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A Comprehensive Review and Comparison of Control Charts for Ordinal Samples

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Sometimes measurements in different (industrial) sectors do not have a quantitative range, but a qualitative range consisting of a finite number of categories, which in turn exhibit a natural order. Several proposals have been made in the literature to monitor such data. In a comprehensive review, we present existing control charts that focus on independent and identically distributed ordinal samples, and compare them in terms of their average run length performance. To allow for a fair comparison, we distinguish between the pure (original) charts and the charts when combined with an EWMA feature. Furthermore, our survey includes control schemes that have not previously been considered for monitoring ordinal observations, but which surprisingly perform best in most cases we have studied. To emphasize practical relevance, all scenarios considered are motivated by real-world datasets from the literature.

Keywords

Statistical process control; attributes control charts; ordinal data.

Primary authors: Prof. WEISS, Christian (Helmut Schmidt University); OTTENSTREUER, Sebastian (Helmut Schmidt University)

Presenter: OTTENSTREUER, Sebastian (Helmut Schmidt University)

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