

# Generative Compression

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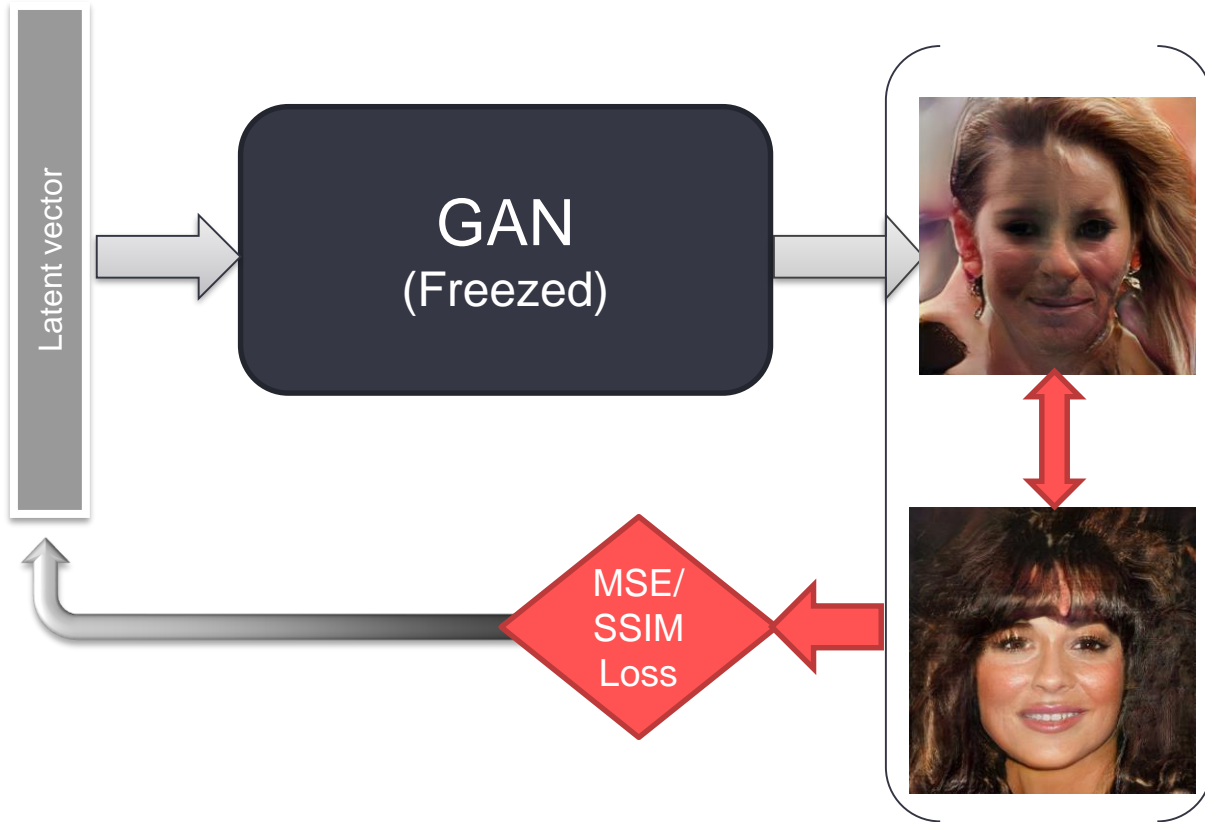
# Background

- Every day a huge amount of data is being sent across the internet
- Efficient data compression play a key role in reducing bandwidth and storage
- We explore the use of GAN and VAE-GAN for compression of images (can be extended to videos)

## Proposed Approaches

- Approach 1: Given an image and a pretrained GAN on the same domain, we can find the latent vector that produces the image
- Approach 2: Propose a VAE-GAN architecture that achieves high rate of compression when trained of a sufficiently large dataset

# Approach 1 Technical Details: GAN

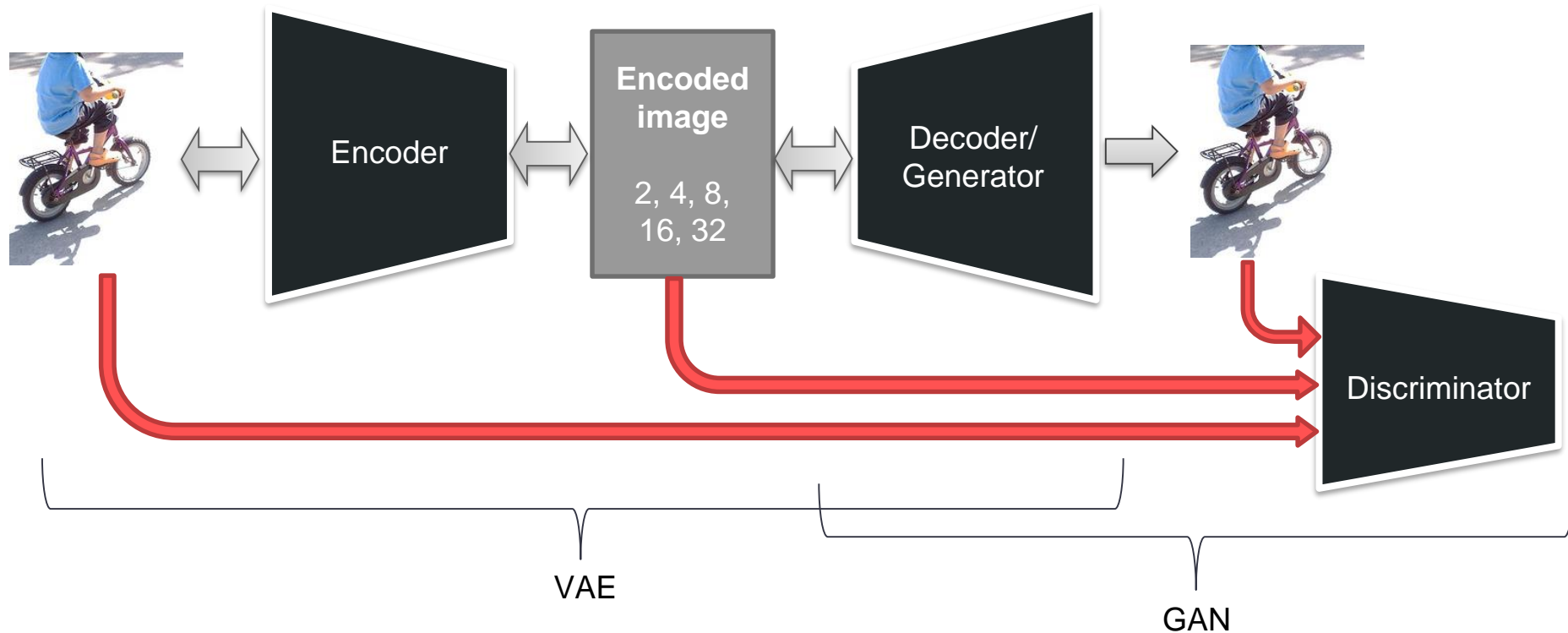


After 100 iterations



After 1000 iterations

## Approach 2 Technical Details: VAE-GAN



# Contributions (Novelty)

- Developed both the architectures from scratch
- Scrapped images from the web for the VAE-GAN training

## Sample Reconstructions

Approach 1



Original



GAN  
(176x)



Lossy 8 bits  
(412x)



Lossy 6 bits  
(495x)

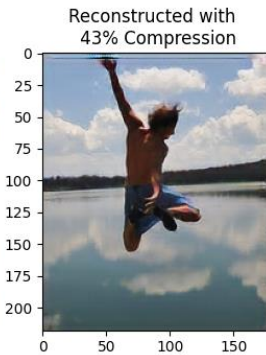
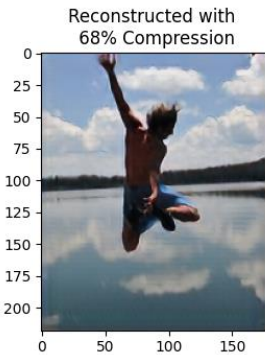
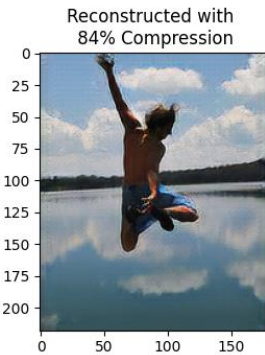
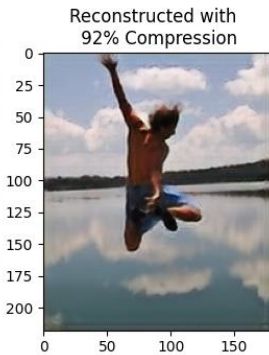
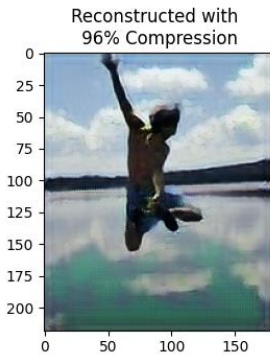
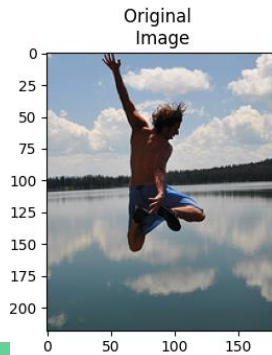


Lossy 8 bits  
(559x)



JPEG 1%  
(99x)

Approach 2



# Results & Conclusion

- We evaluate the models on the Structural Similarity Index (SSIM) and Peak Signal to Noise Ratio (PSNR) between the original image and reconstructed image.
- Though VAE-GAN seems to have lower compression ratio (CR), they practically perform better across different domains (unlike GANs).

**Table 1:** Approach 1: GAN Compression

Compression method	SSIM	PSNR	CR
GAN	0.79	26.48	176 ×
Lossy compression 8bits	0.77	25.06	412.5 ×
Lossy compression 6bits	0.67	25.06	495 ×
Lossy compression 4bits	0.46	25.06	559 ×
JPEG Quality 1%	0.51	19.96	99 ×

**Table 2:** Approach 2: VAE-GAN Compression

Number of Channel	SSIM	PSNR	CR
28 Channels	0.83	24.79	1.74 ×
16 Channels	0.80	24.37	3.06 ×
8 Channels	0.81	24.06	6.12 ×
4 Channels	0.79	23.57	12.24 ×
2 Channels	0.71	21.57	24.49 ×