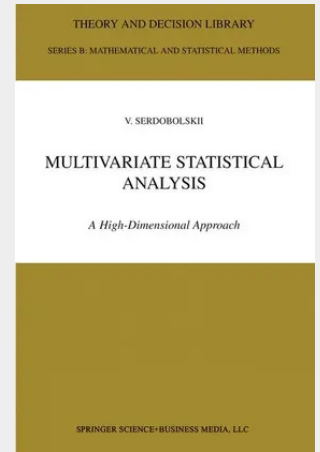


Multivariate Statistical Analysis

A High-Dimensional Approach

In the last few decades the accumulation of large amounts of information in numerous applications has stimulated an increased interest in multivariate analysis. Computer technologies allow one to use multi-dimensional and multi-parametric models successfully. At the same time, an interest arose in statistical analysis with a deficiency of sample data. Nevertheless, it is difficult to describe the recent state of affairs in applied multivariate methods as satisfactory. Unimprovable (dominating) statistical procedures are still unknown except for a few specific cases. The simplest problem of estimating the mean vector with minimum quadratic risk is unsolved, even for normal distributions. Commonly used standard linear multivariate procedures based on the inversion of sample covariance matrices can lead to unstable results or provide no solution in dependence of data. Programs included in standard statistical packages cannot process 'multi-collinear data' and there are no theoretical recommendations except to ignore a part of the data. The probability of data degeneration increases with the dimension n , and for $n > N$, where N is the sample size, the sample covariance matrix has no inverse. Thus nearly all conventional linear methods of multivariate statistics prove to be unreliable or even not applicable to high-dimensional data.

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