Simulation Study for Nonparametric $(M/G_k/k):(FCFS/\infty/\infty)$ Queueing Models

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Abstract

In this paper, $(M/G_k/k):(FCFS/\infty/\infty)$ queueing systems are considered. Two nonparametric positive skewed probability distributions for service times are suggested to build a simulation model for $(M/G_k/k):(FCFS/\infty/\infty)$ queueing systems when $k \geq 1$; and the special case $(M/G/k):(FCFS/\infty/\infty)$. using the suggested nonparametric service time distributions, it is possible: to generate a large number of random variable values then construct a large number of experiments, to estimate the probability distribution of the customer's number in the system, and to obtain the performance measures of the system and derivate its confidence intervals. In addition, an algorithm is presented to obtain the output of the suggested simulation model. A comparative study is accomplished to compare the output of the suggested nonparametric simulation model and the output of the experimental simulation model via four numerical examples.

Keywords: $(M/G_k/k):(FCFS/\infty/\infty)$, $(M/G/k):(FCFS/\infty/\infty)$ Systems, Nonparametric density function; Monte Carlo Method; Stationary and Non-Stationary states, Measures of performance; Confidence intervals, Independent replications method; Percentile Bootstrap Method

1. Introduction