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# A general procedure to combine estimators

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## Abstract

A general method to combine several estimators of the same quantity is investigated. In the spirit of model and forecast averaging, the final estimator is computed as a weighted average of the initial ones, where the weights are constrained to sum to one. In this framework, the optimal weights, minimizing the quadratic loss, are entirely determined by the mean squared error matrix of the vector of initial estimators. The averaging estimator is built using an estimation of this matrix, which can be computed from the same dataset. A non-asymptotic error bound on the averaging estimator is derived, leading to asymptotic optimality under mild conditions on the estimated mean squared error matrix. This method is illustrated on standard statistical problems in parametric and semi-parametric models where the averaging estimator outperforms the initial estimators in most cases.

*Keywords:* Averaging, Parametric estimation, Weibull model, Boolean model

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## 1. Introduction

We are interested in estimating a parameter  $\theta$  in a statistical model, based on a collection of preliminary estimators  $T_1, \dots, T_k$ . In general, the relative performance of each estimator depends on the true value of the parameter, the sample size, or other unknown factors, in which case deciding in advance

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