Implicit Inversion turns CLIP into a Decoder

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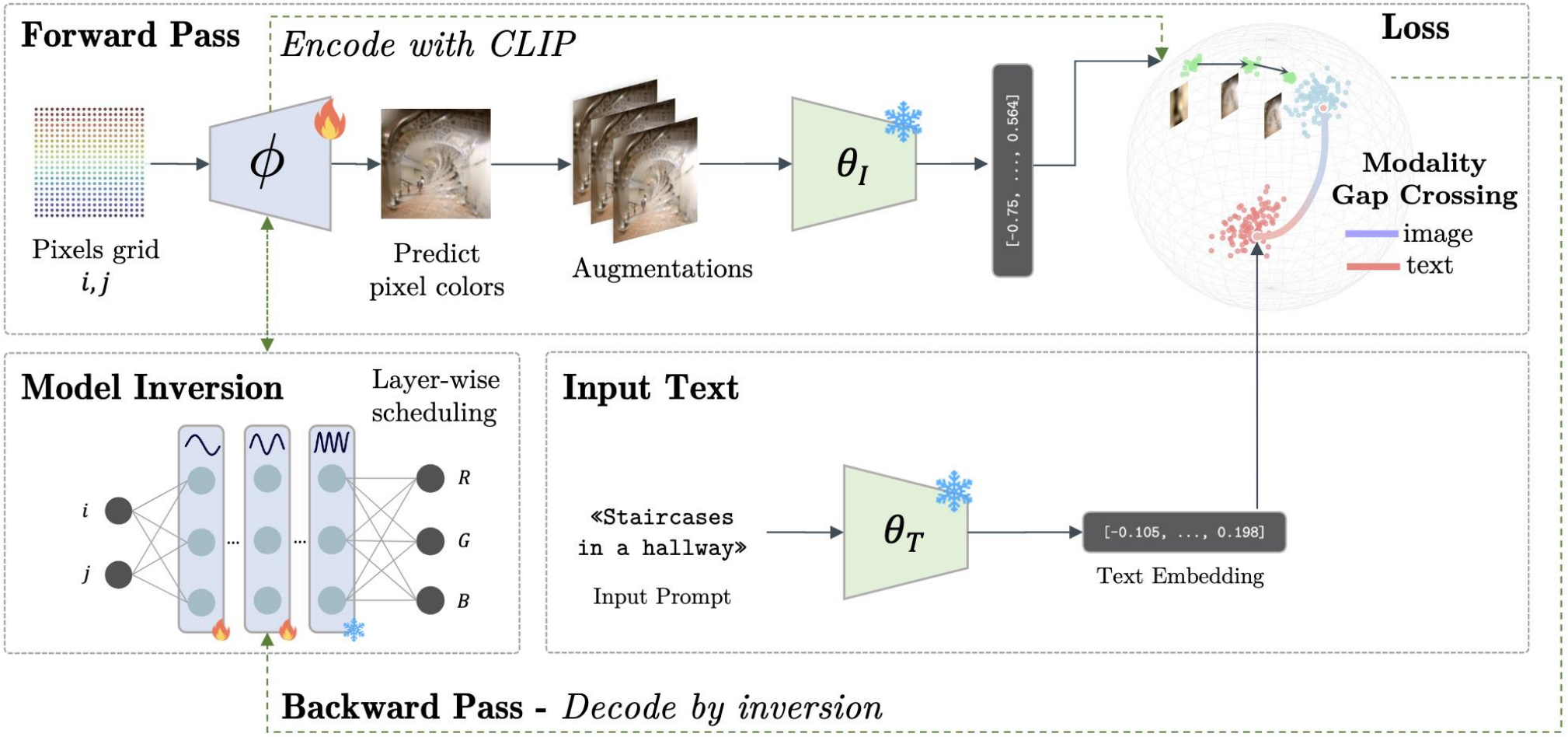
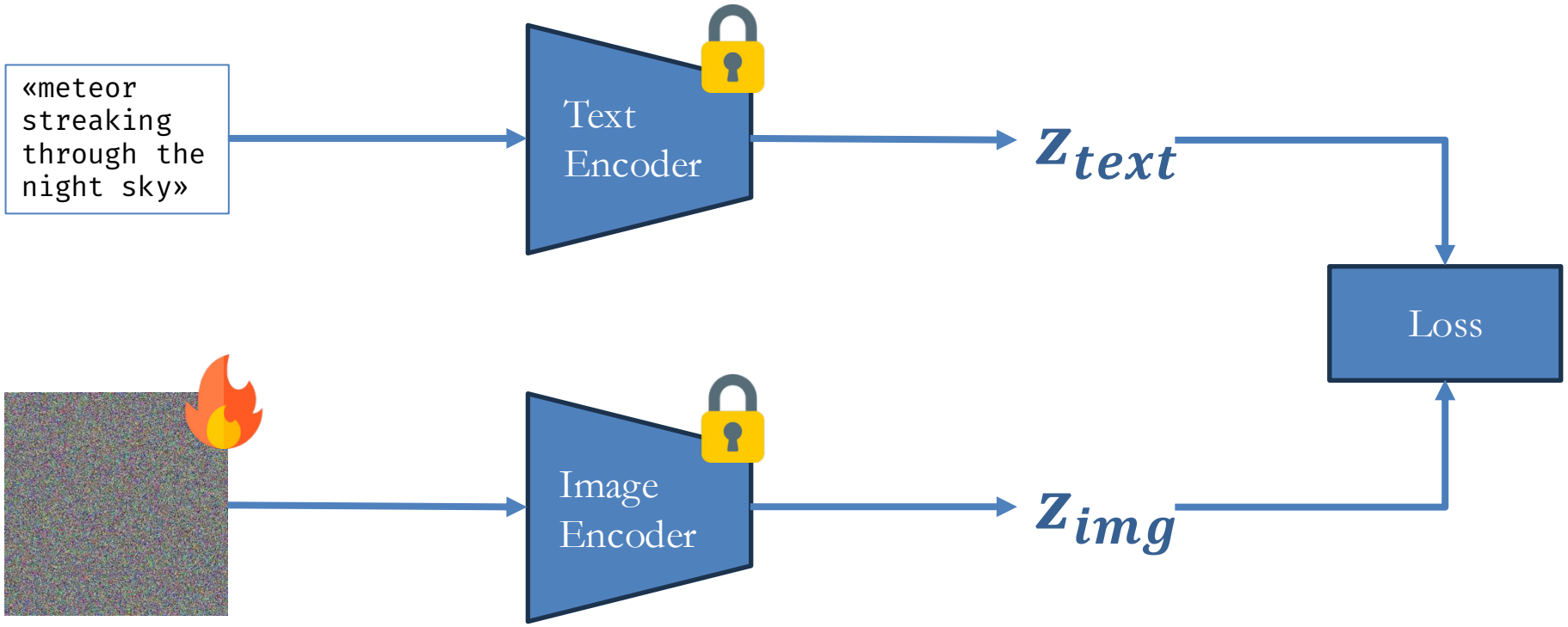
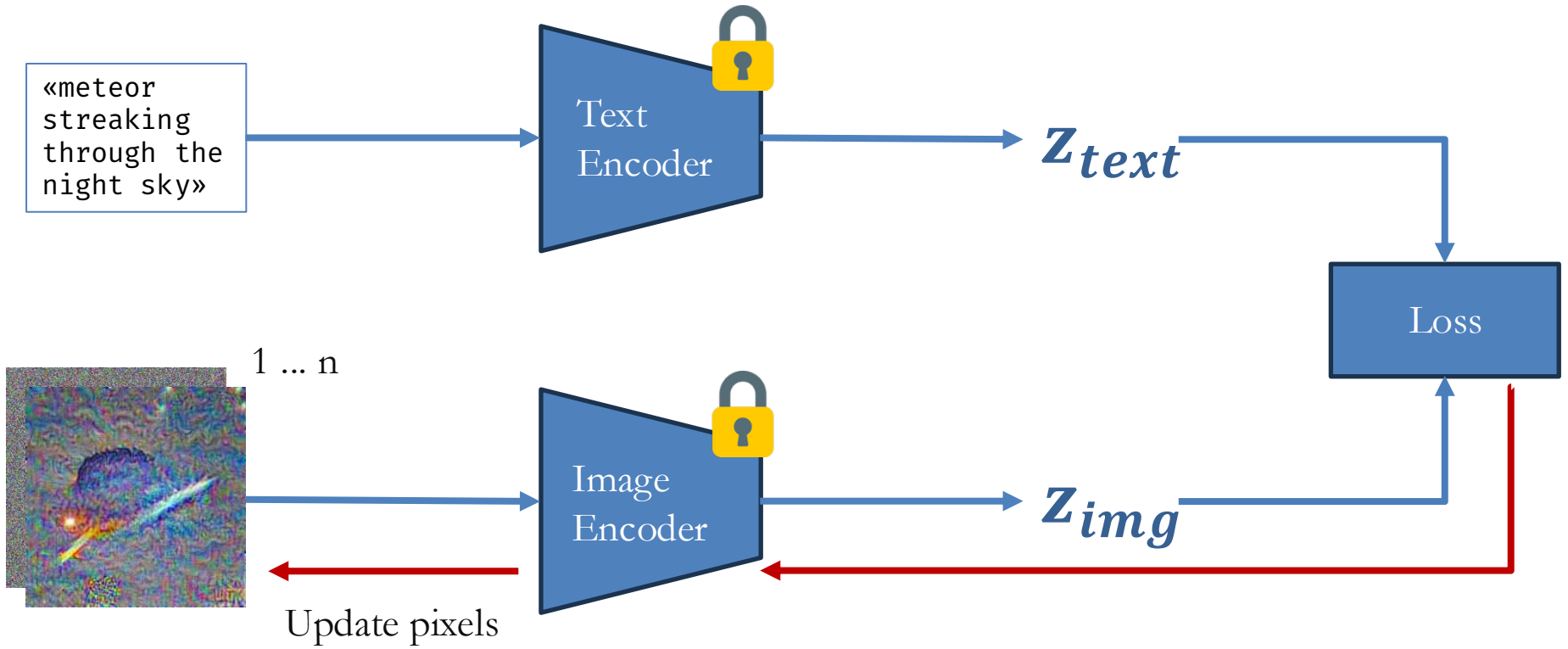
Method


Forward Pass
Encode with CLIP
Loss
Pixels grid
i, j
ϕ
Predict
pixel colors
Augmentations
θ_I
[-0.75, ..., 0.564]
Modality
Gap Crossing
image
text
Model Inversion
Layer-wise
scheduling
i
j
R
G
B
Input Text
«Staircases
in a hallway»
Input Prompt
θ_T
[-0.105, ..., 0.198]
Text Embedding
Backward Pass - Decode by inversion

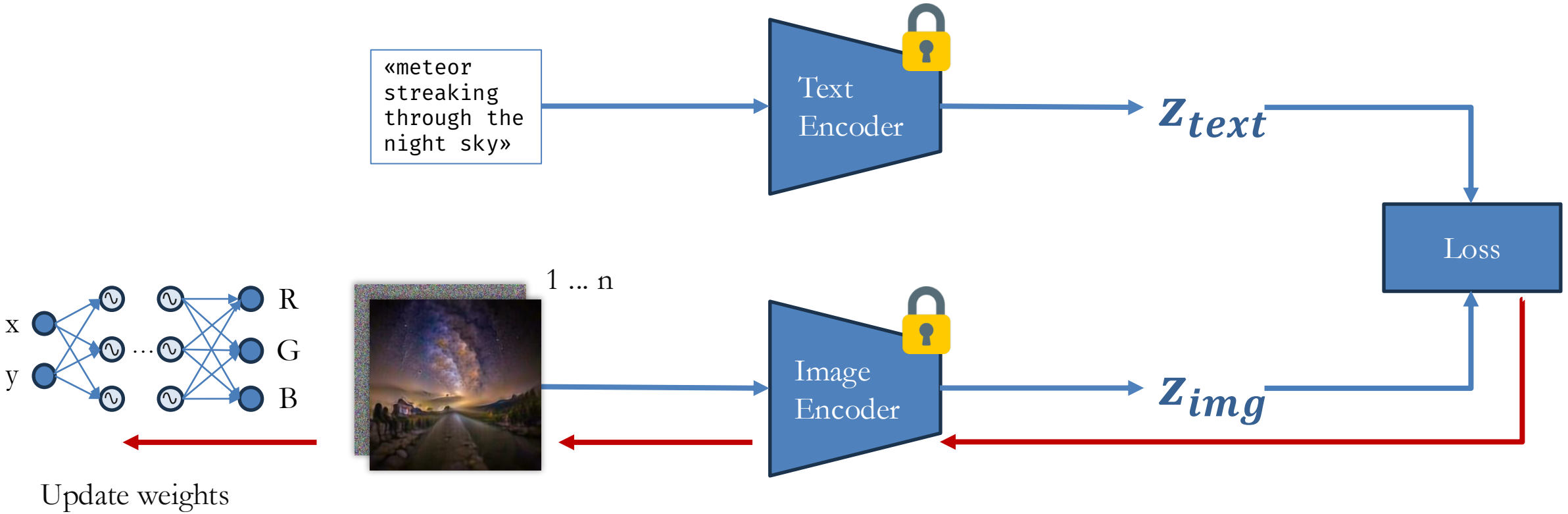
Encoder Only Image Synthesis



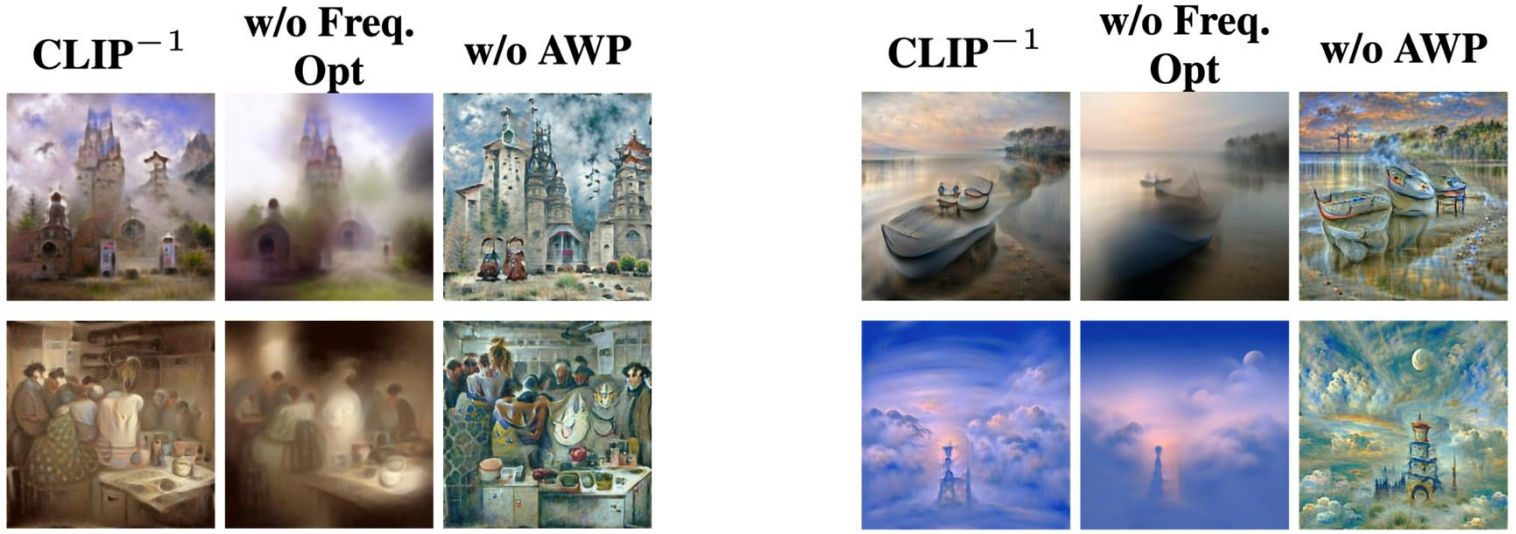
Encoder Only Image Synthesis: Inversion



Encoder Only Image Synthesis: Implicit inversion

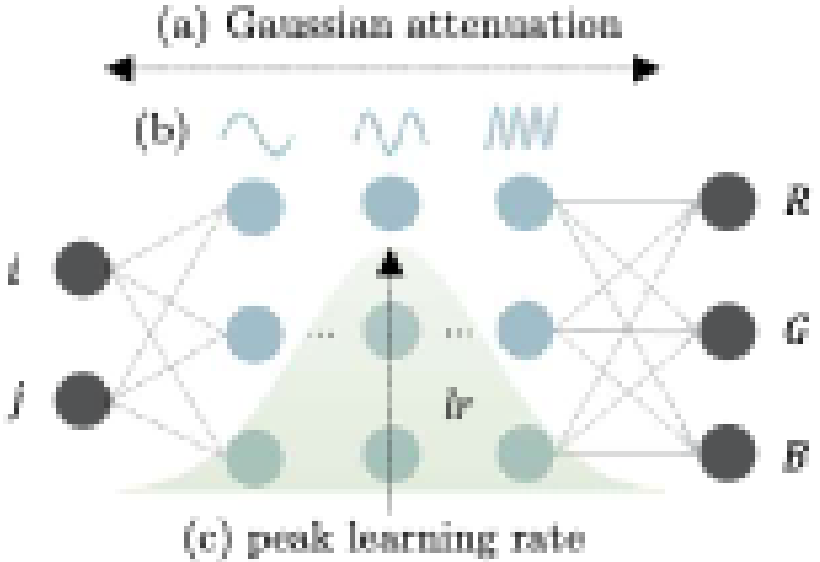


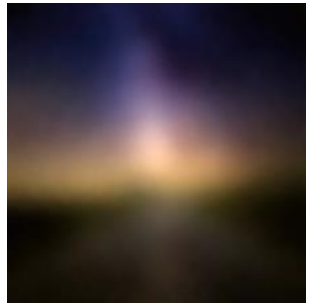
Stable Init with Adversarial Weights Perturbation



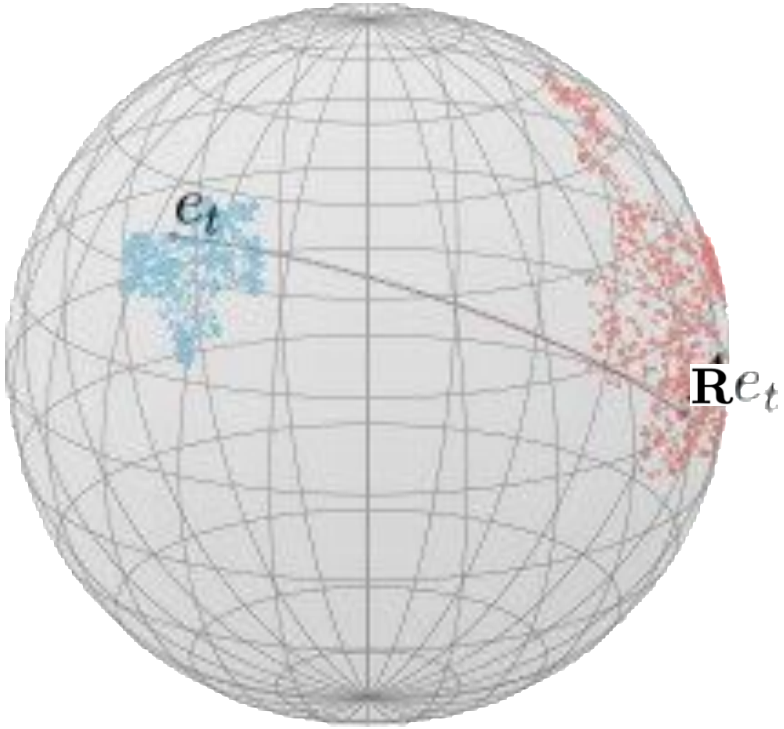
$$\min_{\phi} \max_{\Delta\phi \in \Omega} \mathcal{L}\left(f_{\phi+\Delta\phi}, \mathbf{blur}(\mathbf{x})\right)$$

Optimize by frequency



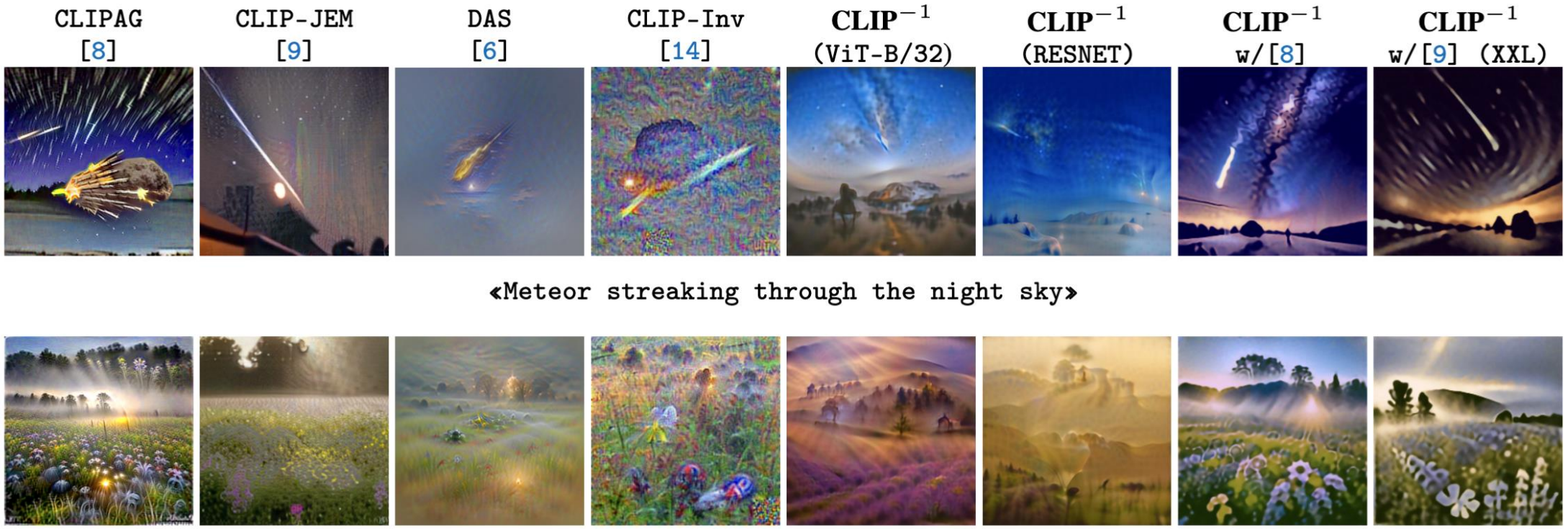


Modality Gap Crossing

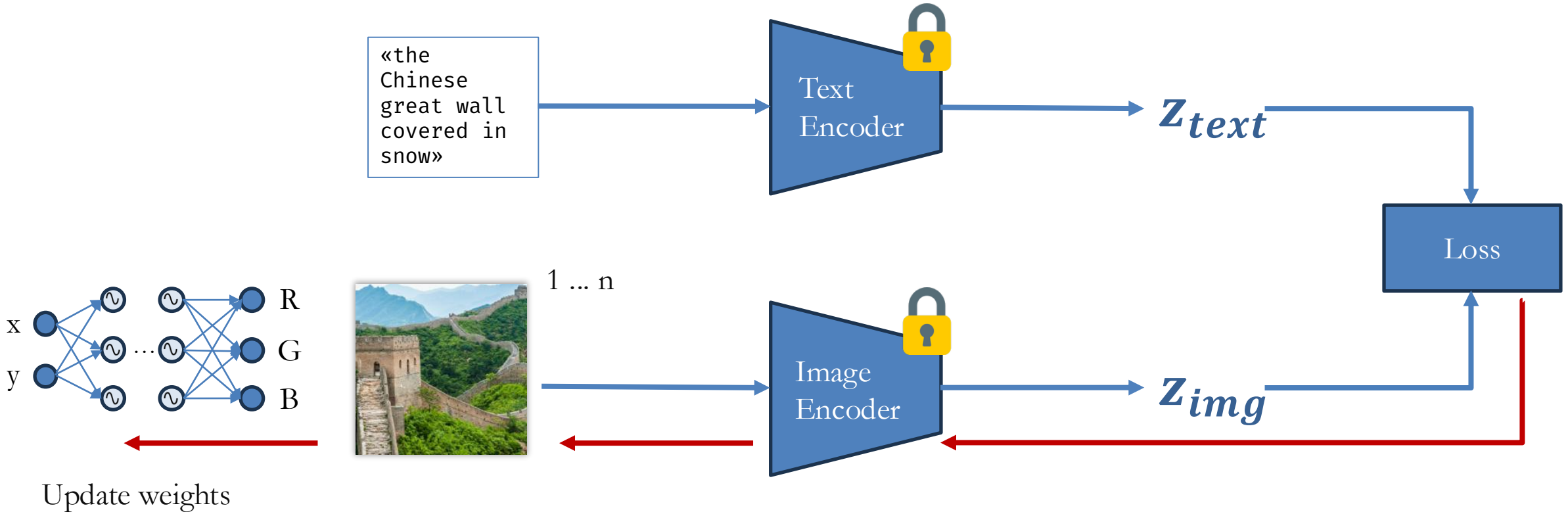


$$\min_{\mathbf{R}} ||\mathbf{R}\mathbf{E}_T - \mathbf{E}_I||_F \qquad \text{s.t. } \mathbf{R}^\top \mathbf{R} = \mathbf{I}$$

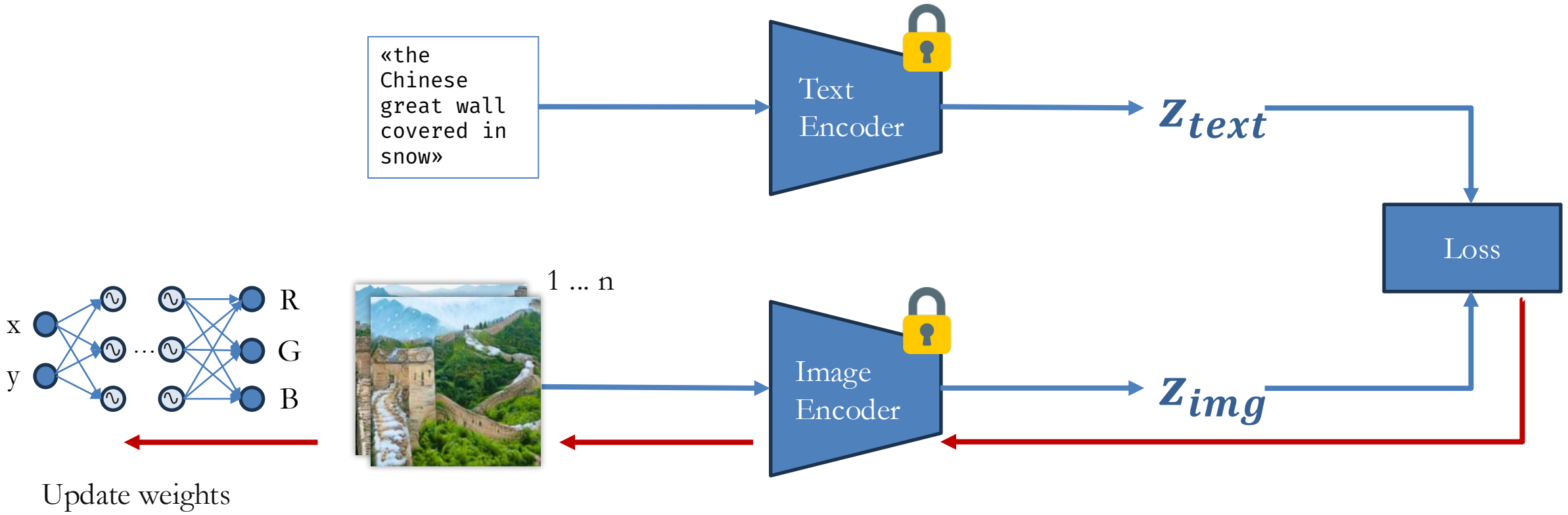
Quantitative Comparison



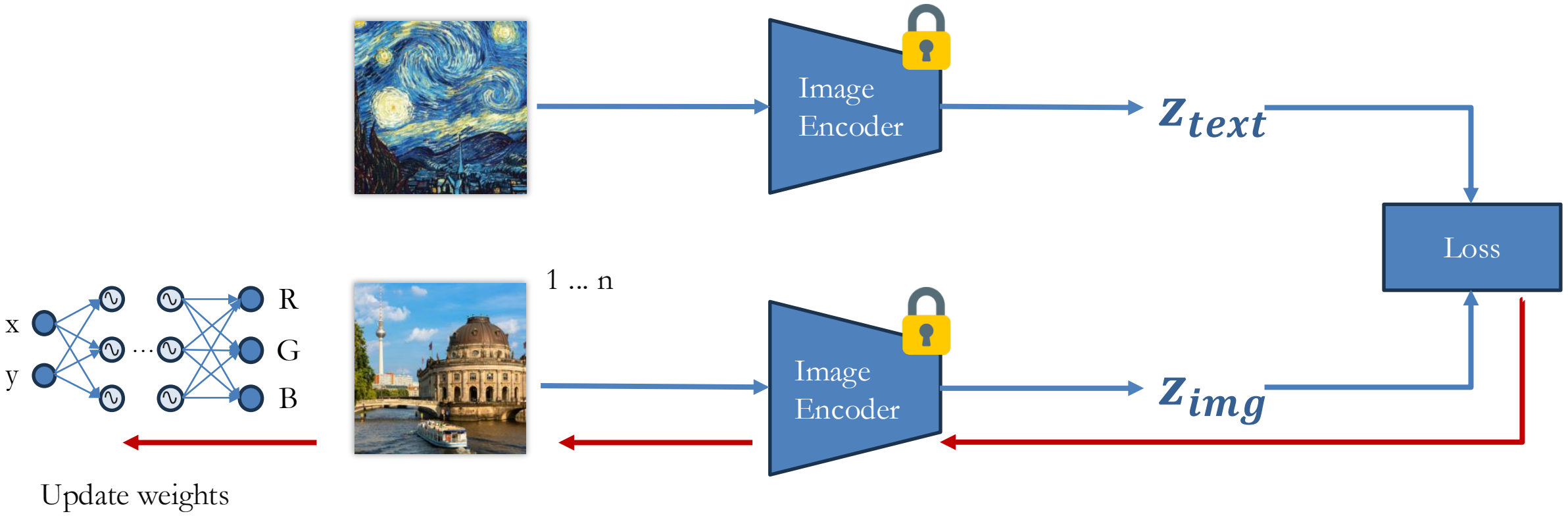
Downstream Tasks: Controlled modification



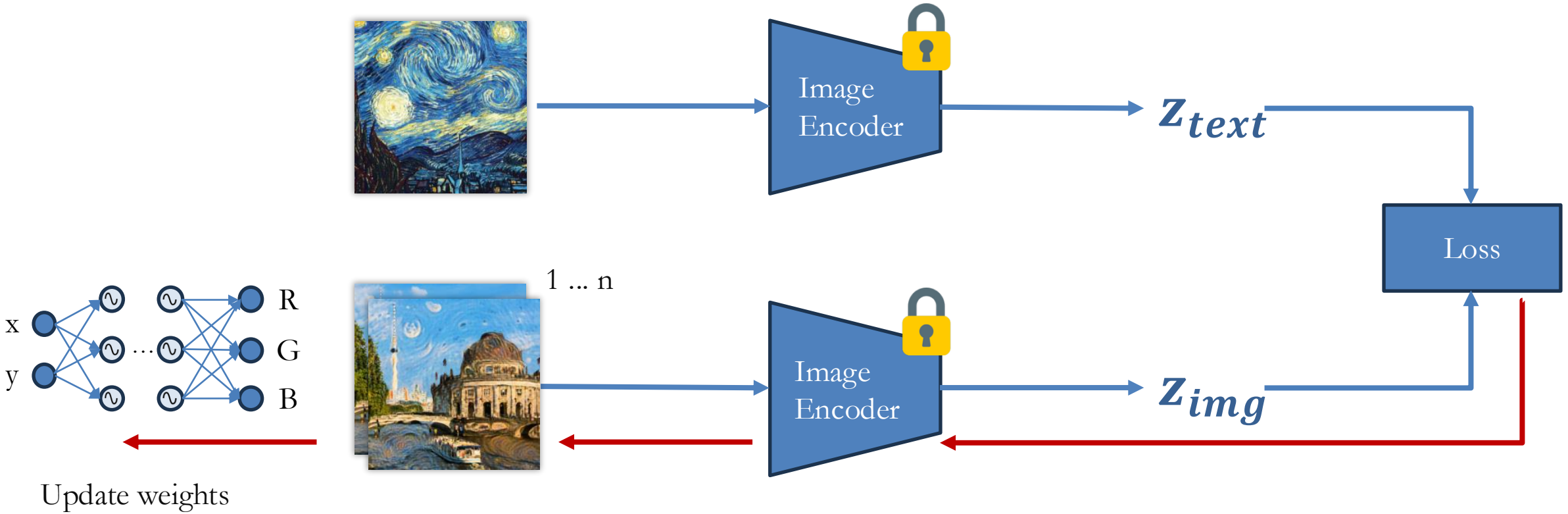
Downstream Tasks: Controlled modification



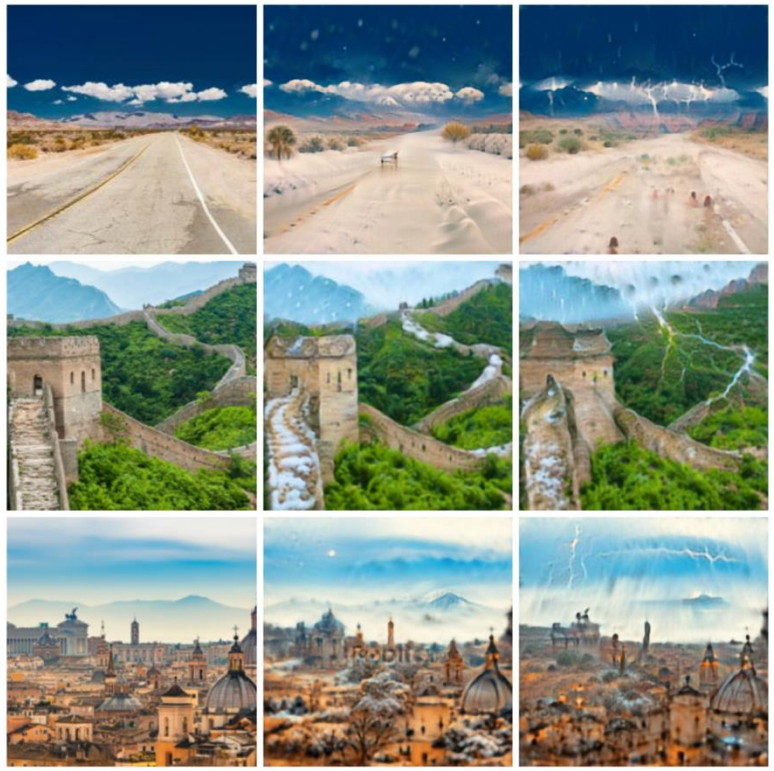
Downstream Tasks: Style Transfer



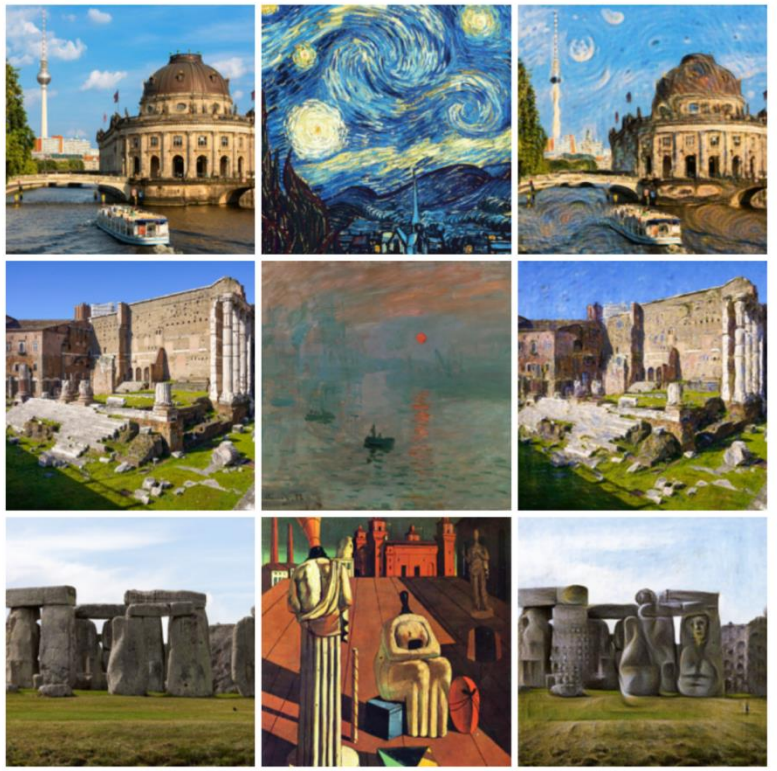
Downstream Tasks: Style Transfer



Results

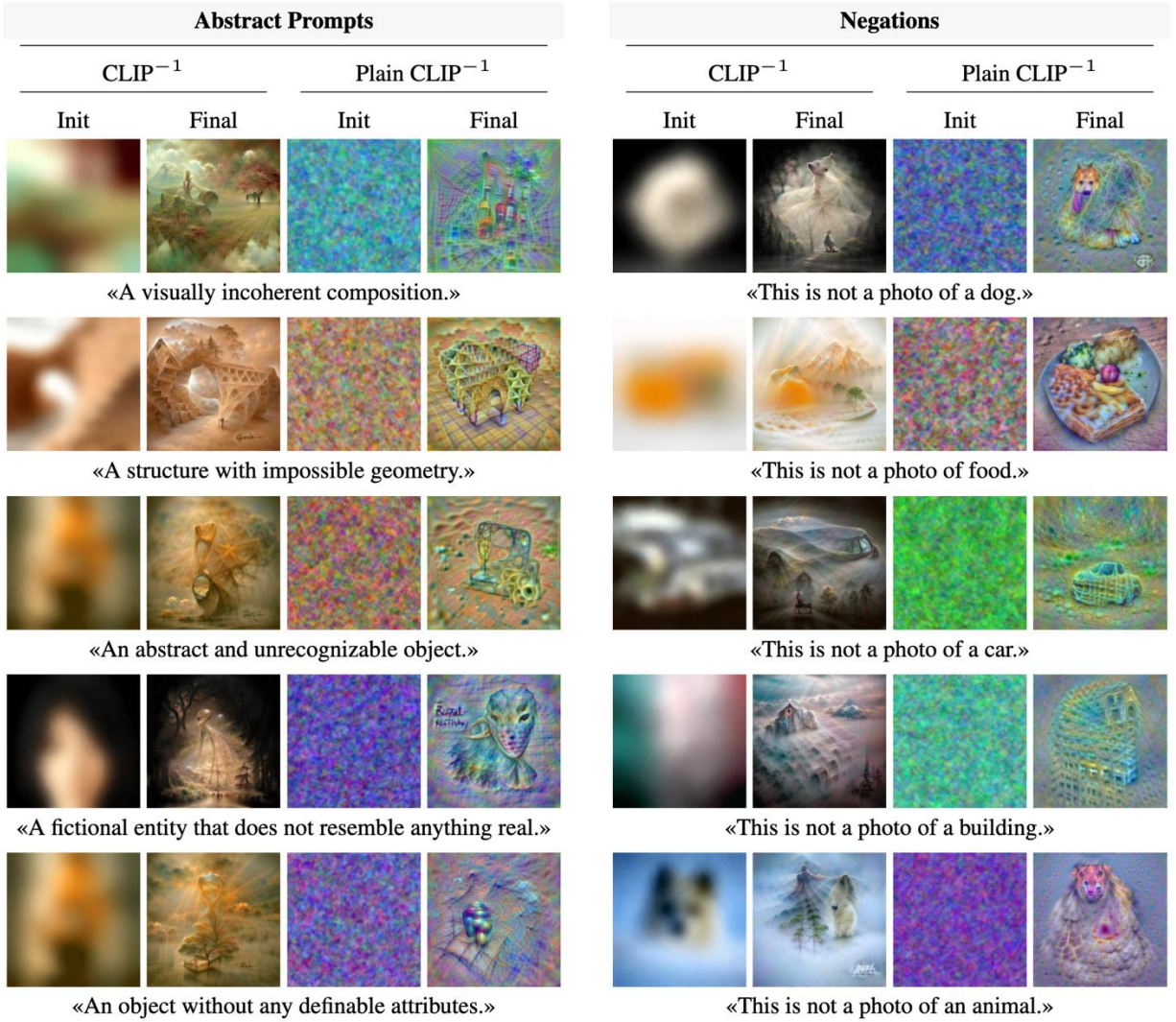


Original Prompt 1 Prompt 2



Original Reference Result

Interpretability of CLIP's embedding space



Thank you!