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Closeness of Gamma and generalized exponential distribution.

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Summary: Recently a new distribution, named as generalized exponential distribution or exponentiated exponential distribution, was introduced and studied quite extensively by the authors [see Aust. N. Z. J. Stat. 41, 173–188 (1999); J. Stat. Comput. Simulation 69, 315–337 (2001; Zbl 1007.62011)]. It is observed that the generalized exponential distribution can be used as an alternative to the gamma distribution in many situations. Different properties like monotonicity of the hazard functions and tail behaviors of the gamma distribution and the generalized exponential distribution are quite similar in nature, but the latter one has a nice compact distribution function. It is observed that for a given gamma distribution there exists a generalized exponential distribution so that the two distribution functions are almost identical. Since the gamma distribution function does not have a compact form, efficiently generating gamma random numbers is known to be problematic. We observe that for all practical purposes it is possible to generate approximate gamma random numbers using generalized exponential distributions and the random samples thus obtained cannot be differentiated using any statistical tests. Moreover, if there is a skewed data set where the gamma distribution fits very well, the generalized exponential distribution also can be used. We use two real life data sets and observe that the fitted distribution functions are "almost identical" in many respects in both cases.

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