Abstract

There have been several famous studies conducted in the past employing clear, precise data and the relationship between the research variable and auxiliary variables to estimate the mean of a finite population. Neutrosophic Statistics, or generalized classical statistics, has become more significant in recent years. It addresses the ambiguity, vagueness, and uncertainty in data.

In this study, I introduce two ratio-type exponential estimators (first one is single-phase estimator and second one is two-phase estimator) under interval neutrosophic data for estimation of finite population mean employing auxiliary information. The neutrosophic information achieves the form $O_N = O_L + O_U I_N$, where $I_N \in [I_L, I_U]$, $O_N \in [O_L, O_U]$. In this research, I have computed the MSEs of the proposed estimators and all the existing estimators understudy. Also given the mathematical comparison of the challenger estimators.

For the realistic research, to support the claim, use the real life data of the history of temperature of lahore, Punjab along with their simulated analysis have conducted.

Evidently, it has been noted that using the asserted estimator to handle ambiguous, hazy, and uncertain data is quite beneficial. As opposed to a single-valued outcome, t offers results in interval form, increasing the likelihood that a population parameter will fall inside the estimated interval.

There is no denying the significance of statistical quality control. Under neutrosophic data containing supplementary information, a memory type control chart was also presented for the first time. A moving average control chart with an exponential estimator of the single-phase ratio type has been built using interval neutrosophic data. The consequences of altering the behavio of the smoothing constant and the CLs coefficient were also taken into account. The proposed control chart was supported by solid evidence obtained using the Neutrosophic Monte Carlo Simulation. For the tiny shifts, the chart demonstrated effective performance in identifying an out-of-order process.