

Sampling and Importance Resampling in Traffic Intensity Estimates in Markovian Single-server Queues ^{*}

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Abstract

Markovian single-server queues are among the simplest models in queueing theory. Such queues have important practical applications. Essentially, it is of great interest to determine their traffic intensity, defined as the ratio between the arrival and service rates, which represents the fraction of time the queue is busy and allows for the calculation of other important performance measures, such as the average queue size and the expected number of people in the system. Fundamentally, the problem addressed here is how traffic intensity can be estimated, based on the number of arrivals during service time using a popular Bayesian method known as sampling/importance sampling. The performance of the proposed estimators is analyzed for different values in the parametric space. Notably, it is observed that the Bayesian estimators are computationally feasible and superior to the classic maximum likelihood estimators in many situations. A numerical example is presented in detail to illustrate the developed procedures.

Keywords: SIR; Bayesian estimation; Markovian queues.

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