Partially varying coefficient single-index additive hazard models

Xuan Wang, Qihua Wang, Xiao-Hua Andrew Zhou

Abstract

The partially linear additive hazards model has been proposed to study the interaction between some covariates and an exposure variable. In this paper, we extend it to the partially varying coefficient single-index additive hazard model where the high dimension covariates are collapsed to a single index, due to practical needs. Two sets of estimating equations were proposed to estimate the varying coefficient functions in the linear components: the link function for the single index and the single-index parameter vector separately. It was shown that the proposed local and global estimators are asymptotically normal. Simulation studies were conducted to examine the finite-sample performance of our method to compare the relative performance of our method with existing ones. A real data analysis was used to illustrate the proposed methods.

On a class of circulas: copulas for circular distributions

M. C. Jones, Arthur Pewsey

Abstract

This article is concerned with the analogue of copulas for circular distributions, which we call 'circulas'. We concentrate on one particular class of circulas, which is pre-existing but not studied in such explicit form or detail before. This class is appealing in many ways but does not necessarily result in especially attractive bivariate circular models for arbitrary non-uniform marginals. A major exception to this is an elegant bivariate wrapped Cauchy distribution previously proposed and developed by two of the current authors. We look both at properties of the circulas themselves, including their density behaviour, distribution function, and dependence measures, and at properties of various distributions based on these circulas by transformation to non-uniform marginal distributions. We consider inference for the latter distributions and present two applications of them to modelling data. We concentrate mostly on the bivariate case, but also briefly consider extension to the multivariate case.

Estimation of two ordered normal means under modified Pitman nearness criterion

Yuan-Tsung Chang, Nobuo Shinozaki

Abstract

The problem of estimating two ordered normal means is considered under the modified Pitman nearness criterion in the presence and absence of the order restriction on variances. When variances are not ordered, a class of estimators is considered that reduce to the estimators of a common mean when the unbiased estimators violate the order restriction. It is shown that the most critical case for uniform improvement with regard to the unbiased estimators is the one when two means are equal. When variances are ordered, a class of estimators is considered, taking the order restriction on variances into consideration. The proposed estimators of the mean with a larger variance improve upon the estimators that do not take the order restriction on variances into consideration. Although a similar improvement is not possible in estimating the mean with a smaller variance, a domination result is given in the simultaneous

estimation.

On local power properties of the LR, Wald, score and gradient tests in nonlinear mixed-effects models

Artur J. Lemonte

Abstract

The local powers of some tests under the presence of a parameter vector, $\omega\omega$ say, that is orthogonal to the remaining parameters are studied in this paper. We show that some of the coefficients that define the local powers of the tests remain unchanged regardless of whether $\omega\omega$ is known or needs to be estimated, whereas the others can be written as the sum of two terms, the first of which being the corresponding term obtained as if $\omega\omega$ were known, and the second, an additional term yielded by the fact that $\omega\omega$ is unknown. We apply our general result in the class of nonlinear mixed-effects models and compare the local powers of the tests in this class of models.

Estimation of copula-based models for lifetime medical costs

Xiao Bing Zhao, Xian Zhou

Abstract

Medical cost data are recorded through medical care and the cost is always related to some sojourn in the health status of the patient. The total medical cost accumulated in the entire lifetime of a life is of great interest to the health insurance industry and government policy makers. In this paper, we develop a new method to assess the lifetime medical cost up to the death time by incorporating the dynamics of change in the health status of the patient based on incomplete data. A copula model is proposed to fit the cost lifetime medical data subject to a terminal event (death). A two-stage estimation procedure is applied to draw the statistical inference of the marginals and the copula parameters. The asymptotic properties of the estimators are established, and a simulation is performed to evaluate the proposed model and estimation methods.

Depth-based runs tests for bivariate central symmetry

Rainer Dyckerhoff, Christophe Ley...

Abstract

McWilliams (J Am Stat Assoc 85:1130–1133, 1990) introduced a nonparametric procedure based on runs for the problem of testing univariate symmetry about the origin (equivalently, about an arbitrary specified center). His procedure first reorders the observations according to their absolute values, then rejects the null when the number of runs in the resulting series of signs is too small. This test is universally consistent and enjoys good robustness properties, but is unfortunately limited to the univariate setup. In this paper, we extend McWilliams' procedure into tests of bivariate central symmetry. The proposed tests first reorder the observations according to their statistical depth in a symmetrized version of the sample, then reject the null when an original concept of simplicial runs is too small. Our tests are affine invariant and have good robustness properties. In particular, they do not require any finite moment assumption. We derive their limiting null distribution, which establishes their asymptotic distribution freeness. We study their finite-sample properties through Monte Carlo experiments and conclude with some final comments.

Change-point model selection via AIC

Yoshiyuki Ninomiya

Abstract

Change-point problems have been studied for a long time not only because they are needed in various fields but also because change-point models contain an irregularity that requires an alternative to conventional asymptotic theory. The purpose of this study is to derive the AIC for such change-point models. The penalty term of the AIC is twice the asymptotic bias of the maximum log-likelihood, whereas it is twice the number of parameters, $2p_0$, in regular models. In

change-point models, it is not twice the number of parameters, 2m+2pm, because of their irregularity, where m and pm are the numbers of the change-points and the other parameters, respectively. In this study, the asymptotic bias is shown to become 6m+2pm, which is simple enough to conduct an easy change-point model selection. Moreover, the validity of the AIC is demonstrated using simulation studies.

On consistency and optimality of Bayesian variable selection based on g-prior in normal linear regression models
P. 963-997

Minerva Mukhopadhyay, Tapas Samanta...

Abstract

Consider Bayesian variable selection in normal linear regression models based on Zellner's g-prior. We study theoretical properties of this method when the sample size n grows and consider the cases when the number of regressors, p is fixed and when it grows with n. We first consider the situation where the true model is not in the model space and prove under mild conditions that the method is consistent and "loss efficient" in appropriate sense. We then consider the case when the true model is in the model space and prove that the posterior probability of the true model goes to one as n goes to infinity. "Loss efficiency" is also proved in this situation. We give explicit conditions on the rate of growth of g, possibly depending on that of p as n grows, for our results to hold. This helps in making recommendations for the choice of g.

Quantile residual lifetime with right-censored and length-biased data
P. 999-1028

Peng Liu, Yixin Wang, Yong Zhou

Abstract

Right-censored length-biased data are commonly encountered in many applications such as cancer screening trials, prevalent cohort studies and labor economics. Such data have a unique structure that is different from traditional survival data. In this paper, we propose an estimator of the quantile residual lifetime (QRL) with this kind of data based on the nonparametric maximum likelihood estimation method. In addition, we develop two tests by taking difference and ratio of the QRL from two independent samples. We also establish the asymptotic properties of the proposed estimator and the test statistics. Simulation studies are performed to demonstrate that the proposed estimator works well in finite-sample situations. We illustrate its application using two data examples: one is the Oscars Award data, the other is the Channing house data.