Project 4 - Diffusion Models

Part 0 Setup

Prompts to DeepFloyd IF Model, Random Seed Used (180)

Stage I (low-res) and **Stage II**'s (high-res) Num_Iterations were changed as follows (Stage I x II)

| **20x20** | **40x10** | **10x40** |

(1) 'an oil painting of a snowy mountain village'

(2) 'a man wearing a hat'


(3) 'a rocket ship'

Stage II demonstrates a much higher performance boost when increased from 20 -> 40, The computational cost also increases because Stage II is the high-resolution (texture, edges, lighting) stage compared to the low-result Stage I (structure, object location, object-pose).

Overall I would recommend increasing the iterations of Stage II while slightly decreasing the iterations of Stage I for high-quality images.
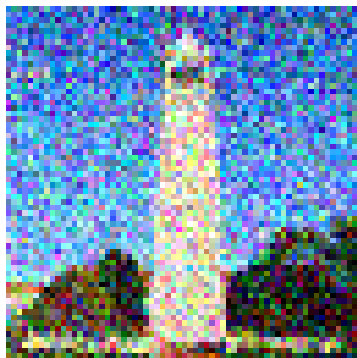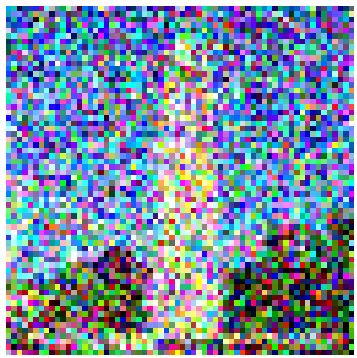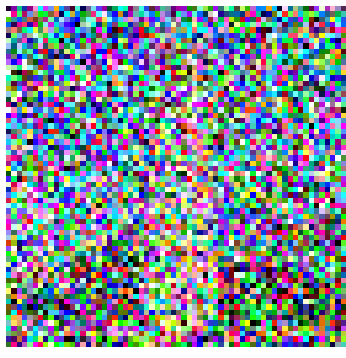
Part 1
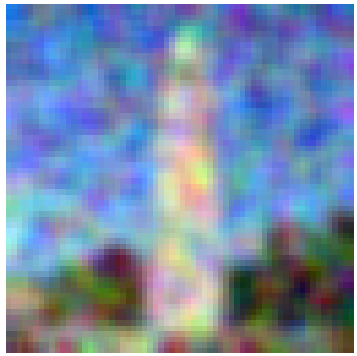
1.1 Noisy Test Images

Noise added by the forward process
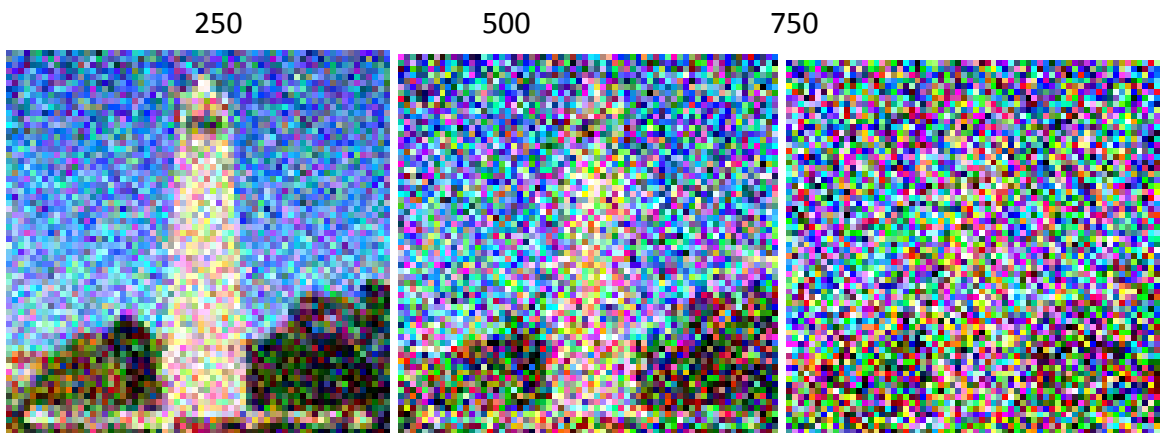
250	500	750

1.2 Gaussian Blur

Gaussian added in second row

250	500	750

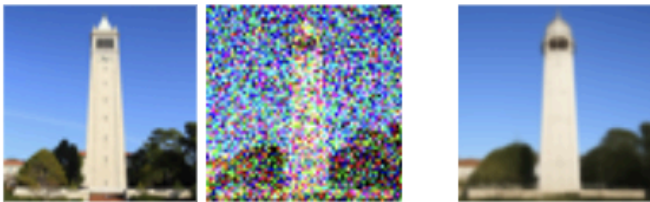## 1.3 One Step Denoising with pretrained UNet
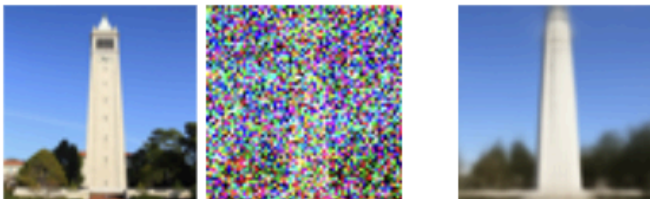
Reverse forward process

Original   Noisy t=250 One-step Denoised
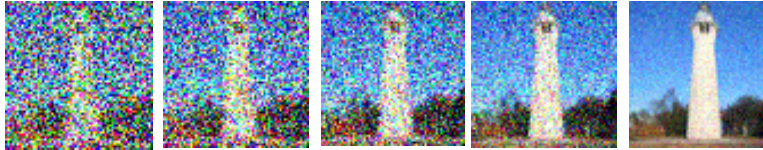

Original   Noisy t=500 One-step Denoised

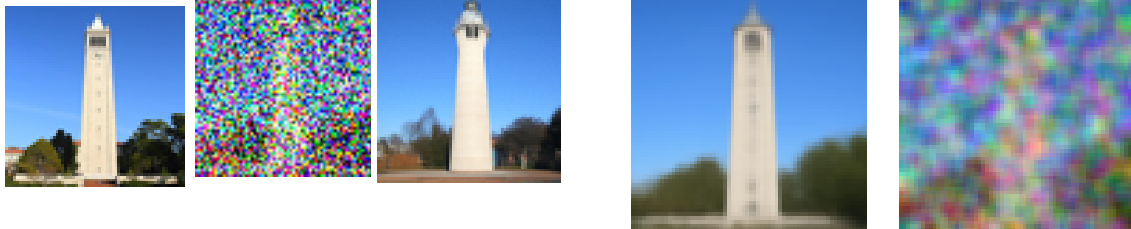Original   Noisy t=750 One-step Denoised

1.4 Iterative Denoising

Step 0 Step 5 Step 10 Step 15 Step 20
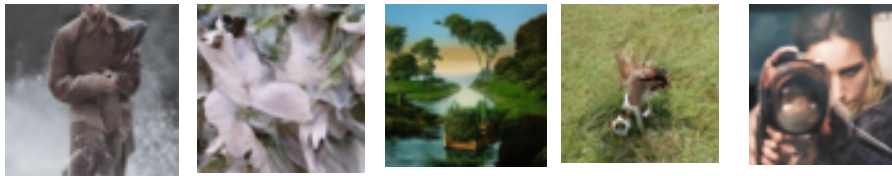

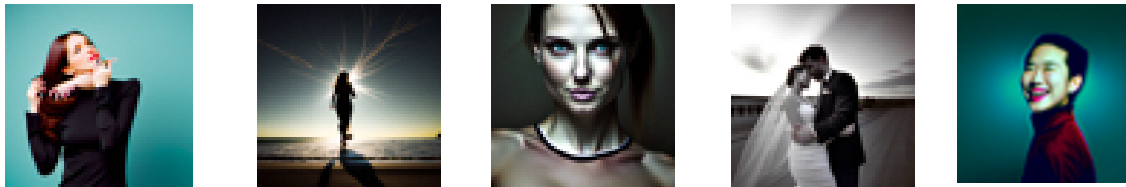Original Noisy t=690 Iterative Denoising One-Step Denoising Gaussian Blur

1.5 Diffusion Model Sampling

Sample 1 Sample 2 Sample 3 Sample 4 Sample 5
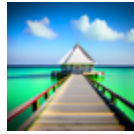

1.6 Classifier Free Guidance

CFG Sample 1 CFG Sample 2 CFG Sample 3 CFG Sample 4 CFG Sample 5
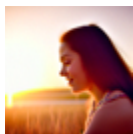
1.7 Image to Image Translation

Test Image | i_start = 1	Test Image | i_start = 3	Test Image | i_start = 5	Test Image | i_start = 7	Test Image | i_start = 10	Test Image | i_start = 20

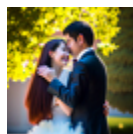| Test 1 | i_start = 1	Test 1 | i_start = 3	Test 1 | i_start = 5	Test 1 | i_start = 7	Test 1 | i_start = 10	Test 1 | i_start = 20
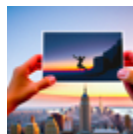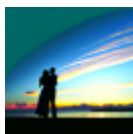
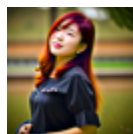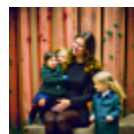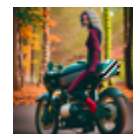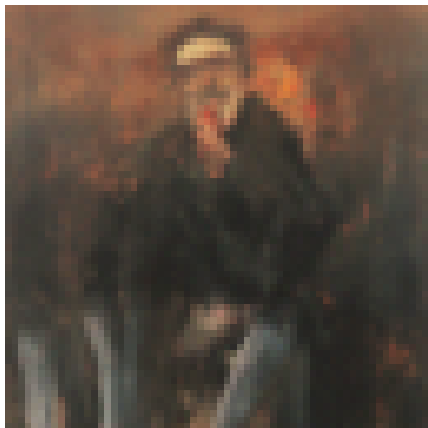| Test 2 | i_start = 1	Test 2 | i_start = 3	Test 2 | i_start = 5	Test 2 | i_start = 7	Test 2 | i_start = 10	Test 2 | i_start = 20

Part 3 Visual Anagrams

Upright: an oil painting of an old man

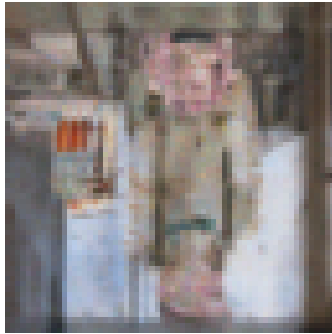Flipped: an oil painting of people around a campfire

Upright: a lithograph of waterfalls

Flipped: a lithograph of a skull

Upright: a photo of a man

Flipped: a photo of a hipster barista