

COMP70058 Computer Vision

Tutorial 3 - Texture and Region Based Segmentation

Sample Answers

1.

With the Matlab code below, the localisation result with the “Template” image is given in Fig. 1(a) and with the “Template_small” in Fig. 1(b). The localisation with the smaller template image is not very accurate because the size of the template is different to the size of the object on the image.



Figure 1: (a) Template matching with “Template” image, (b) Template matching with “Template_small” image

```
I = rgb2gray(imread('Scene.png'));
T = rgb2gray(imread('Template.png'));
C=normxcorr2(T,I);

[ypeak,xpeak] = find(C==max(C(:)));
yoffSet = ypeak-size(T,1);
xoffSet = xpeak-size(T,2);

figure; imshow(I)
drawrectangle(gca,'Position',[xoffSet,yoffSet,size(T,2),size(T,1)], ...
    'FaceAlpha',0);
```

	Co-occurrence		Normalised Co-occurrence	
	Pattern 1	Pattern 2	Pattern 1	Pattern 2
Horizontal, d=1	0 20 20 0	10 10 10 10	0.0 0.5 0.5 0.0	0.25 0.25 0.25 0.25
Horizontal, d=2	16 0 0 14	0 15 15 0	0.53 0.0 0.0 0.47	0.0 0.5 0.5 0.0
Diagonal 45, d=1	16 0 0 16	0 16 16 0	0.5 0.0 0.0 0.5	0.0 0.5 0.5 0.0
Diagonal 45, d=2	10 0 0 8	8 0 0 10	0.56 0.0 0.0 0.44	0.44 0.0 0.0 0.56
Vertical, d=1	0 20 20 0	10 10 10 10	0.0 0.5 0.5 0.0	0.25 0.25 0.25 0.25
Vertical, d=2	16 0 0 14	0 15 15 0	0.53 0.0 0.0 0.47	0.0 0.5 0.5 0.0
Diagonal 135, d=1	16 0 0 16	16 0 0 16	0.5 0.0 0.0 0.5	0.5 0.0 0.0 0.5
Diagonal 135, d=2	10 0 0 8	10 0 0 8	0.56 0.0 0.0 0.44	0.56 0.0 0.0 0.44

Characteristic vectors are:

Energy	[0.5, 0.5018, 0.5, 0.5072, 0.5, 0.5018, 0.5, 0.5072]	Pattern 1
	[0.25, 0.5, 0.5, 0.5072, 0.25, 0.5, 0.5, 0.5072]	Pattern 2
	[0.25, 0.0018, 0.0, 0.0, 0.25, 0.0018, 0.0, 0.0]	Individual Distances
	0.5036	Manhattan Distance

Entropy	[1.0, 0.997, 1.0, 0.989, 1.0, 0.997, 1.0, 0.989] [2.00, 1.0, 1.0, 0.989, 2.00, 1.0, 1.0, 0.989] [0.43, 0.003, 0.0, 0.0, 0.46, 0.003, 0.0, 0.0] 0.896
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(NB logs to the base 2 have been used here. If you used logs to the base e, the answers should be multiplied by 0.693.)

Maximum	[0.5, 0.53, 0.5, 0.56, 0.5, 0.53, 0.5, 0.56]
	[0.25, 0.5, 0.5, 0.56, 0.25, 0.5, 0.5, 0.56]
	[0.25, 0.03, 0.0, 0.0, 0.25, 0.03, 0.0, 0.0]
	0.56

In this case, the measures don't give a very good set of discriminants as the patterns really only differ in the first and fifth co-occurrence matrices. The bigger distance in the entropy is because the entropy vectors have larger magnitudes. Notice that although there are differences in some of the matrices, the calculated discriminants seem to destroy them.