



Quantized GANs for Mobile Image Reconstruction

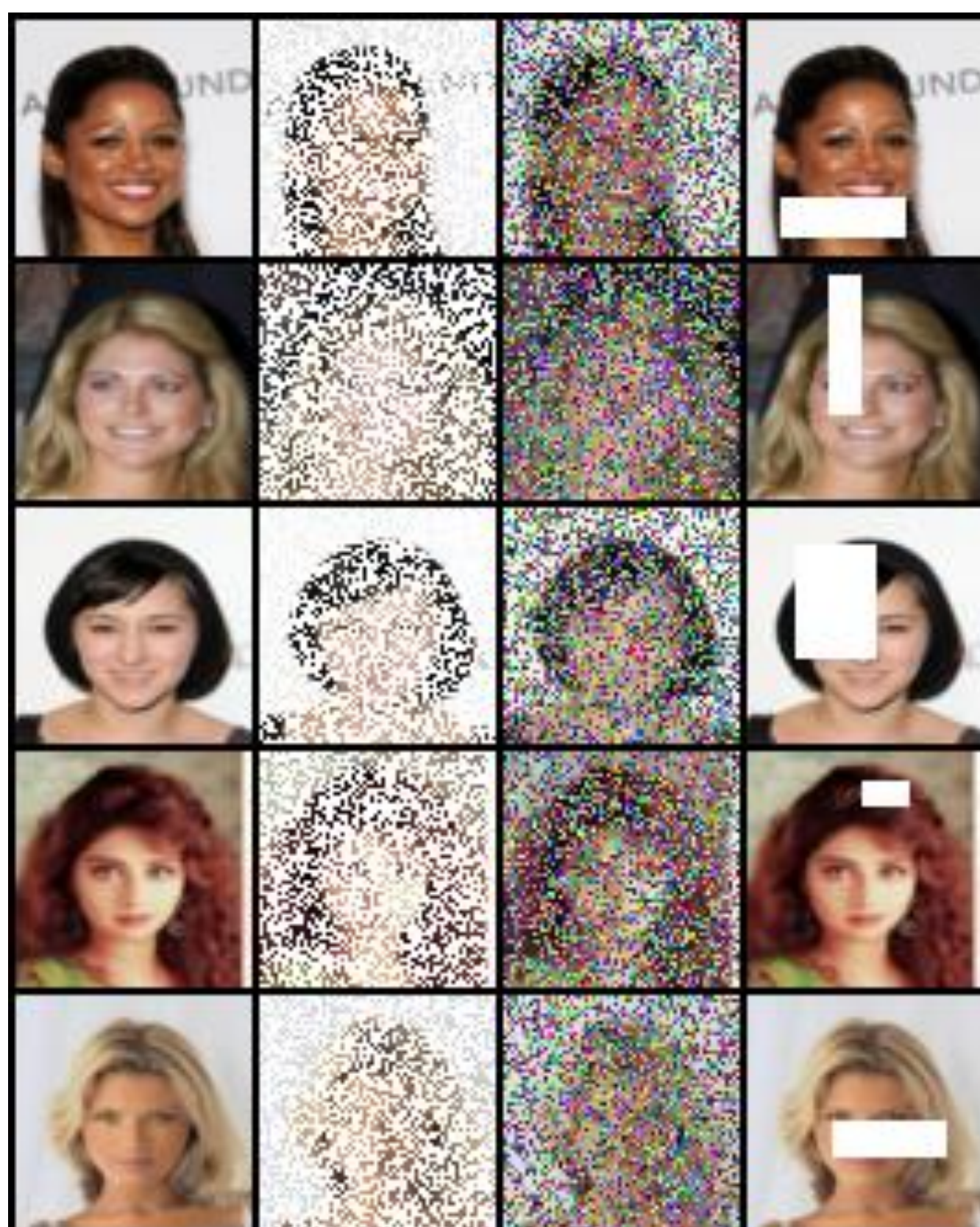
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CS 231n Spring 2019

Stanford
Computer Science

Problem Definition

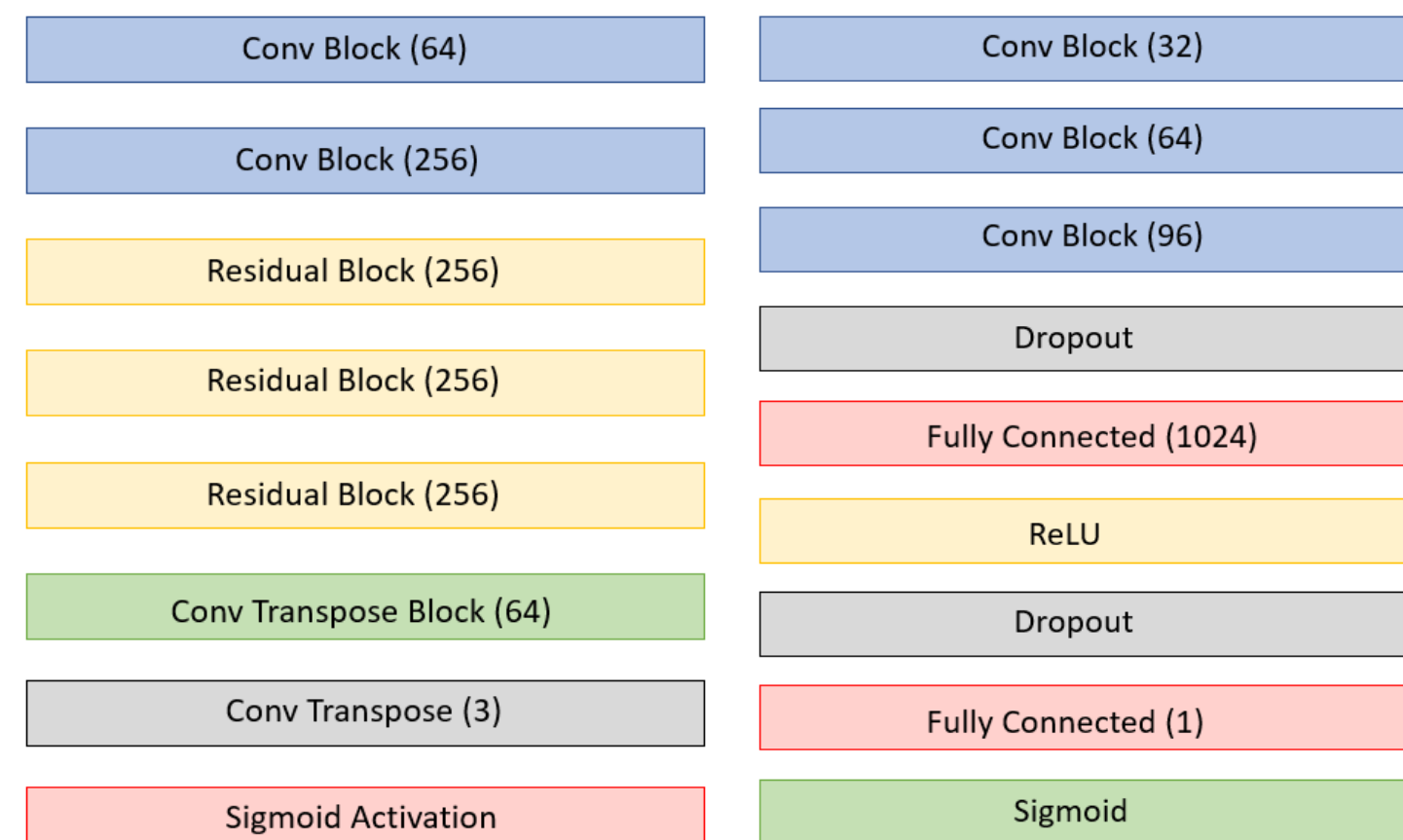
- Given an image, we add corruption in one of the following forms:
 - White Noise
 - RGB Noise
 - Partial Occlusion by White Box
- Our goal is to reconstruct the original image using a generator network.
- Used the CelebA dataset.

Original Noise 1 Noise 2 Noise 3



Methodology

Generative Adversarial Network



Generator

Discriminator

Loss Functions

$$\mathcal{L}_D(x) = -\log(D(x)) - \log(1 - D(G(x)))$$

$$L_1 = \log(1 - D(G(x)))$$

$$L_2 = \sum_{i=1}^N \|F^{(i)}(x) - F^{(i)}(G(x))\|_1$$

$$L_3 = \sum_{i=1}^N \|S^{(i)}(x) - S^{(i)}(G(x))\|_1$$

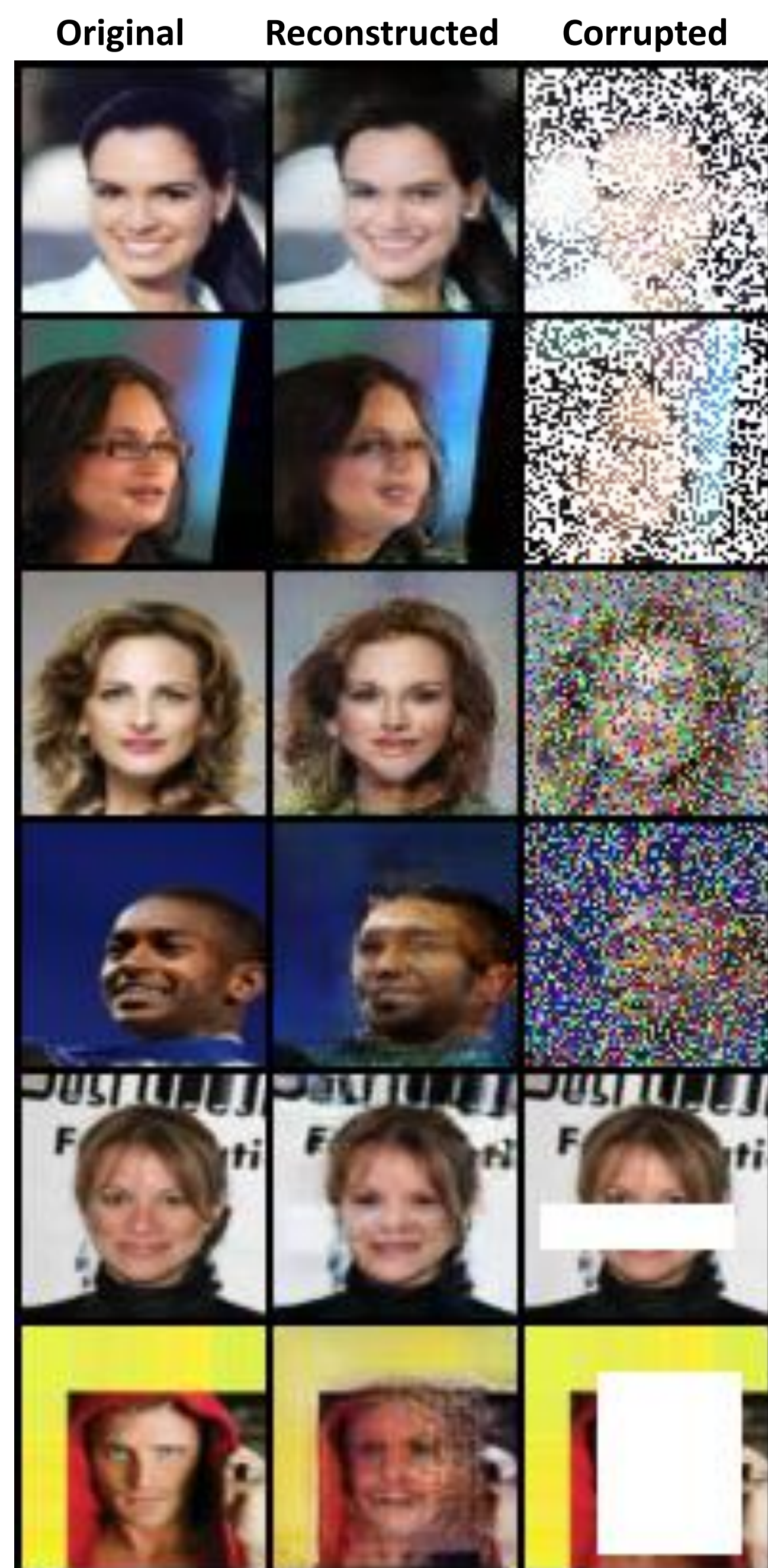
$$L_4 = \|x - G(x)\|_2^2$$

$$\mathcal{L}_G = \lambda_1 L_1 + \lambda_2 L_2 + \lambda_3 L_3 + \lambda_4 L_4$$

$$\lambda_1 = 1, \lambda_2 = \lambda_3 = 0.00001, \lambda_4 = 0.001$$

- x : the true image
- $G(x)$: the attempted reconstruction of x
- F^i : activation of discriminator i th layer (features)
- S^i : activation of squeezeNet i th layer (features)

Results



Results



Reconstruction of All-White Image

Quantization



L to R: Original, Corrupted, R32, R8, R6, R4

Model	PSNR			
	Average	White noise	RGB noise	Box
Noise	10.3	10.3	10.3	10.3
32-bit	21.2	22.5	20.1	21.5
8-bit	21.2	22.5	20.2	21.2
6-bit	21.3	22.3	20.1	21.3
4-bit	16.1	15.6	16.3	16.5
1-bit	8.5	8.5	8.7	8.3

Model	32-bit	8-bit	6-bit	4-bit	1-bit
Size	17.5 MB	4.4 MB	3.2 MB	2.2 MB	0.5 MB