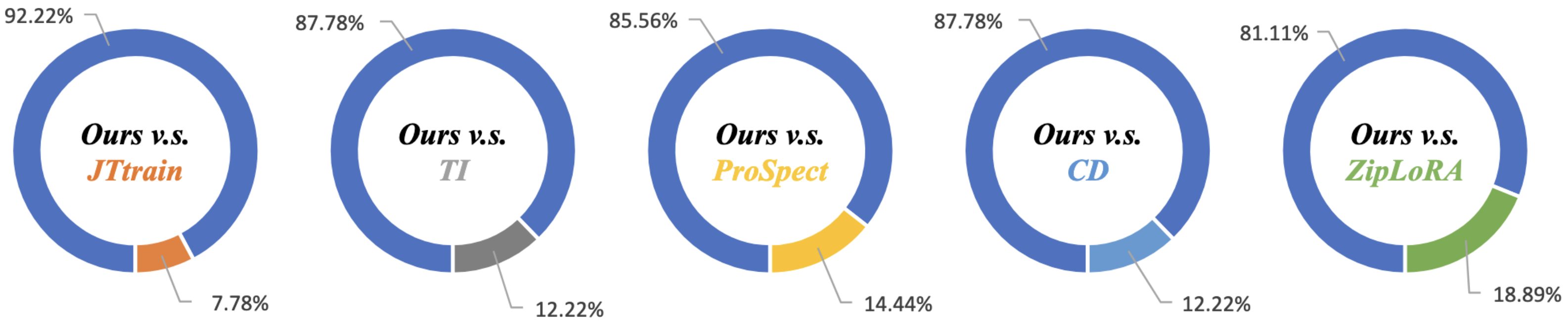


References

Ours

ZipLoRA (A/B testing)

Our method demonstrates strong generation stability.



Stability preference comparison in user study.
Our results have better preference than other baselines.

More results of ours

Customize your style with diverse content

A [c1] teddybear | A [c2] character | A [c3] bird | A [c4] mountain | A [c5] building | A [c6] sculpture

A dog in [s] paper style | A [c1] teddybear in [s] paper style | A [c2] character in [s] paper style | A [c3] bird in [s] paper style | A [c4] mountain in [s] paper style | A [c5] building in [s] paper style | A [c6] sculpture in [s] paper style

Customize your content with diverse style

A dog in
[s1] paper style

Flowers in
[s2] yarn style

A tree in
[s3] sticker style

A woman in
[s4] cartoon style

A cat in
[s5] painting style

A rose in
[s6] painting style

A [c] bird

A [c] bird in
[s1] paper style

A [c] bird in
[s2] yarn style

A [c] bird in
[s3] sticker style

A [c] bird in
[s4] cartoon style

A [c] bird in
[s5] painting style

A [c] bird in
[s6] painting style

Re-textualization

A [c] dog

...running.

...on mountain.

...reading books.

A tree
in [s] sticker style

...sleeping.

...practicing karate.

...as a chef.

Re-textualization

A [c] teapot

...floating on river.

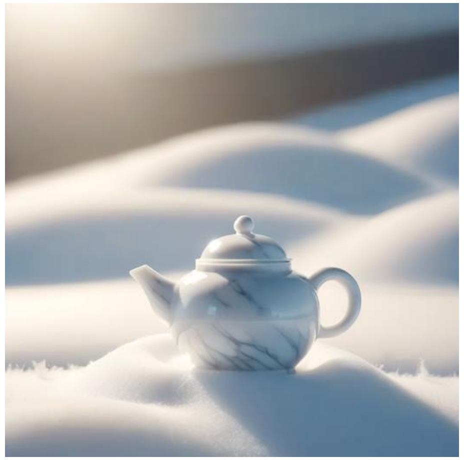
...on grass.

...turquoise.

Cup
in [s] marble style

...by window.

...on a picnic table.



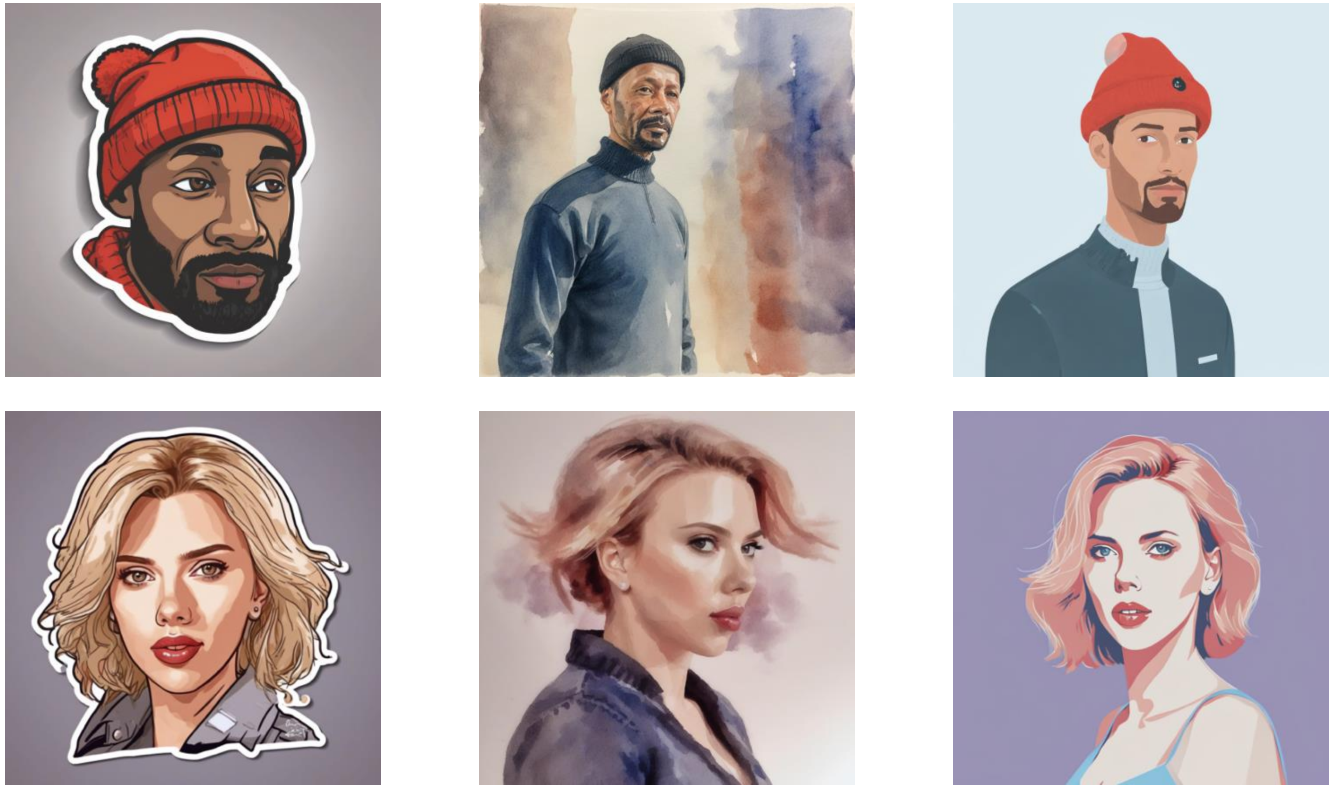
...on top of snow.

Application — Texture

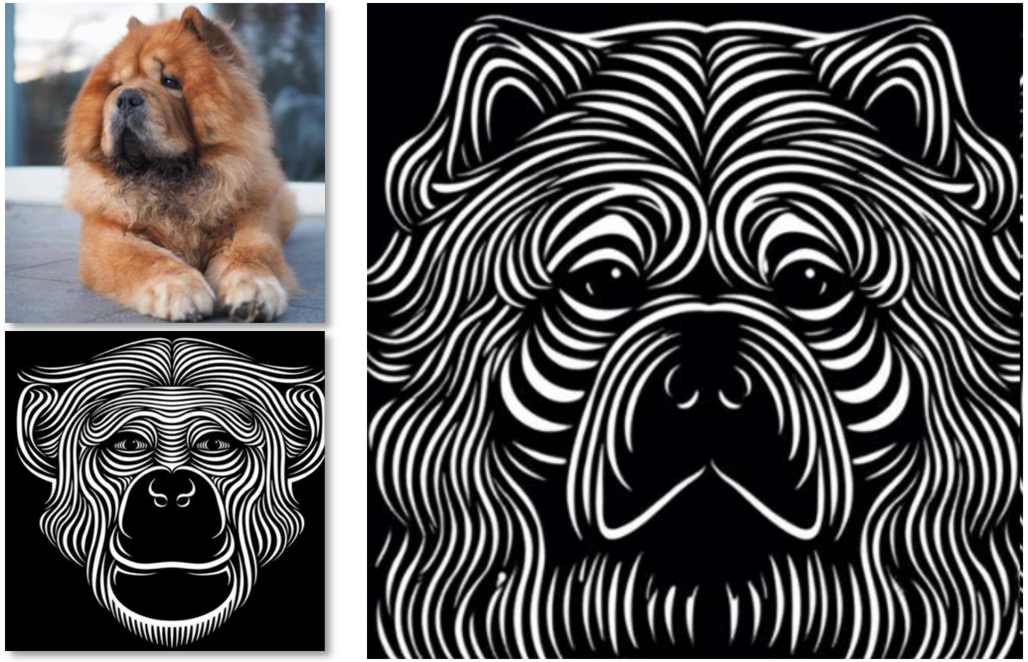
Application—Portrait

Style

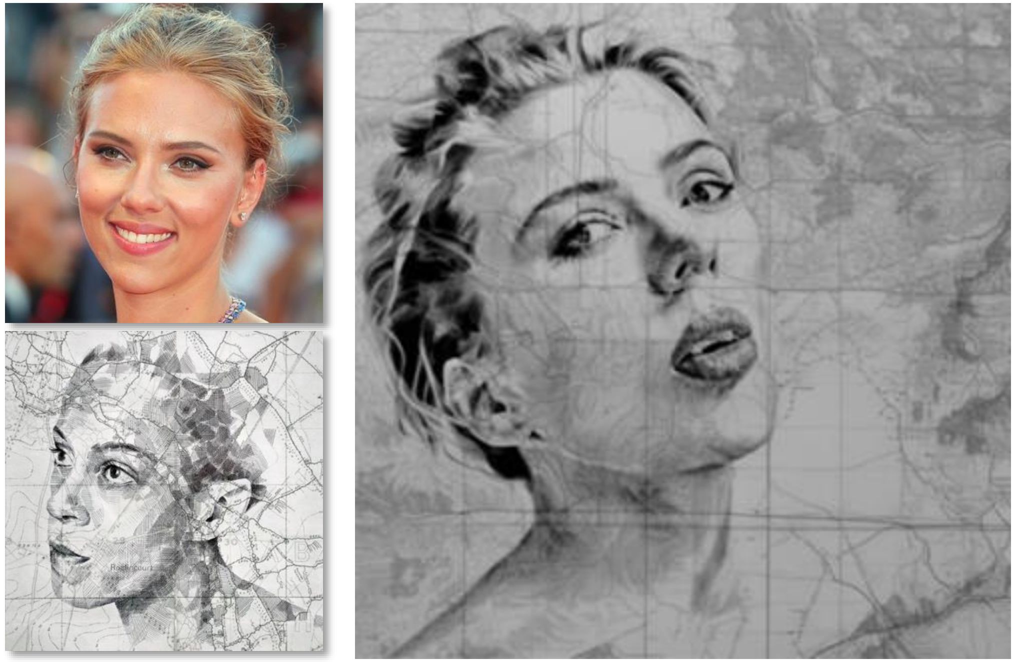
Portrait



Application—Modern Art



Hypnotic line art



Portrait map art

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Thanks.

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Project page: https://yuci-gpt.github.io/B4M/

Code: https://github.com/ICTMCG/Break-for-make


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