

MULTIVARIATE CONTROL CHART BASED ON ROBUST ESTIMATOR

(Carta Kawalan Multivariat Berasaskan Penganggar Teguh)

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ABSTRACT

A Hotelling T^2 control chart has been widely used for monitoring first phase of multivariate statistical process control. However, this classical control chart which is based on classical estimators is not effective in detecting multivariate outliers. As an alternative, T^2 statistics based on robust minimum volume ellipsoid or the minimum covariance determinant are proposed. The performance of these robust control charts are investigated extensively by real examples and Monte Carlo simulation. The result indicates that the robust control charts is more effective in detecting outliers than the classical control charts.

Keywords: Multivariate control chart; multivariate outliers; minimum volume ellipsoid; minimum covariance determinant; probability of detecting a shift

ABSTRAK

Carta Kawalan Hotelling T^2 telah digunakan secara meluas bagi memantau fasa pertama proses kawalan berstatistik multivariat. Walau bagaimanapun, carta kawalan klasik ini yang berasaskan penganggar klasik tidak begitu berkesan untuk mengenal pasti titik terpercil multivariat. Sebagai alternatif, statistik T^2 yang berasaskan isi padu elipsoid minimum teguh atau penentu kovarians minimum dicadangkan. Prestasi carta kawalan teguh ini diselidiki dengan menggunakan contoh sebenar dan simulasi Monte Carlo. Keputusan kajian menunjukkan bahawa carta kawalan teguh lebih berkesan bagi mengenal pasti titik terpercil daripada carta kawalan klasik.

Kata kunci: Carta kawalan multivariat; titik terpercil multivariat; isi padu elipsoid minimum; penentu kovarians minimum; kebarangkalian mengesan anjakan

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