Solution

a) GLCM for dist=1:

	0	1	2	3
0	4	1	0	0
1	1	6	0	0
2	0	0	2	3
3	0	0	3	2

	0	1	2	3
0	0	1	1	3
1	1	0	2	2
2	1	2	0	3
3	3	2	3	0

The appropriate feature should be contrast $\sum_i (i-j)^2 p(i,j)$

Image 1:

$$2\cdot(1^2\cdot 1)+2\cdot(1^2\cdot 3)=8$$

Image 2:

$$2\cdot(1^2\cdot 1)+2\cdot(2^2\cdot 1)+2\cdot(3^2\cdot 3)+2\cdot(1^2\cdot 2)+2\cdot(2^2\cdot 2)+2\cdot(1^2\cdot 3)=90$$

Solution

b) A suitable feature is: $\int_{r1}^{r2}\int_{\varphi 1}^{\varphi 2} F(r,\varphi)\,dr\,d\varphi$

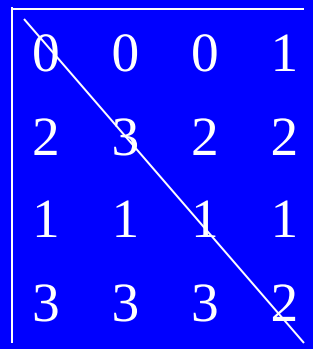
ie compute the energy in a segment of the spectrum

Solution

c) No, the autocorrelation function does not cover spectral magnitude and phase simultaneously

Solution

d) Sum up the values along diagonals parallel to the main diagonal



Solution

e) Contrast:

Horizontal direction:

$$\sum_i \sum_j (i-j)^2 p(i,j) = (2^2 \cdot 4 + 3^2 \cdot 4 + 1^2 \cdot 2 + 2^2 \cdot 2) \cdot 2$$

$$= (4 \cdot 4 + 9 \cdot 4 + 1 \cdot 2 + 4 \cdot 2) \cdot 2$$

$$= (16 + 36 + 2 + 8) \cdot 2$$

$$= 124$$

Vertical direction:

$$\sum_i \sum_j (i-j)^2 p(i,j) = 1^2 \cdot 2 + 1^2 \cdot 2 = 4$$