More statistical features

Information - the information associated to the gray-level f:

$$I_g = -\log_2 p(f) \qquad [bits]$$

$\Rightarrow$ information is large when an unlikely gray-level is generated

Entropy – average information of the image:

$$H = -\sum_{f=0}^{L} p(f) \cdot \log_2 p(f) \qquad [bits]$$

$\Rightarrow$ how many bits we need to code the image data:

H is high – pixel values are distributed among many gray levels

$H_{max} = -\sum_{f=0}^{L} \frac{1}{L} \log_2 \frac{1}{L} = \sum_{f=0}^{L} \frac{1}{L} \log_2 L = \log_2 L$ [bits] (uniform PDF)

Energy – how the gray-levels are distributed:

$$E = \sum_{f=0}^{L} \left[p(f) \right]^2$$

E (low) – number of gray-levels of the image is high

$E_{max} = 1$ (only one gray-level in the image)