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# Study on Analysis of Variance in Statistics

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**Abstract:** *Variance is a key statistical measure that quantifies the spread of values within a dataset, offering insights into data variability. It evaluates the average squared deviation of data points from the mean and serves as the foundation for statistical methods such as ANOVA and regression analysis. Introduced by Ronald Fisher in 1918, variance builds upon earlier concepts by Gauss and is calculated differently for populations and samples, using Bessel's correction for unbiased estimation in samples. Unlike range, variance incorporates all data points, ensuring comparability across datasets of varying sizes. Its properties, including invariance to additive constants and scalability by squared factors, make it a robust metric for analyzing data spread. Variance is especially critical in experimental designs to distinguish between systematic (between-groups) and unsystematic (within-groups) variance, enabling researchers to assess and interpret variability in diverse contexts.*

**Keywords:** Variance, Data variability, Statistical analysis, ANOVA, Experimental design.


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