

Performance Analysis of Queueing Network Models with Fuzzy Arrival and Service Rates

Gunjan¹ and Dr Naveen Kumar²

Research Scholar, Department of Mathematics, Baba Mastnath University, Asthal Bohar, Rohtak

Professor, Department of Mathematics, Baba Mastnath University, Asthal Bohar, Rohtak

gvarshney1@gmail.com and naveenkapilrkt@gmail.com

Abstract: *Queueing network models are used as basic tools in analyzing performance in systems whose performance is of significant concern in the form of congestion and wait time, including telecommunications, manufacturing and computer systems. Nevertheless, the classical queueing models assume crisp (deterministic or well-defined stochastic) arrival rates and service rates. These parameters in real-life situations are also uncertain in nature since human behavior, changes in environment, or incomplete information are inherently uncertain. The fuzzy set theory offers a solid mathematical model of such uncertainties. The performance analysis of the queueing network models in which arrival and/or service rates are expressed as fuzzy numbers is explored in this paper. We overview the current approaches to fuzzy queueing model and derive analytical performance indication of common models of fuzzy queueing and validate them using numerical examples. The most important Key Performance Indicators like mean queue length, waiting time, and use of the system are calculated on the basis of fuzzy parameterizations. It is compared to the conventional stochastic models to show the advantages of the fuzzy approach and its drawbacks. The future direction of research in incorporating fuzzy logic with advanced queueing networks is also discussed in the paper.*

Keywords: Queueing Networks, Fuzzy Arrival Rate, Fuzzy Service Rate, Fuzzy Queueing Theory, Performance Analysis, Uncertainty Modeling

