

## ESTIMATION IN THE MULTIVARIATE NORMAL DISTRIBUTION

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### **ABSTRACT**

*We present two methods for estimating the population mean vector and variance-covariance matrix in the multivariate normal distribution. We introduce two algorithms, both of which maximize the loglikelihood function. The first method is based on the least square results, and some proven identities to demonstrate the parameter matrix  $\Phi$  replaced by  $F$ , the solution of normal equation, can maximize the loglikelihood function. This means the least square solution coincides with the maximum likelihood estimates. The second methods will completely depend on matrix differentiation method. We also discuss the problem of how to identify a given data set that fits the multivariate normal distribution better than other distributions.*

**KEYWORDS:** *Estimation, Maximize The Loglikelihood Function, Mean Vector, Multivariate Normal Distribution, Q-Q Plot, Skewness and Kurtosis Measure, Test Normality, Variance-Covariance Matrix*

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