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On the Sampling Distributions of Classical Statistics in Multivariate Analysis

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CONTENTS

Introduction

The most fundamental distribution of the exact sampling theory in normal multivariate analysis is the so-called "Wishart's distribution", namely the joint distribution of the $\frac{1}{2}k(k+1)$ central sample moments of the second order formed by a random sample of size n drawn from a k-variate normal population. This distribution was obtained by R. A. Fisher[1] in 1915 for the special case when $k=2$, and the derivation for the general case was first given, in 1928, by Prof. John Wishart[2], and later various methods of derivation were given by various authors[3].

The important statistics in normal multivariate theory are the classical inter-class correlation coefficient, multiple correlation coefficient, partial correlation coefficient, and the Hotelling's generalised Student's ratio T. The exact sampling distributions of these statistics were derived on the basis of Wishart distribution, and they are well-known and now are classical.

In 1933, Prof. M. S. Bartlett[4] considered in detail the processes of derivations of the sampling distributions of some multivariate statistics from the Wishart distribution and established the "Decomposition