

Nonparametric Adaptive CUSUM Chart for Detecting Arbitrary Distributional Changes

Jun Li

University of California, Riverside
900 University Ave. Riverside, CA, USA
jun.li@ucr.edu

Nonparametric control charts that can detect arbitrary distributional changes are highly desirable due to their flexibility to adapt to different distributional assumptions and distributional changes. However, most of nonparametric control charts in the literature either can only detect location changes, or involve intensive computation. In this paper, we propose a new nonparametric adaptive CUSUM chart. The proposed control chart can detect arbitrary distributional changes and is efficient in computation. Its self-starting nature makes the proposed control chart applicable to situations where no sufficiently large reference data are available. Our proposed control chart also has a built-in post-signal diagnostics function that can identify what kind of distributional changes have occurred after an alarm. Our simulation study and real data analysis show that the proposed control chart performs well across a broad range of settings, and compares favorably with existing nonparametric control charts.