

CAP5415 Computer Vision

Assignment # 5

Let the sample mean m_n and the sample variance σ_n^2 for a set of n samples x_1, x_2, \dots, x_n be defined by

$$m_n = \frac{1}{n} \sum_{i=1}^n x_i$$

and

$$\sigma_n^2 = \frac{1}{n-1} \sum_{i=1}^n (x_i - m_n)^2.$$

Show that the effect of adding a new sample x_{n+1} can be computed by the recursion relations:

$$m_{n+1} = m_n + \frac{1}{n+1} (x_{n+1} - m_n)$$

and

$$\sigma_{n+1}^2 = \frac{n-1}{n} \sigma_n^2 + \frac{1}{n+1} (x_{n+1} - m_n)^2$$