Zhongyao Chu 20123

Q1. Image Smoothing

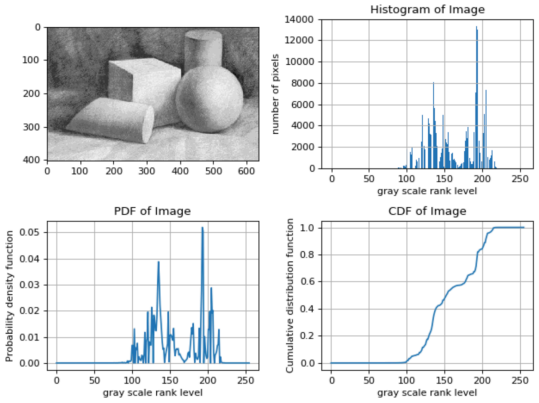


figure 1.1 Before

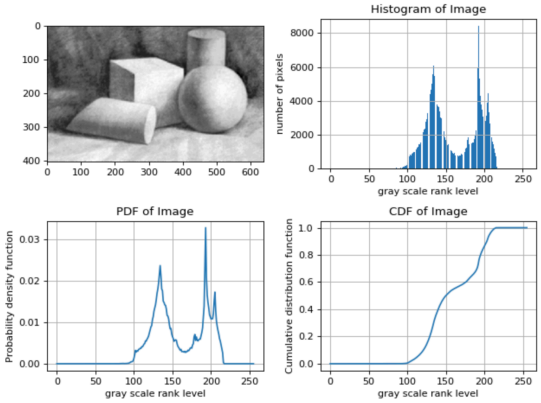


figure 1.2 After

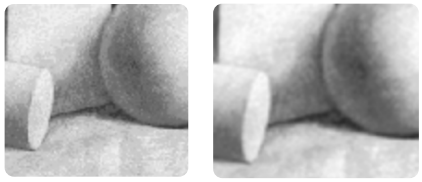


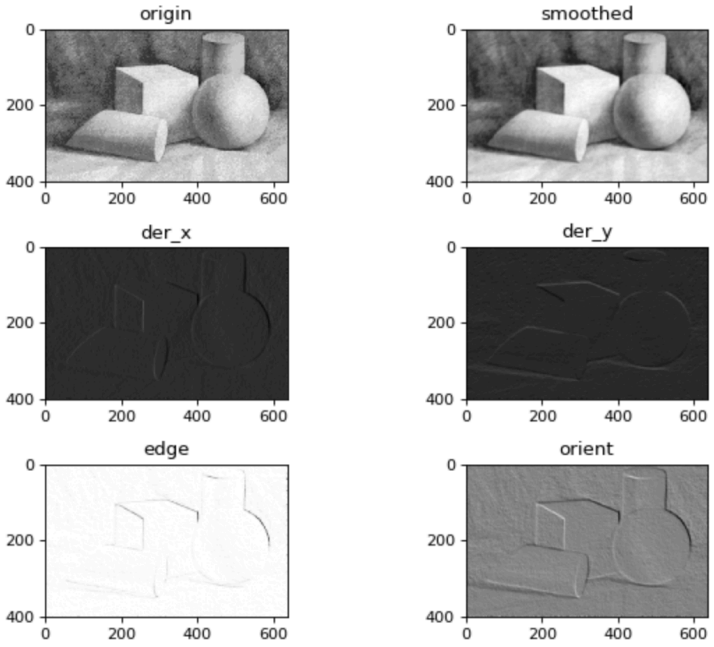
figure 1.3 comparison.

By comparing details, we can see that the smoothing kernel sucessfully smoothes the image. Also, the cdf of the image becomes smoother.

Q2. Edge detection

As we can see, firstly the smoothing kernel smoothes the origin image, which reduces the noises on the image. Then, derivative x and y kernel calculates the 1-st derivative on both axis, giving us der_x, der_y. Combining der_x, der_y, we get edge map. By calculating $\arctan(\frac{der\_x}{der\_y})$, we get orient map.

Figure 2.1 Edge Detection Process



Q3. Template Matching.

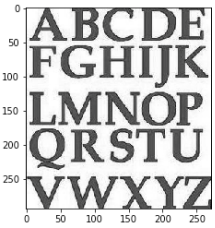


Figure 3.1 to match

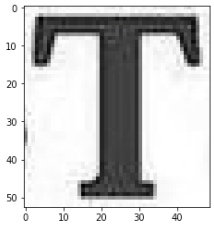


Figure 3.2 Template

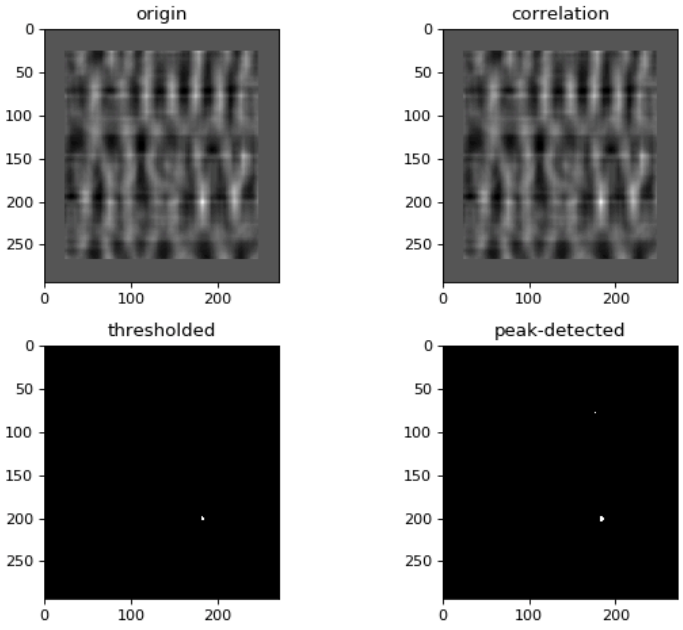


Figure 3.3 Matching Result

As seen above, the position of template is correctly detected after thresholded on the peak map.