

## Nonparametric (M/G/1): (FCFS/ $\infty$ / $\infty$ ) Queueing System

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**Abstract:** In this paper, the (M/G/1): (FCFS/ $\infty$ / $\infty$ ) queueing system at steady state is considered. Firstly, the nonparametric estimates of positive skewed density functions of service time are derived; and the most important statistical properties of these estimates are stated. Also a simulation study to evaluate the accuracy of these estimates is presented. Secondly, the above nonparametric estimates are combined with Kendall's probability distribution of the customer's number in the system to obtain the nonparametric distribution of the (M/G/1): (FCFS/ $\infty$ / $\infty$ ) queueing system. Thirdly, the performance measures of the nonparametric model are derived. Finally, a numerical example is introduced to illustrate the above estimates and the derivation of the nonparametric model.

**Keyword:** Imbedded Markov Chain; Kendall's Model; Kernel Density Functions; (M/G/1): (FCFS/ $\infty$ / $\infty$ ); Nonparametric Density Estimation; Steady State; Taylor Expansion.

### 1. Introduction