NUISANCE PARAMETER ELIMINATION AND OPTIMAL ESTIMATING FUNCTIONS

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Abstract

In the context of obtaining optimal estimating functions for interesting parameters in the presence of nuisance parameters in parametric models, a method of elimination of nuisance parameters is proposed in this paper. The proposed method is direct and does not impose any 'factorization' conditions on the likelihood. In this direction, a sequence of lower bounds for the variance-covariance matrix of estimating functions is derived. A recipe which gives a transparent approach for obtaining optimal estimating functions is suggested. It is shown that minimum variance unbiased estimators could be obtained using the recipe.

Keywords and Phrases: Lower bounds, nuisance parameter elimination, optimal estimating function.

1 Introduction

In the theory of estimating functions applied to parametric models involving nuisance parameters, the 'elimination' of nuisance parameters to obtain optimal estimating functions (EF) for interesting parameters is a very important task. In a pioneering work, Godambe (1976) suggested a method of eliminating nuisance parameters by multiplying and adding suitable functions to the score function and formally established the optimality of conditional score function. Lloyd (1987) and Bhapkar and Srinivasan (1993) claimed the optimality of marginal score function. However, that there are errors in the results of Lloyd (1987) and Bhapkar and Srinivasan (1993) has been pointed out by Bhapkar (1995, 1997) who imposed some more conditions and established the optimality of marginal score function. The conditional and marginal factorization properties were used by the above authors in the elimination of nuisance parameters. Heyde (1997) proposed a method of