A NEW PROCESS CAPABILITY INDEX THAT IS BASED ON THE PROPORTION OF CONFORMANCE

Michael Perakis and Evdokia Xekalaki

Process capability indices (PCI's) aim to quantify the capability of a process to produce according to some given specifications. These specifications are determined through the lower specification limit, the upper specification limit and the target value. A variety of PCI's can be found in the literature and the most prominent among them are Cp, Cpk, Cpm and Cpmk. The basic drawback of these four indices is that they have been developed under the somewhat restrictive assumption that the distribution of the examined process is normal. For this reason, some modifications of these indices have been proposed in the literature. However, the construction of confidence limits for these modifications without resorting to the method of bootstrap is extremely cumbersome. Moreover, some of these indices do not have a direct association to the proportion of conformance of the process, i.e. to the probability of producing within the specification area.

In this paper, a new PCI is proposed, which is based on the proportion of conformance of the examined process and has several appealing features. Indeed, this index is simple in its assessment and interpretation and is applicable to processes with normal or non-normal distributions. Further, it can be used under either unilateral or bilateral tolerances and the assessment of confidence limits for its true value is not very involved. Moreover, point estimators and confidence limits for the new index are constructed, under several distributional assumptions.

MICHAEL PERAKIS
Department of Statistics, AUEB
Athens, Greece