Boundless: Generative Adversarial Networks for Image Extension

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Introduction

Image extension models have broad applications in image editing, computational photography and computer graphics. Comparing with in-painting model " Context Encoder " as baseline, we implemented conditioning in a GAN to train an image extension model. Furthermore, we experimented with different batch sizes to observe the influence on the results. Here we focus on the four experiments below:

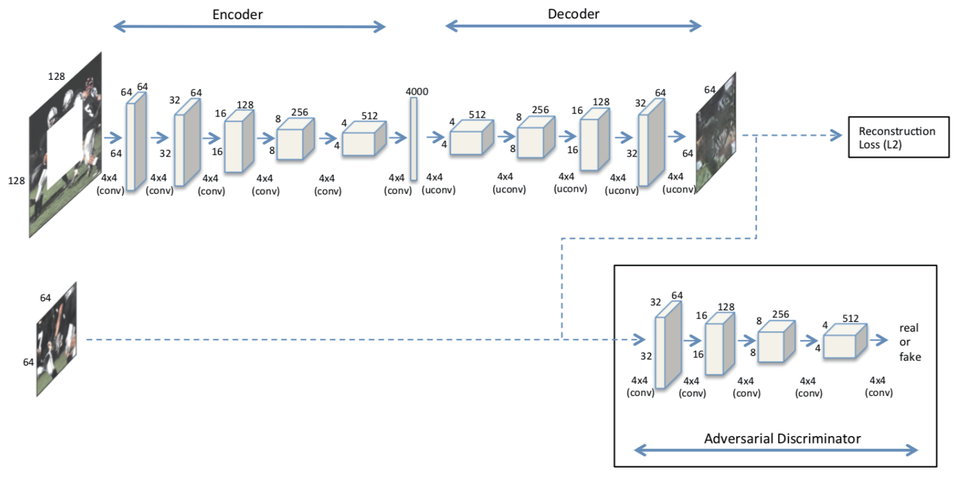
- Experiment 1: Baseline model with batch size = 8
- Experiment 2: Baseline model with batch size = 16
- Experiment 3: Ours with batch size = 8
- Experiment 4: Ours with batch size = 16

Dataset:

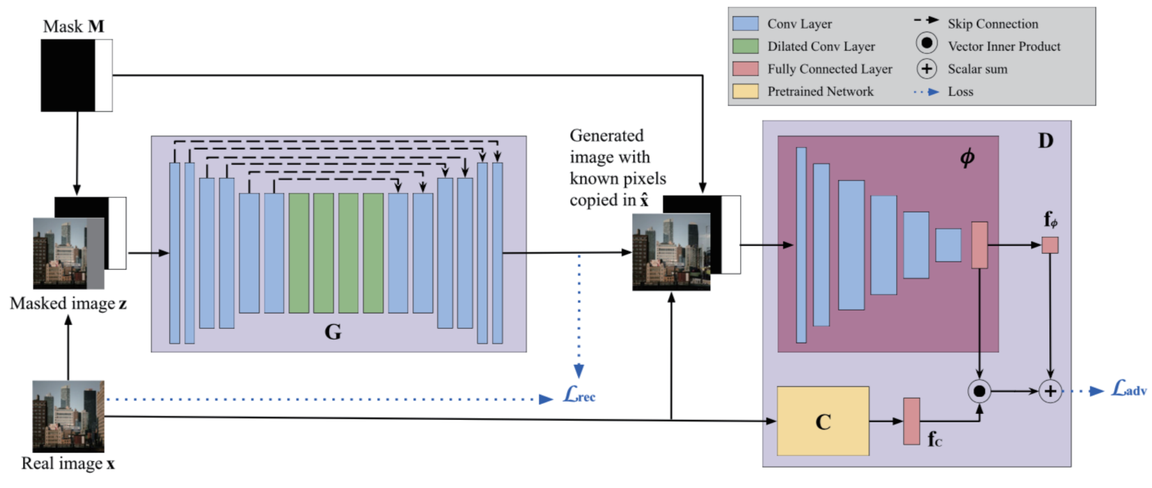
- MIT places dataset: islet, sandbar, ocean, forest road, mountain
- 2455 images in total
- Image size: 256 x 256

Methodology

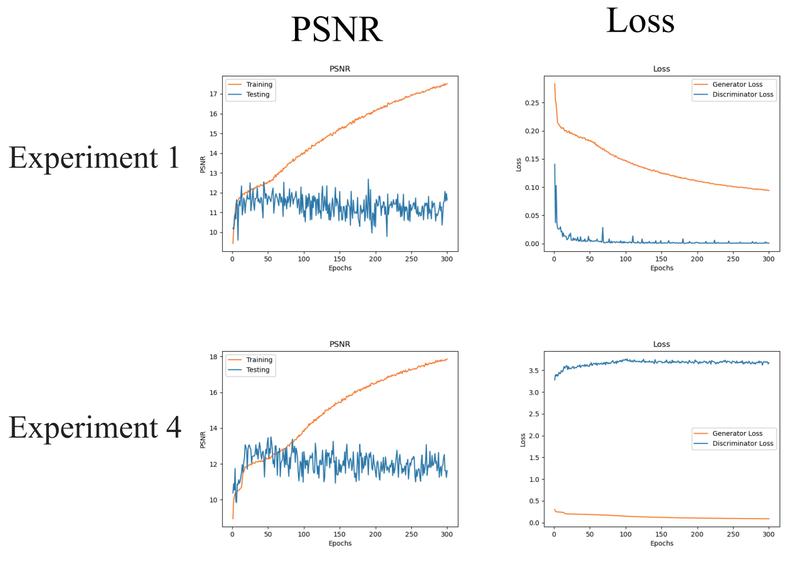
Context Encoder (baseline)



Ours



Experimental Results



PSNR

model \ score	test psnr	train psnr
Experiment 1	12.68	12.26
Experiment 2	12.49	17.00
Experiment 3	13.48	**18.02**
Experiment 4	**13.50**	17.86

PSNR for different testdata classes

model \ score	islet	sandbar	ocean	forest road	mountain	baseball field
Experiment 1	13.32	11.27	11.43	9.62	11.32	9.42
Experiment 2	13.21	11.79	11.57	9.69	11.79	9.49
Experiment 3	13.67	11.57	12.00	10.10	11.88	9.64
Experiment 4	**13.73**	**12.07**	**12.02**	**10.21**	**12.01**	**9.75**

Conclusion

- Models trained with conditioning have better performance than baseline.
- Training with larger batch size would generate more smooth images, which makes them blurred.
- When testing on different classes, can obviously observe models having better performance on specific datasets.

Reference: [1] Deepak Pathak, Philipp Krahenbuhl, Jeff Donahue, Trevor Darrell, Alexei A. Efros. Context Encoders: Feature Learning by Inpainting. CVPR 2016
[2] Piotr Teterwak, Aaron Sarna, Dilip Krishnan, Aaron Maschinot, David Belanger, Ce Liu, William T. Freeman. Boundless: Generative Adversarial Networks for Image Extension. arXiv:1908.07007 [cs.CV]