A BAYESIAN APPROACH TO NONPARAMETRIC TEST PROBLEMS*

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Abstract. We propose an alternative approach to the classical "nonparametric" test problems, such as the goodness of fit test and the two-sample "nonparametric" test. In this approach, those problems are reviewed from the viewpoint of the estimation of the underlying population distributions and are formulated as the problem of model selection between Bayesian models which were recently proposed by the present authors. The model selection can be easily realized by choosing a model with the smallest ABIC, Akaike Bayesian information criterion. The approach provides the estimates of the density of the underlying population distribution(s) of any shape as well as the evaluation of the goodness of fit or the check of homogeneity of distributions. The practical utility of the present procedure is demonstrated by numerical examples. The difference in behavior between the present procedure and a density estimator GALTHY proposed by Akaike and Arahata is also briefly discussed.

Key words and phrases: Goodness of fit test, two-sample nonparametric test, Bayesian model, smoothing prior, nonparametric density estimator, model selection, ABIC, AIC, multinomial logistic transformation, B-spline.