



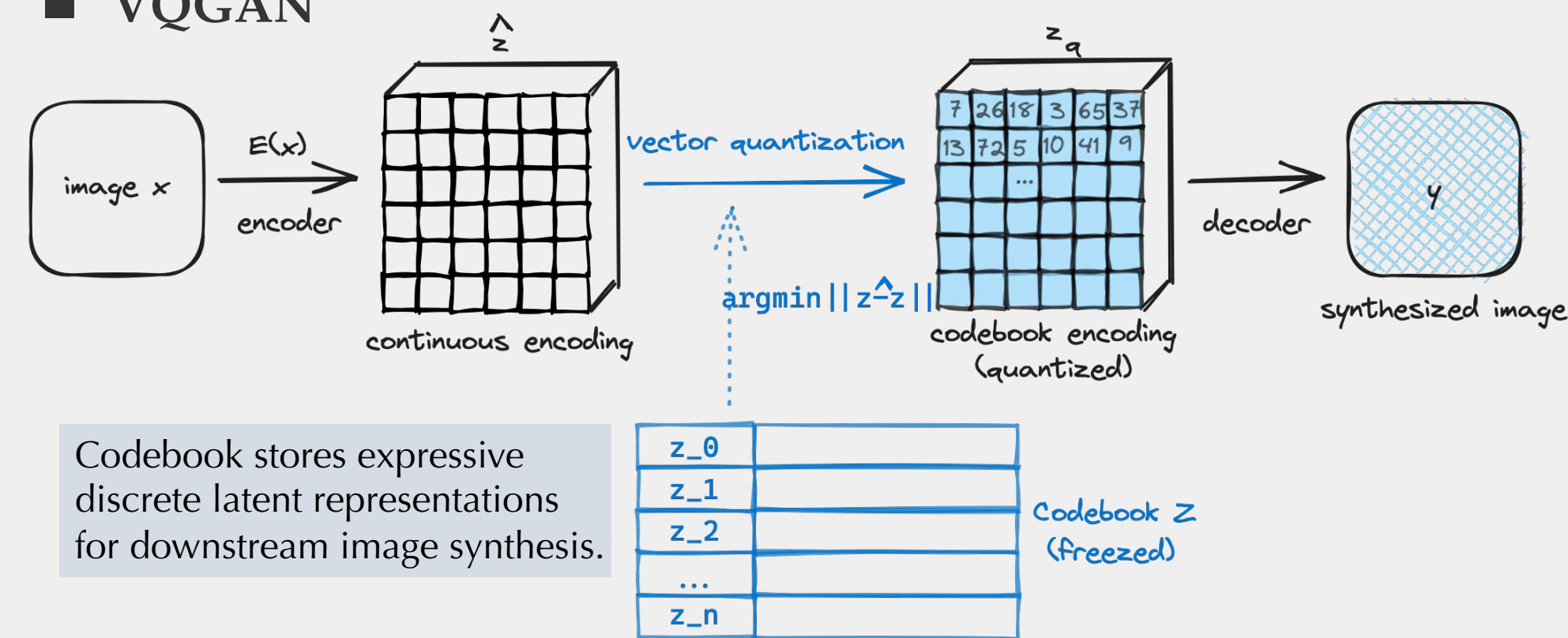
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TL;DR

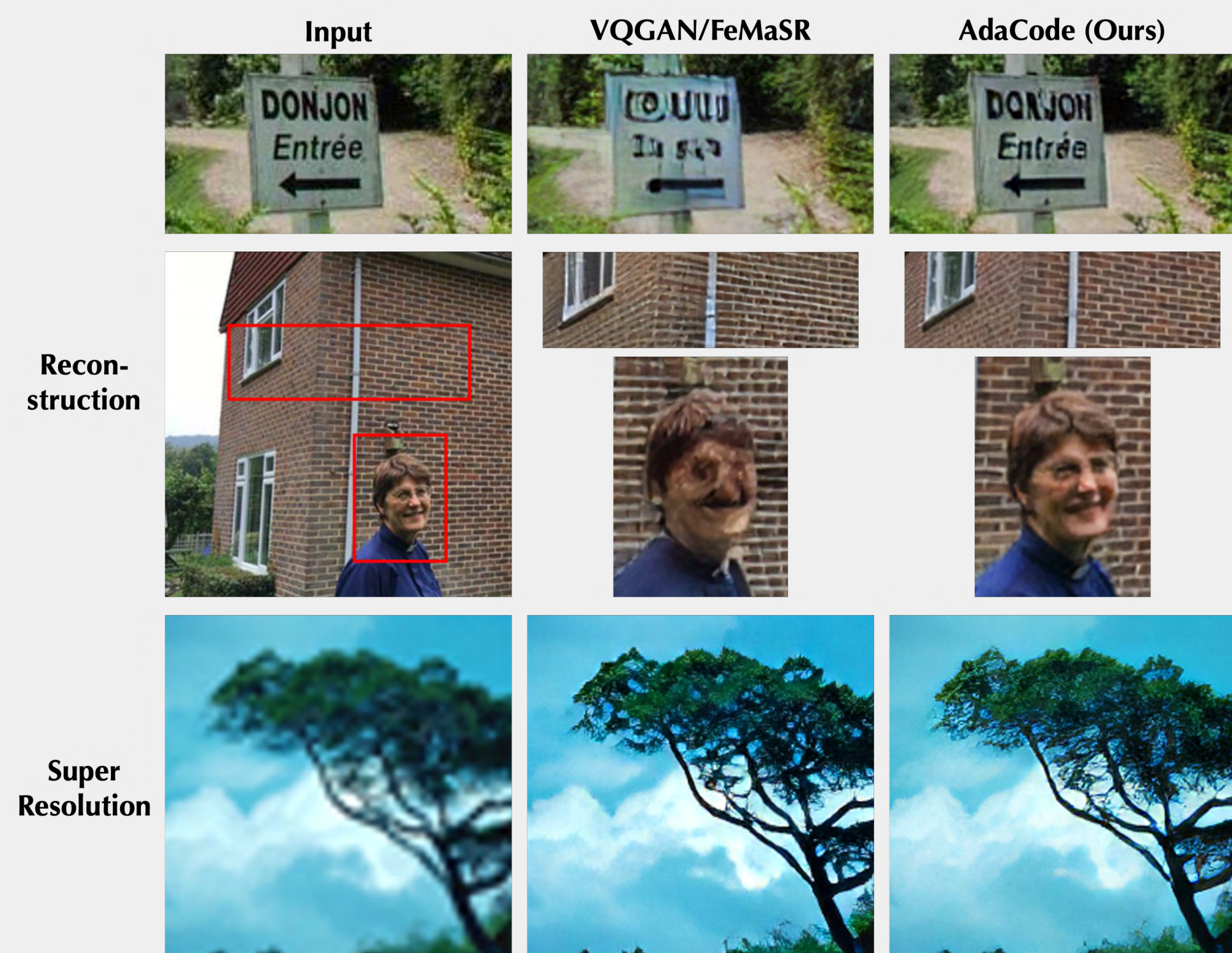
AdaCode learns image-adaptive codebooks for class-agnostic image reconstruction and restoration. Instead of learning a single codebook regardless of image content, we learn a set of basis codebooks and adaptively combine them to form a more flexible and expressive representation.

Motivation

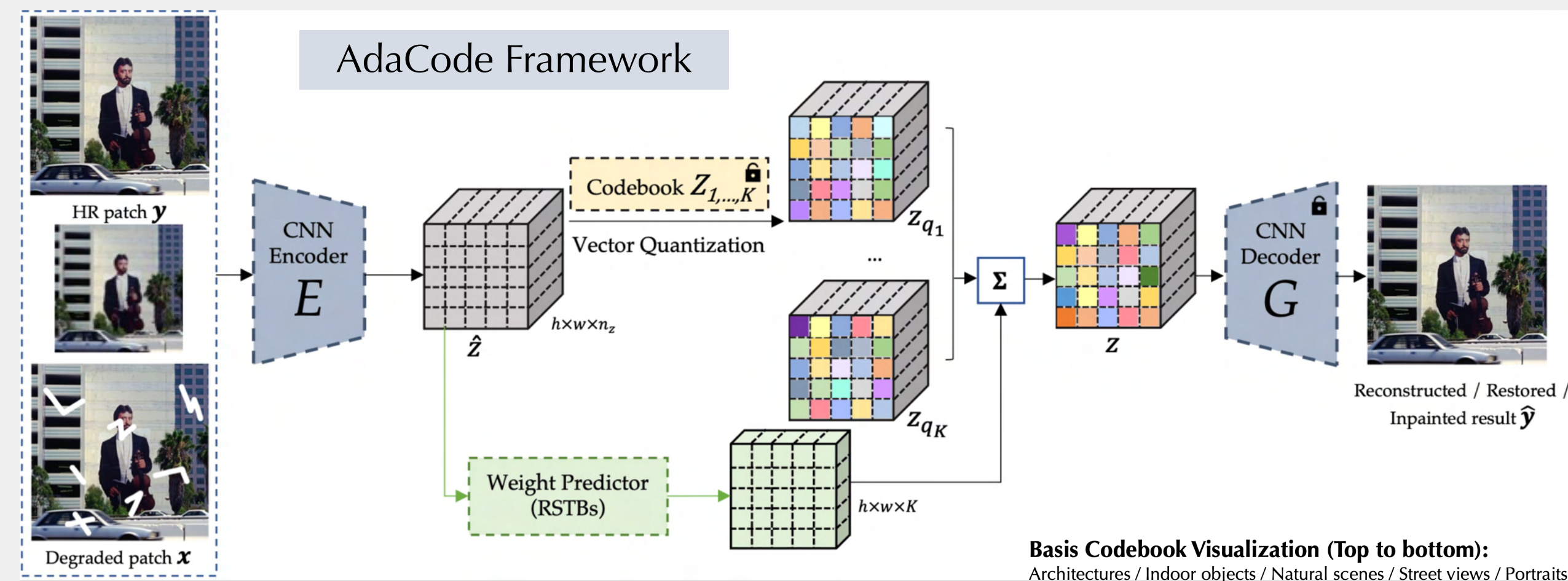
VQGAN



However, It's hard for a single codebook to capture all the intricate patterns in natural images.



Methodology

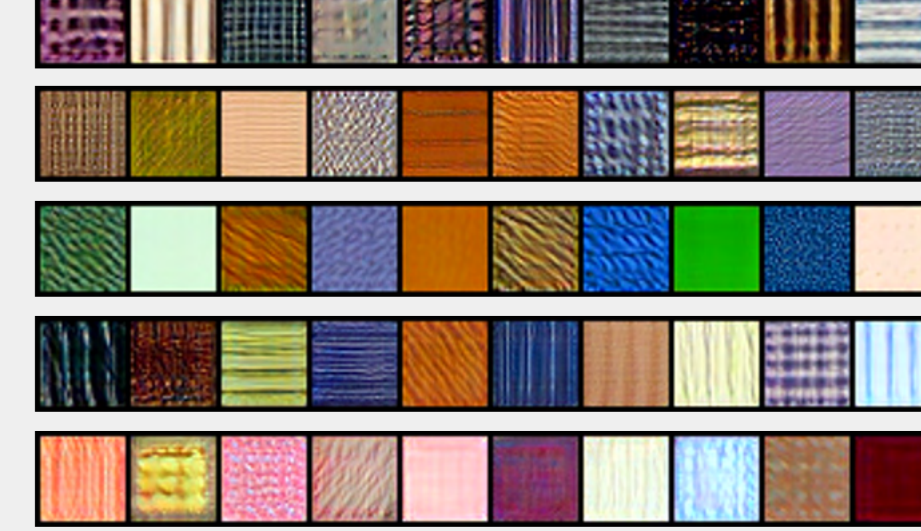


AdaCode training in 3 stages:

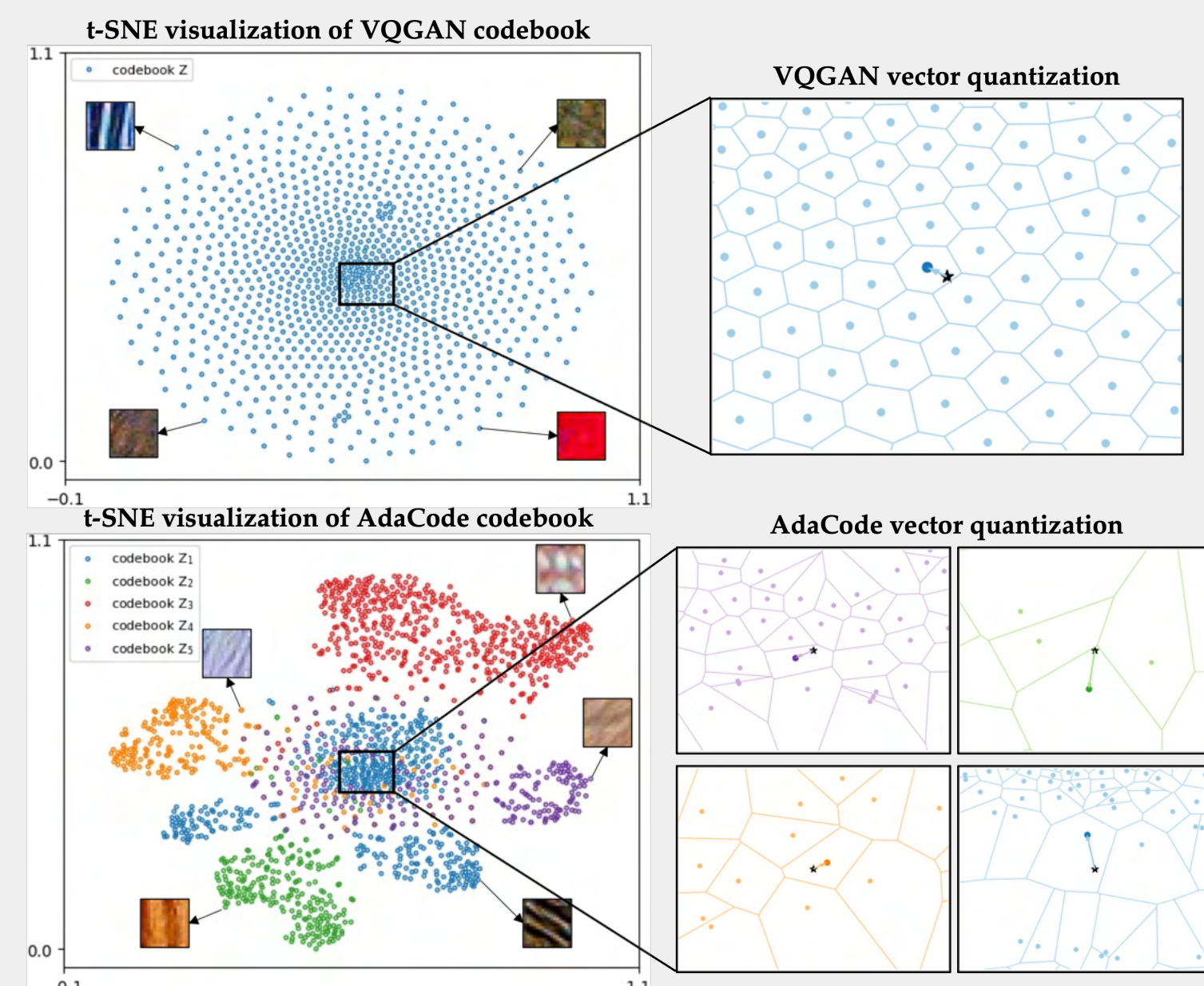
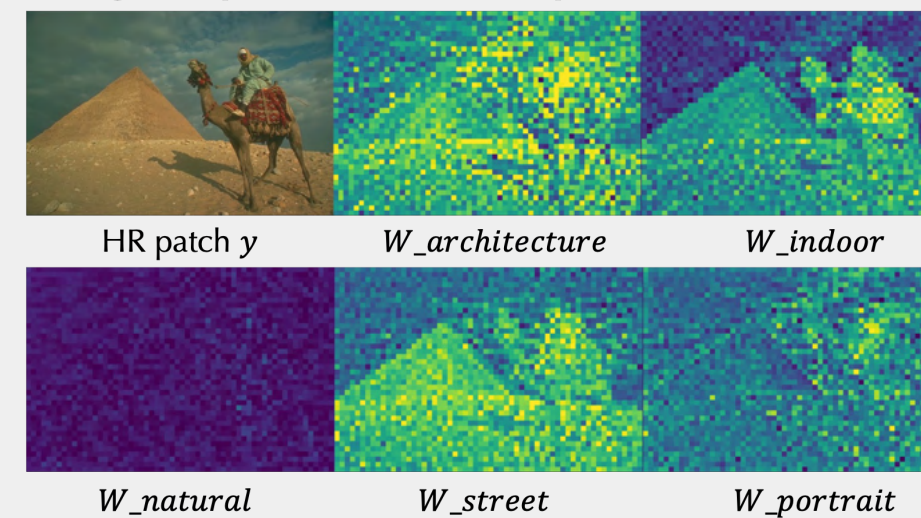
1. Class-specific codebook pretraining
Train separate VQGANs to reconstruct images on 5 semantically divided subsets.
→ 5 Basis Codebooks
2. AdaCode Representation Learning
Freeze all the basis codebooks. Train AdaCode to learn the image-adaptive weighted combination of basis codebooks and reconstruct images.
→ Weight Predictor + Decoder
3. Restoration via AdaCode
Freeze all the codebooks and the decoder. Train AdaCode for super-resolution and image inpainting.

Basis Codebook Visualization (Top to bottom):

Architectures / Indoor objects / Natural scenes / Street views / Portraits



Weight map visualization example:

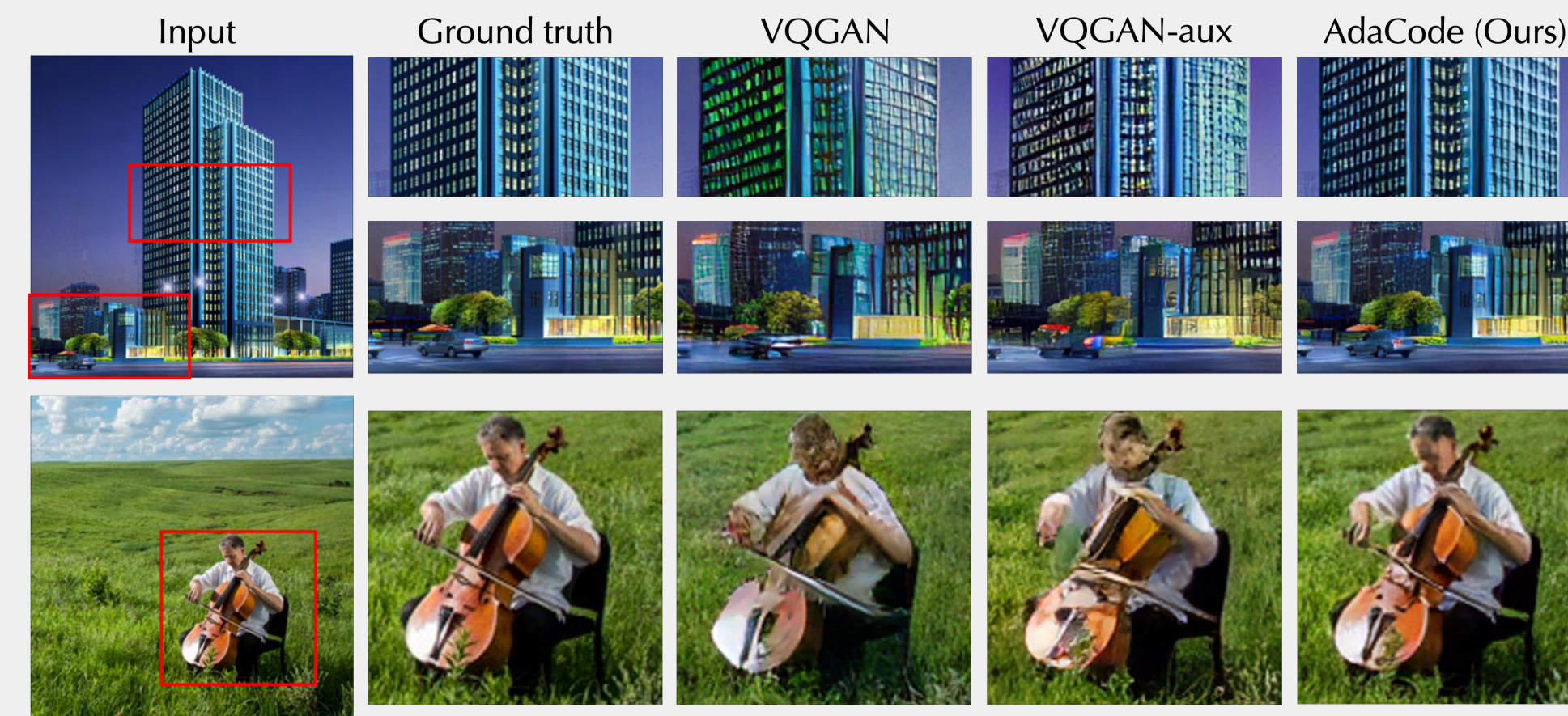


Intuition: Codebook is a **partition of the latent space**. Each representation in the degraded input x is pulled towards its nearest code entry, allowing for the information loss in x to be relatively compensated.

Compared to VQGAN which uses one general codebook, AdaCode flexibly forms a better approximation to alleviate the discrete code discontinuity.

Results

Reconstruction



VQGAN-aux: VQGAN with a merged codebook concatenating all the basis codebooks.

Super Resolution (4x)

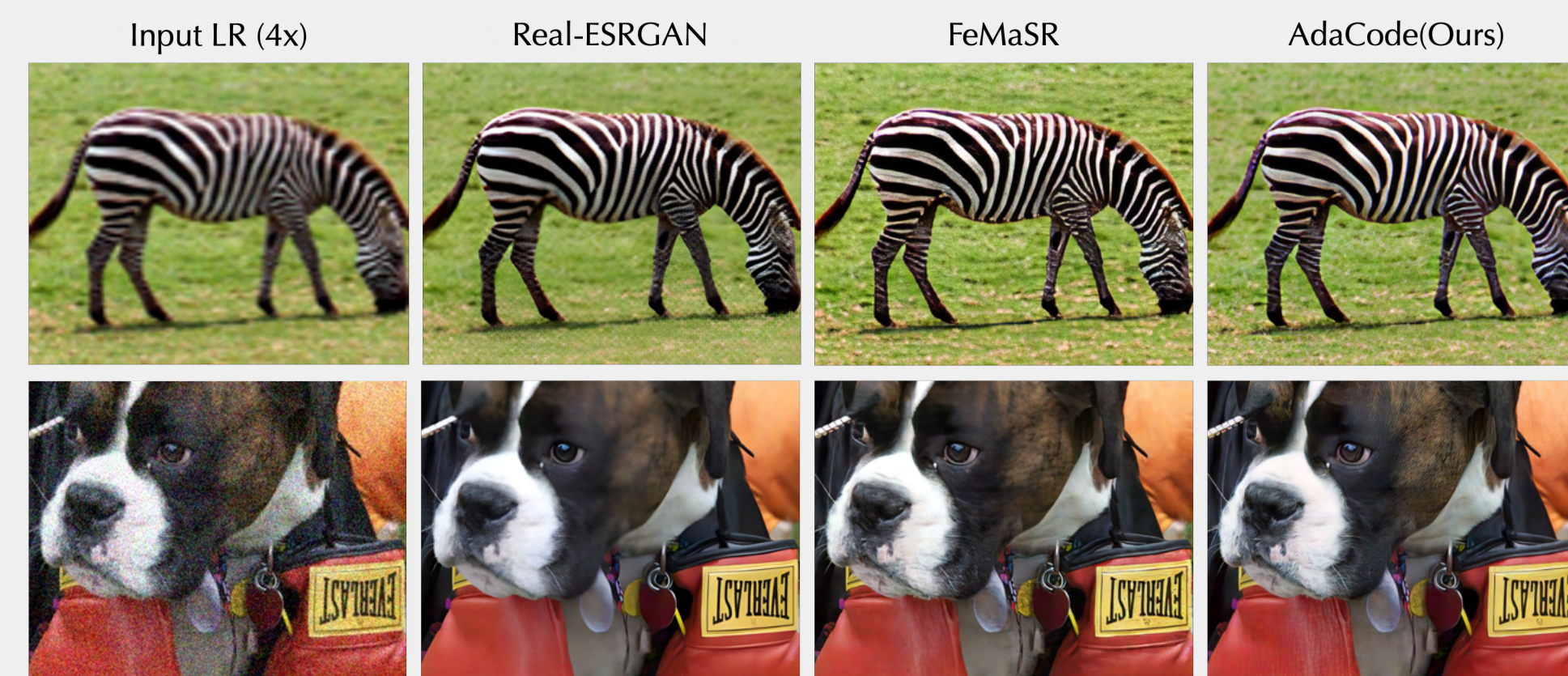


Image Inpainting

