MSc Thesis Seminar

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A Performance Analysis of Multivariate Nonparametric Control Charts

Abstract:

Robust and efficient multivariate control charts are not common in literature. This report explores the versatility of the few distribution-free, nonparametric multivariate Statistical Process Control (MSPC) charts suitable for average run length (ARL) analysis. Current data sets are becoming ever-increasingly complex, large, and less likely to follow nice distributional properties, a fact especially true for a multivariate setting. The purpose of our study is to compare the newest available methods, not previously compared with one another in cases and data structures not previously explored. Due to the versatility and robustness of the types of data these methods can accommodate, finding real world applications is trivial. The five methods applied here are able to exploit different types of changes to the structure of a distribution, rather than simply detect a mean shift. These methods have similar features able to avoid lengthy data-gathering steps, and applicable in short-run and start up situations. They tend to establish their cut-off values online, rather than beforehand, establishing their truly distribution-free property by applying data-dependent control limits. Some of the current improvementareas, continues to be on creating more computationally efficient algorithms for these methods.