

An example for Project III

Tianmin Shu

1 Filters

On top of the given 17 filters, we add 12 Gabor filters with size of 15 and orientations of 0, 30, 60, 90, 120 and 150. In addition, we add 2 first order gradient filters with different direction than the given ones and a 1×1 filter. Totally, we have 32 filters. Fig. 1 shows some of the filters.

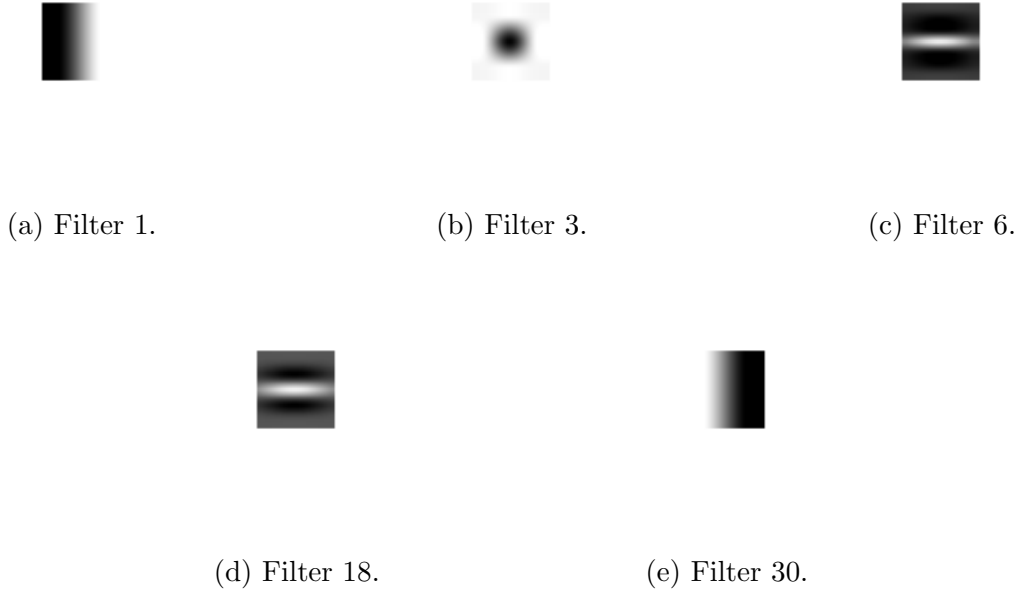


Figure 1: Some filters.

2 Results

The initial T is set to be T_0 and decreasing coefficient is β . (Choose your own coefficients for T_0 and β through experiments.) We use 15 bins and assign them with weights: $[8, 7, 6, 5, 4, 3, 2, 1, 2, 3, 4, 5, 6, 7, 8]$. To accelerate the computation, we just consider $[0, 7]$ gray intensity range for each pixel.

We also crop and resize the sizes of original images to be 256×256 .

2.1 Fur

The result using 28 filters out of all 32 filters is good enough. The chosen filters are 26, 8, 16, 1, 32, 2, 29, 25, 12, 31, 22, 30, 23, 19, 28, 27, 15, 4, 24, 20, 6, 21, 18, 5, 10, 17, 13. Fig. 2 shows the curve of the average weighted error per bin over the number of filters used for synthesis.

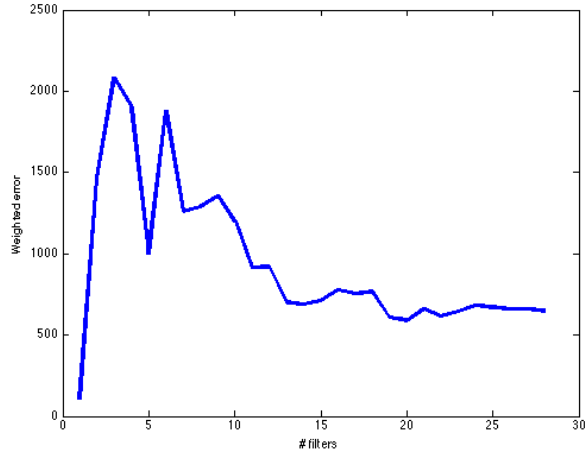
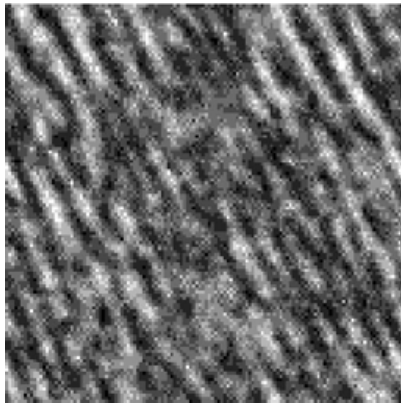
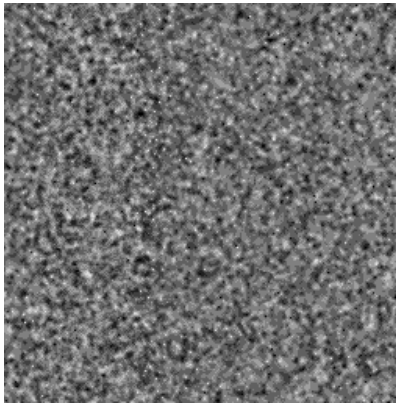


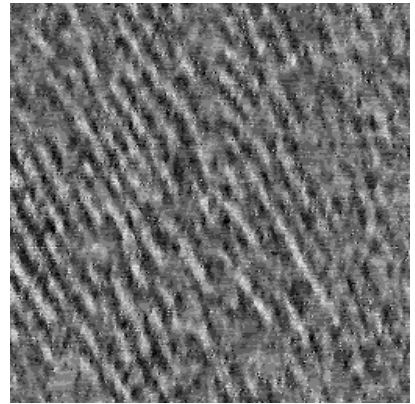
Figure 2: Error over the number of filters used (fur).



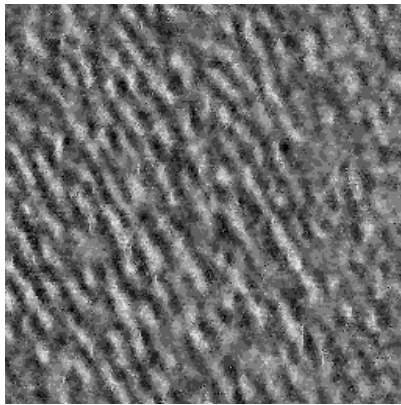
(a) Original.



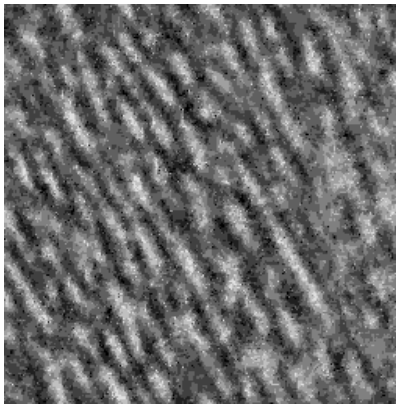
(b) 1 filter.



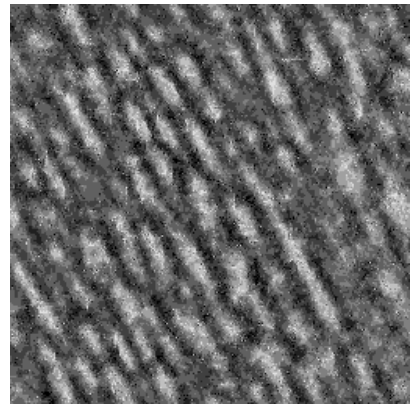
(c) 5 filters.



(d) 10 filters.



(e) 20 filters.



(f) 28 filters.

Figure 3: Synthesized images (fur).

2.2 Stucco

We finally choose 20 filters out of all 32 filters. The chosen filters are 32, 16, 3, 26, 12, 2, 20, 14, 4, 29, 31, 23, 10, 1, 6, 30, 19, 27, 5, 9.

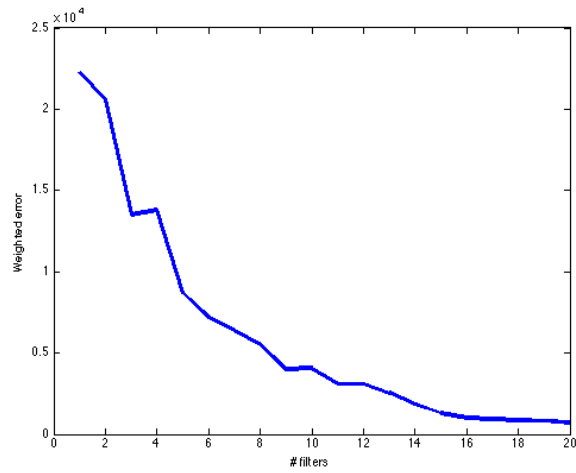


Figure 4: Error over the number of filters used (stucco).

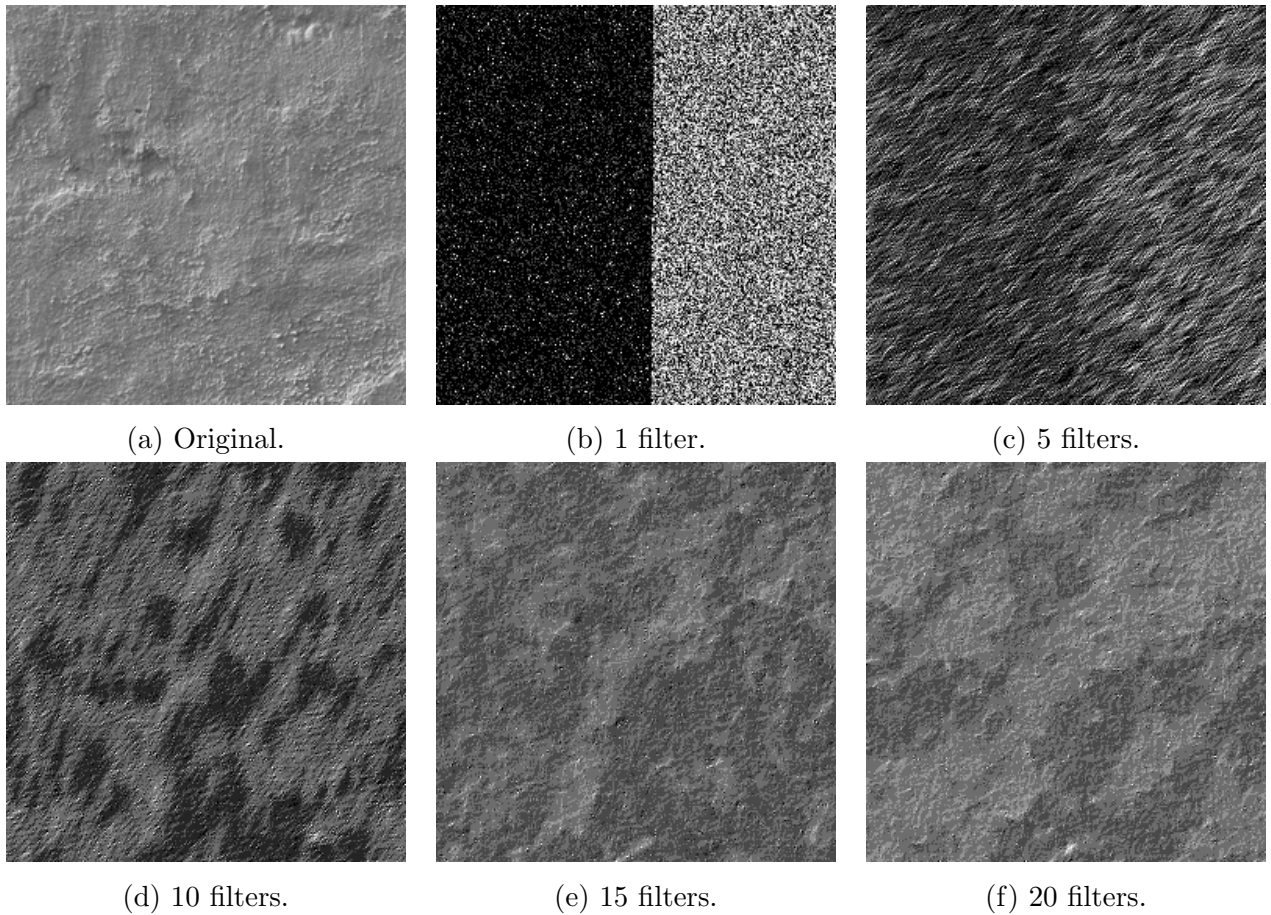


Figure 5: Synthesized images (stucco).

2.3 Grass

We choose 20 filters out of all 32 filters. The chosen filters are 32, 5, 3, 25, 6, 2, 27, 23, 4, 8, 1, 12, 10, 16, 31, 24, 14, 29, 26, 30.

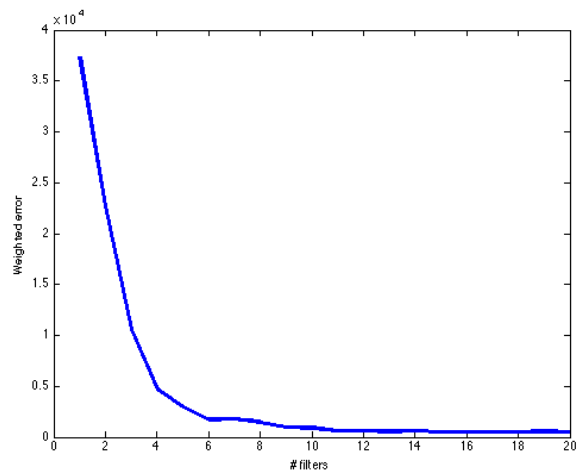
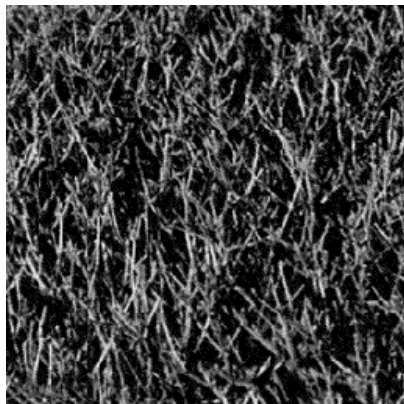
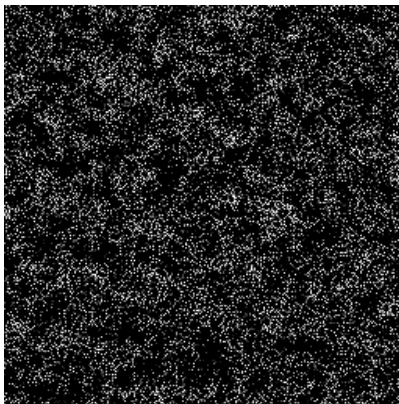


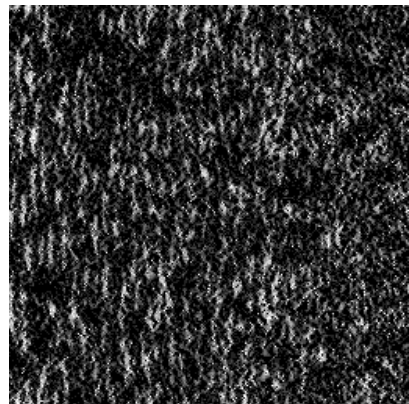
Figure 6: Error over the number of filters used (grass).



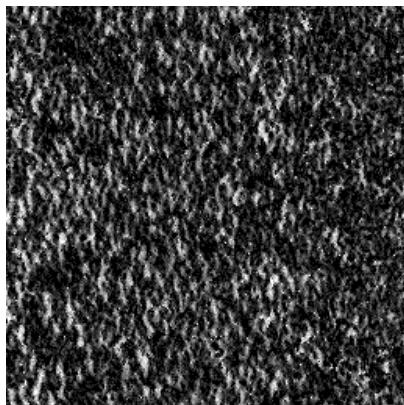
(a) Original.



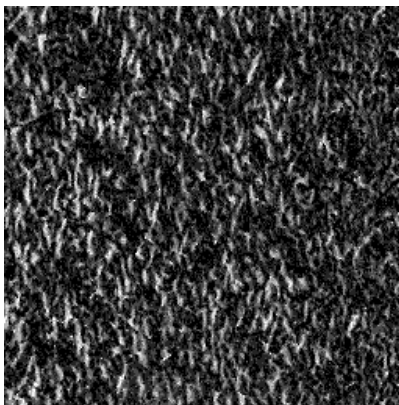
(b) 2 filters.



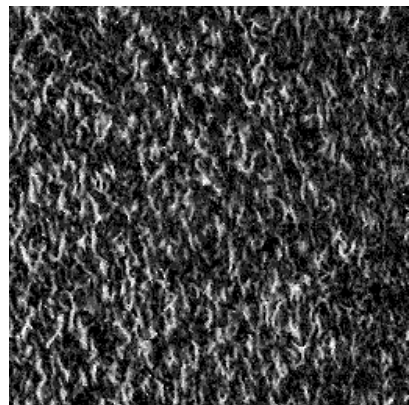
(c) 5 filters.



(d) 10 filters.



(e) 15 filters.



(f) 20 filters.

Figure 7: Synthesized images (grass).