Detection of Out-of-Control State and Discrimination of Switchover Time Based on a Time Serial Process Monitoring Procedure

Yasuhiko Takemoto\textsuperscript{1,*} and Ikuo Arizono\textsuperscript{2}

\textsuperscript{1} School of Business Administration, University of Hyogo
\textsuperscript{2} Graduate School of Engineering, Osaka Prefecture University

Abstract

In general, a process starts in an in-control state and then some assignable causes change the process state to be out-of-control. It is worthwhile to utilize serial data in addition to the current data in order to monitor the process state, for which the CUSUM and EWMA control charts are useful. Performance of the CUSUM and EWMA control charts has been investigated under the condition that the process starts in an out-of-control state. However, as mentioned above, a process usually starts in an in-control state. In this paper, we present CUSUM and EWMA control charts based on the Kullback-Leibler information. Then, and investigate their performance under the condition that some assignable causes change the process from the in-control state to an out-of-control state. Because it is also important to discriminate the switchover time of the process state, we propose a discrimination procedure for the process state switchover time based on the information criterion.

Key words: CUSUM control chart, EWMA control chart, information criterion, Kullback-Leibler information

\textsuperscript{*}Corresponding author
E-mail address: ys-take@biz.u-hyogo.ac.jp (Yasuhiko Takemoto)

Received May 26, 2005; Received in final form September 30, 2005; Accepted October 25, 2005.