



Detecting Outliers in Gamma Distribution¹

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Abstract

Zerbet and Nikulin presented the new statistic Z_k for detecting outliers in Exponential distribution. They also compared this statistic with Dixon's statistic D_k . In this paper, we extend this approach to Gamma distribution and compare the result with Dixon's statistic. The results show that the test based on statistic Z_k is more powerful than the test based on the Dixon's statistic.

Key Words: Gamma sample, Z statistic, Dixon's statistic, Outlier, Slippage hypothesis, Test of Chauvenet, Upper outlier, Power of the test.

1 Introduction

Bol'shev [2] generalized the Chauvenet's test for rejecting outlier observations (see Bol'shev [2] and Voinov and Nikulin [12]). This method is suitable for detecting k outliers in an univariate data set. The Chauvenet's test can be used for exponential case. Also, Ibragimov and Khalifina [6] considered various **modification** of this test. **Several authors considered the problem for testing one outlier in exponential distribution** (Chikkagoudar and Kunchur [4], Lewis and Fiellerm [9], Likes [10] and Kabe [7]). Only two types of statistics for testing multiple outliers exist. First is Dixon's while the second is based on the ratio of the some of the observations suspected to be outliers to the sum of all observations of the sample. In fact, most of these authors have considered a general case of gamma model and the results for exponential model are given as a special case. This approach is **focused** on alternative models, namely slippage alternatives in exponential samples (see Barnett and Toby Lewis [1]). Zerbet and Nikulin [13] proposed a statistic different from the well known *Dixon's statistic* D_k to test for multiple outliers. In this paper, we extend the statistic Z_k **proposed** by Zerbet and Nikulin [13] for Gamma

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