

AdaEraser: Training-Free Object Removal via Adaptive Attention Suppression

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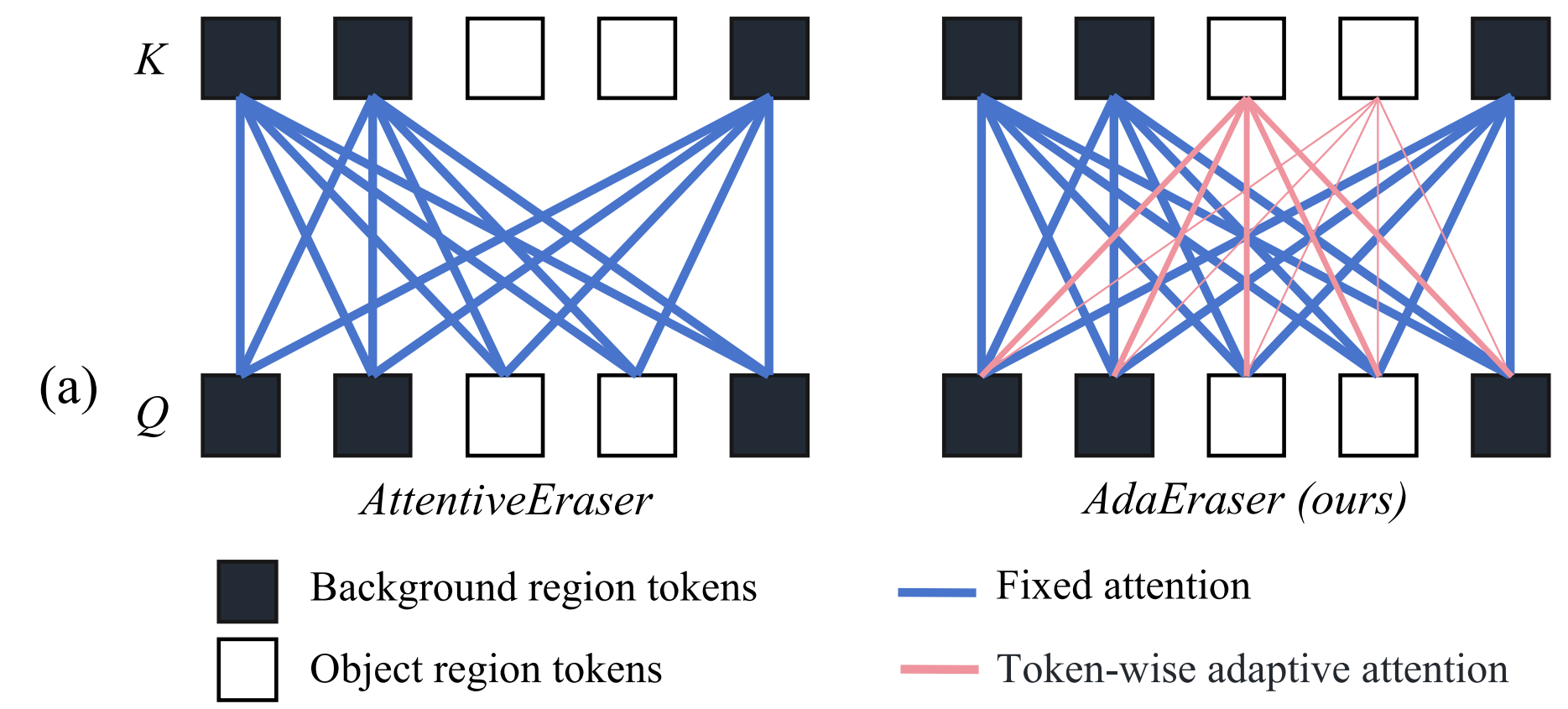


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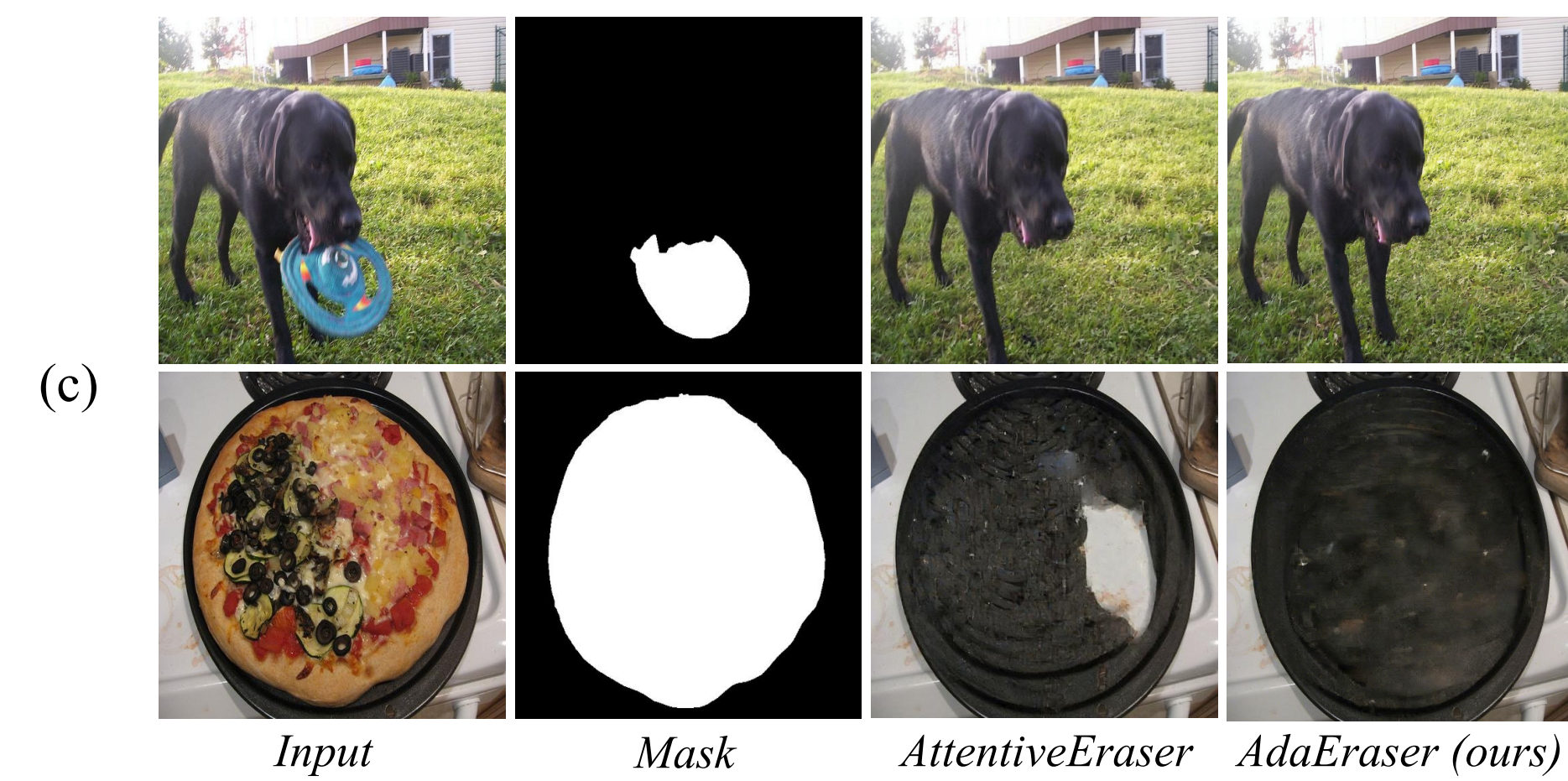
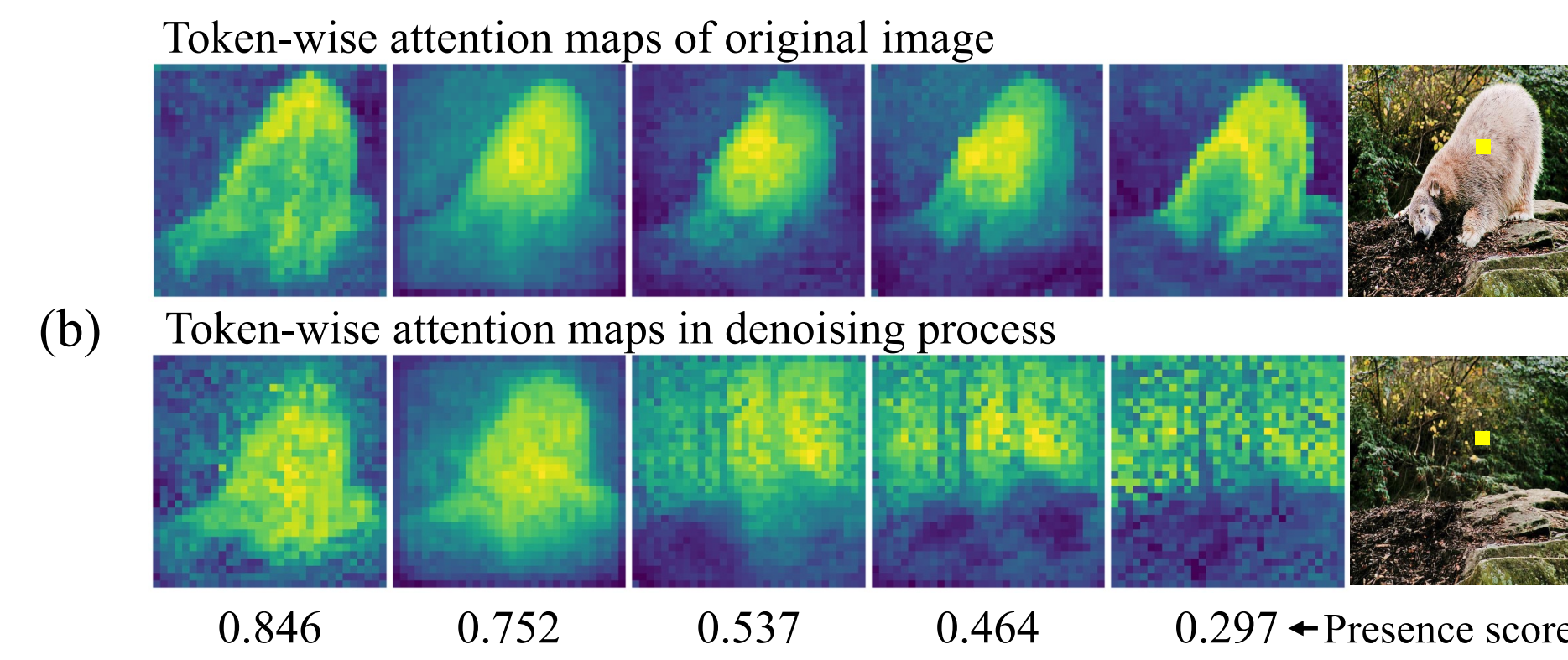
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Introduction

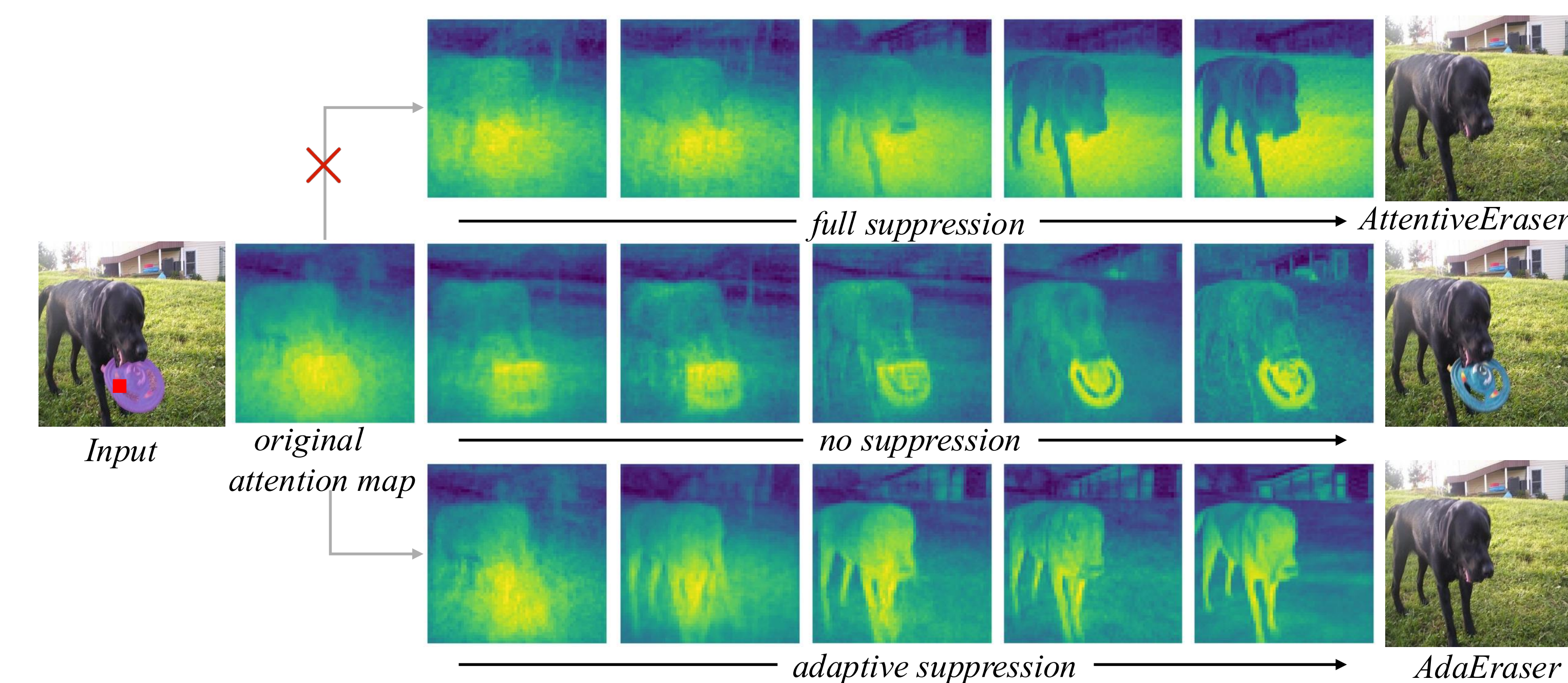


➤ AttentiveEraser suppresses self-attentions from image tokens in Q to object tokens in K.

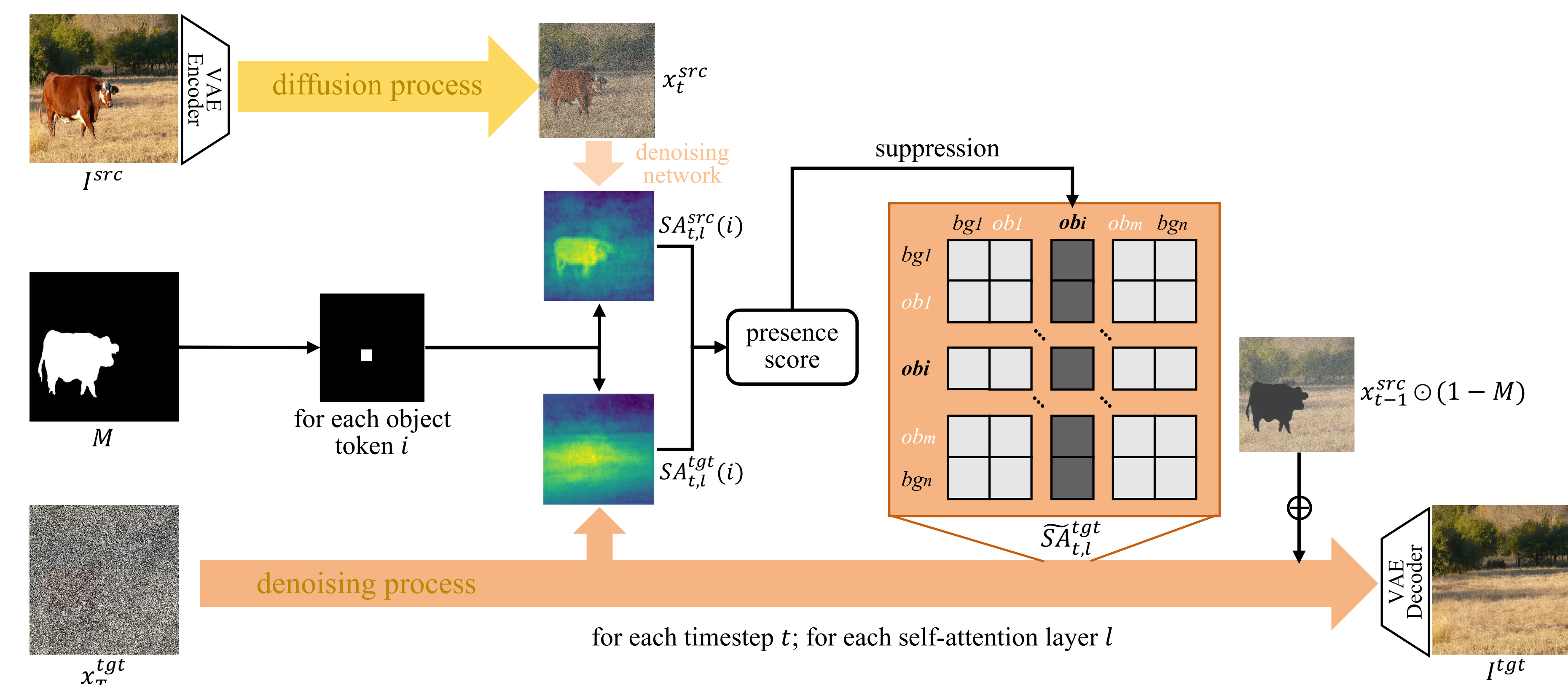
➤ AdaEraser adaptively adjust the suppression strength based on the presence level of the target object.



Motivation



Method



Overall Pipeline of AdaEraser

➤ We compare the self-attention maps within the object region before and during object removal to monitor the presence level of the target object.

➤ Token-wise presence scores are computed for all spatial tokens within the object region:

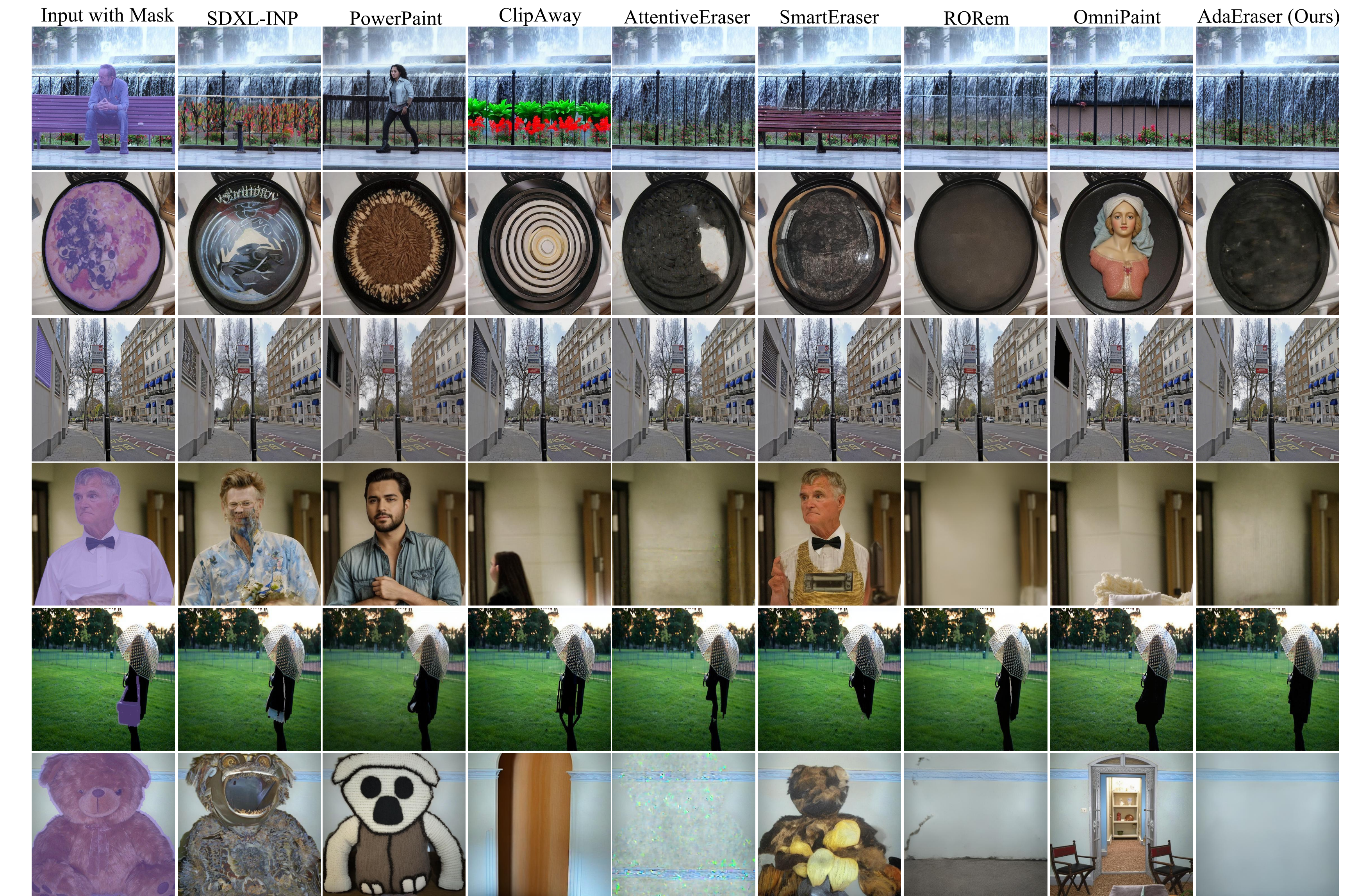
$$p(i) = \text{Sim}(SA_{t,l}^{tgt}(i), SA_{t,l}^{src}(i))$$

➤ We compute suppression coefficients based on the presence scores, then modulate the self-attention layers with these coefficients.

$$\eta(i) = \begin{cases} 1 - p(i), & \text{if } i\text{-th token} \in M \\ 1, & \text{otherwise} \end{cases}$$

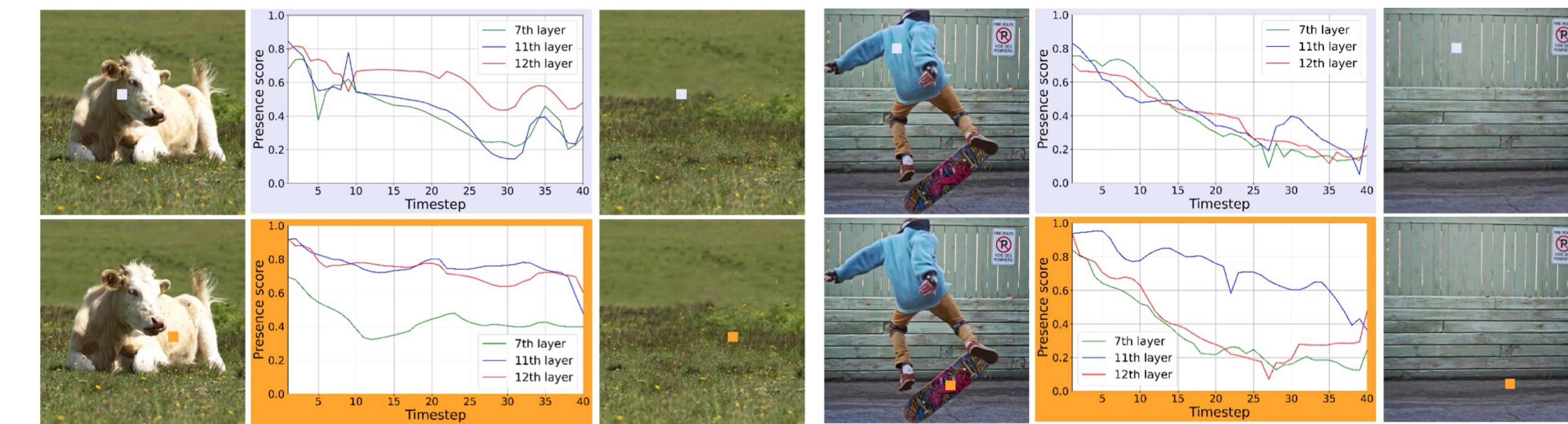
$$\widetilde{SA}_{t,l}^{tgt}(i) = \frac{\eta(i) \exp(QK_i^T / \sqrt{d})}{\sum_{j=1}^N \eta(j) \exp(QK_j^T / \sqrt{d})}$$

Results



Qualitative comparison.

Evolution of presence score



Evolution of presence score across timesteps. The curves represent different tokens in various layers.