Multi-dimensional Indenpendent Retrospective Approximation for Making Resource Allocation Decisions in Manufacturing Sys

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ABSTRACT

In manufacturing systems,the inappropriate production planning and randomness of system may cause machine bottleneck or resource wastes.Therefore,having a good resource allocation becomes important. In this thesis,we view resource allocation as a problem of solving a system of nonlinear equations. We treat system attributes as decision variables and system performance as function values. Since there may be multiple(say n) controllable attributes of interest to meet multiple(say n) performances measures in manufacturing systems,the considered resource allocation problem is a multi-dimensional stochastic root finding problem(SRFP),solving n equations for n unknowns using the estimates of function values. We propose multi-dimensional independent retrospective approximation(MIRA)algorithm for SRFPs. MIRA combines the existing independent retrospect ive approximation algorithm and broyden''s method.Users need only specify the desired values of system performance measures and provide a computer logic that estimates the system performance measures by mimic the manufacturing system through simulation experiments.Our algorithm will find the value of system attributes so that the corresponding system performances measures meet the specified values.We further modify the broyden''s method for resource allocation applications in manufacturing systems. Simulation experiments of two tandem queueing problems are conducted to evaluated the algorithm efficiency and accuracy of MIRA.Our simulation results show that most cases MIRA algorithm provides a good solution within specified precision.

Keywords : 資源配置、多元回溯近似法、布萊伊登法、回溯近似法、方程組、隨機求根

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