عنوان مقاله:

Comparative Study of Four Evolutionary Algorithms for Economic and Economic-Statistical Designs of MEWMA Control Charts

محل انتشار:

دوفصلنامه بهینه سازی در مهندسی صنایع, دوره 4, شماره 9 (سال: 1390)

تعداد صفحات اصل مقاله: 14

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خلاصه مقاله:

The multivariate exponentially weighted moving average (MEWMA) control chart is one of the best statistical control chart that are usuallyused to detect simultaneous small deviations on the mean of more than one cross-correlated quality characteristics. The economic design ofMEWMA control charts involves solving a combinatorial optimization model that is composed of a nonlinear cost function and traditionallinear constraints. The cost function in this model is a complex nonlinear function that formulates the cost of implementing the MEWMAchart economically. An economically designed MEWMA chart to possess desired statistical properties requires some additional statisticalconstraints to be an economic-statistical model. In this paper, the efficiency of some major evolutionary algorithms that are employed ineconomic and economic-statistical design of a MEWMA control chart are discussed comparatively and the results are presented. Theinvestigated evolutionary algorithms are simulated annealing (SA), differential evolution (DE), genetic algorithm (GA), and particle swarmoptimization (PSO), which are the most well known algorithms to solve complex combinatorial optimization problems. The major metricsto evaluate the algorithms are (i) the quality of the best solution obtained, (ii) the trends of responses in approaching the optimum value,(iii) the average objective-function-value in all trials, and (iv) the computer processing time to achieve the optimum value. The result of theinvestigation for the economic design shows that while GA is the most powerful algorithm, PSO is the second to the best, and then DE andSA come to the picture. For economic-statistical design, while PSO is the best .and GA is the second to the best, DE and SA have similarperformances

کلمات کلیدی:

Economic-statistical design; Genetic algorithm; Simulated annealing; Particle swarm; Differential evolution