

# Probability Distribution Map and Kmean Cluster Technique

$I(x,y)$




Feature Vector X

X1	X2	X9	X10
X3	X11	X12	X13
X4	X5	X14	X15
X6	X7	X8	X16

=

Feature Map 1

X1	X2	X9	X10
X3	X11	X12	X13
X4	X5	X14	X15
X6	X7	X8	X16

Feature Map 2

X1	X2	X9	X10
X3	X11	X12	X13
X4	X5	X14	X15
X6	X7	X8	X16



Kmean  
Cluster



Region  
segmentation  
result



Probability distribution  
map


$$\text{Prob}(C1) = \frac{8}{16} = \frac{1}{2}$$

$$\text{Prob}(C2) = \frac{8}{16} = \frac{1}{2}$$

$$\text{Prob}(Ci) = \text{Prob}(Ci/Obj) \text{ Prob}(Obj) \quad \dots (1)$$

$$\text{Prob}(Ci/Obj) = \text{Prob}(Ci) / \text{Prob}(Obj) \quad \dots (2)$$



Application Example: Given ROI<sub>i</sub>(x,y) with feature vector X, find it Prob(Ci/Obj) = ? by using equation (2)

## Probability Distribution Map and Kmean Cluster Technique (2/2)

Feature Vector X

$$\begin{array}{l} X_1 = \begin{bmatrix} 0 \\ 0 \end{bmatrix} \quad X_2 = \begin{bmatrix} 1 \\ 0 \end{bmatrix} \quad X_3 = \begin{bmatrix} 0 \\ 1 \end{bmatrix} \quad X_4 = \begin{bmatrix} 1 \\ 1 \end{bmatrix} \\ X_5 = \begin{bmatrix} 2 \\ 1 \end{bmatrix} \quad X_6 = \begin{bmatrix} 1 \\ 2 \end{bmatrix} \quad X_7 = \begin{bmatrix} 2 \\ 2 \end{bmatrix} \quad X_8 = \begin{bmatrix} 3 \\ 2 \end{bmatrix} \\ X_9 = \begin{bmatrix} 6 \\ 6 \end{bmatrix} \quad X_{10} = \begin{bmatrix} 7 \\ 6 \end{bmatrix} \quad X_{11} = \begin{bmatrix} 8 \\ 6 \end{bmatrix} \quad X_{12} = \begin{bmatrix} 6 \\ 7 \end{bmatrix} \\ X_{13} = \begin{bmatrix} 7 \\ 7 \end{bmatrix} \quad X_{14} = \begin{bmatrix} 8 \\ 7 \end{bmatrix} \quad X_{15} = \begin{bmatrix} 9 \\ 7 \end{bmatrix} \quad X_{16} = \begin{bmatrix} 7 \\ 8 \end{bmatrix} \\ X_{17} = \begin{bmatrix} 8 \\ 8 \end{bmatrix} \quad X_{18} = \begin{bmatrix} 8 \\ 8 \end{bmatrix} \quad X_{19} = \begin{bmatrix} 8 \\ 8 \end{bmatrix} \quad X_{20} = \begin{bmatrix} 9 \\ 9 \end{bmatrix} \end{array}$$