Effect of Outlier on Analysis of Variance

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Abstract:

This article discusses the effect of outliers on the analysis of variance. It is observed that outliers significantly increase the variation within groups, which leads to a significant change to F-statistic and resulting in a Type II error, where the null hypothesis is accepted incorrectly. Outliers significantly affect the P-values derived from ANOVA, potentially leading to misleading significance levels. Outliers violate the basic assumptions of ANOVA that the residuals are normally and independently distributed with mean 0 and constant variance, making the ANOVA results unreliable. One practical example is given.