

covariance matrix

Authors

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Abstract

The covariance matrix of a random vector is the expectation of the outer product of the centered random vector with itself, i.e., of the random vector minus its mean. Its entry in row j and column j' is the covariance between the corresponding entries of the random vector. In particular, the diagonal entries are the variances of the individual entries. The covariance matrix thus collects the second-order statistics of a random vector.

Definition

The covariance matrix of a random vector $\mathbf{x} \in \mathbb{R}^d$ is defined as the expectation (if it exists):

$$\mathbf{C}^{(\mathbf{x})} := \mathbb{E} \left\{ (\mathbf{x} - \mathbb{E}\{\mathbf{x}\})(\mathbf{x} - \mathbb{E}\{\mathbf{x}\})^\top \right\}.$$

Cross References

covariance, matrix, RV, random vector

References

- 1.