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The Burr XII power series distributions: A new compounding family

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Abstract. Generalizing lifetime distributions is always precious for applied statisticians. In this paper, we introduce a new family of distributions by compounding the Burr XII and power series distributions. The compounding procedure follows the key idea by Adamidis and Loukas (*Statist. Probab. Lett.* **39** (1998) 35–42) or, more generally, by Chahkandi and Ganjali (*Comput. Statist. Data Anal.* **53** (2009) 4433–4440) and Morais and Barreto-Souza (*Comput. Statist. Data Anal.* **55** (2011) 1410–1425). The proposed family includes as a basic exemplar the Burr XII distribution. We provide some mathematical properties including moments, quantile and generating functions, order statistics and their moments, Kullback–Leibler divergence and Shannon entropy. The estimation of the model parameters is performed by maximum likelihood and the inference under large sample. Two special models of the new family are investigated in details. We illustrate the potential of the new family by means of two applications to real data. It provides better fits to these data than other important lifetime models available in the literature.

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Bivariate sinh-normal distribution and a related model

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Abstract. Sinh-normal distribution is a symmetric distribution with three parameters. In this paper, we introduce bivariate sinh-normal distribution, which has seven parameters. Due to presence of seven parameters it is a very flexible distribution. Different properties of this new distribution has been established. The model can be obtained as a bivariate Gaussian copula also. Therefore, using the Gaussian copula property, several properties of this proposed distribution can be obtained. Maximum likelihood estimators cannot be obtained in closed forms. We propose to use two step estimators based on Copula, which can be obtained in a more convenient manner. One data analysis has been performed to see how the proposed model can be used in practice. Finally, we consider a bivariate model which can be obtained by transforming the sinh-normal distribution and it is a generalization of the bivariate Birnbaum–Saunders distribution. Several properties of the bivariate Birnbaum–Saunders distribution can be obtained as special cases of the proposed generalized bivariate Birnbaum–Saunders distribution.

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Bayesian analysis and diagnostic of overdispersion models for binomial data

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Abstract. In the present paper, we focus our attention on the multiplicative binomial model, the double binomial model and the beta-binomial model considering the Bayesian perspective, modeling both the probability of success and the dispersion parameters. A Bayesian methodology is considered for estimation and diagnostic under these three overdispersed binomial regression models. A teratology data set is analyzed using the considered methodology. We present a simulation study, based on data sets generated mimicking the characteristics of the teratology data to assess the quality of Bayesian estimates and to assess the performance of the considered Bayesian diagnostic tools under each regression model. An extended study based on simulated data is also performed to compare the logit and probit link functions in a setting of overdispersed binomial data. We also consider simulated data sets to illustrate how to detect overdispersion using posterior predictive checks.

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Key words and phrases. Bayesian analysis, diagnostic, overdispersion, multiplicative binomial, double binomial, beta-binomial.

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Asymptotic distribution of the estimated parameters of an ARMA(p, q) process with mixing innovations

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Abstract. In this paper, we consider an ARMA(p, q) model with stationary, ϕ -mixing error variables having uniformly bounded fourth-order moments. Both the autoregressive and moving average components of the model involve stable and explosive roots. Estimating the autoregressive parameters using the instrumental variable technique and the moving average parameters using a derived autoregressive process, we derive the asymptotic distribution of the estimators.

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Key words and phrases. ARMA process, explosive roots, ϕ -mixing errors, asymptotic distribution.

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An optimal combination of risk-return and naive hedging

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Abstract. Taking an approach contrary to the mean–variance portfolio, recent studies have appealed to an older wisdom, “the naive rule provides the best solution,” to improve out-of-sample performance in portfolio selection. Naive diversification, which invests equally across risky assets, is such an example of this simple rule. Previous studies also show that a portfolio combining naive diversification with the mean–variance strategy based on minimizing expected quadratic utility losses may show strong out-of-sample performance. Using the mean squared error, this paper derives an optimal combination of nonstochastic allocation and the mean–variance portfolio. We find that this design is equivalent to the combination of the naive rule and mean–variance strategy based on minimizing the expected utility losses. As an application of this finding, we propose a regression-based combination of maximal risk-return hedging and naive hedging. Our illustration also shows out-of-sample performance of a combined hedging that is superior to that of other methods.

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Key words and phrases. Optimal hedging, risk-return hedging, naive hedging, naive rule, combined forecasts.

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Estimation of parameters in Laplace distributions with interval censored data

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Abstract. We derive maximum likelihood estimators for the parameters of the Laplace distribution for interval censored data. Existence and uniqueness of the estimators are proved. Simulations and real data applications show that the Laplace distribution can be a better model for interval censored data than competing models in spite of being simpler.

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Estimates of the PDF and the CDF of the exponentiated Weibull distribution

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Abstract. Exponentiated Weibull distribution, introduced as an extension of the Weibull distribution, is characterized by bathtub shaped, unimodal failure rates besides a broader class of monotone failure rates. In this paper, we derive maximum likelihood estimators (MLEs), uniformly minimum variance unbiased estimators and three other estimators of the probability density function and the cumulative distribution function of the exponentiated Weibull distribution and compare their performances through numerical simulations. Simulation studies show that the MLE is more efficient than the others. Analysis of a real data set is presented for illustrative purposes.

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Almost sure central limit theorem for exceedance point processes of stationary sequences

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Abstract. In this paper, we proved an almost sure central limit theorem for the exceedance point processes of a stationary sequence which satisfy some long range dependence conditions. As a by-product, we obtained the almost sure central limit theorem for the order statistics of the stationary sequence. The obtained results are also extended to the vector of point processes for some strong mixing random sequences.

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