

Notes on the early history of elemental set methods

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Abstract: In this paper we outline the early history of traditional estimation procedures which are based on the use of elemental sets. There are two distinct classes of such procedures associated with the minimum values of the sum of absolute errors and the largest absolute error criteria respectively. As a matter of historical necessity, our study will concentrate on estimation procedures of the first type. However we shall also discuss some recent work on the least median of squared errors procedure which in principle involves elemental sets of the second type.

Key words: Least median of squared errors, least sum of absolute errors, least sum of squared errors, linear programming, minimax absolute error.

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1 Introduction

In his study of the practical value of elemental set approximations to robust estimation procedures, Hawkins (1993, p.580) has summarised the history of such methods in the following terms:

Elemental set methods have their origins in the single-predictor proposal by Theil (1950). The extension of the idea to handling outlier problems in multiple regression was made independently by Rousseeuw (1984) and by Hawkins, Bradu and Kass (1984). They also arise naturally in the expression of the OLS multiple regression in terms of weighted U-statistics (as sketched in the technical appendix to Hawkins *et al.*, 1984).

Although this brief statement may well have been sufficient for the purposes of Hawkins's paper, it cannot be regarded as an adequate summary of the history of elemental set methods as it fails to mention that meth-