substantial and has greatly increased my awareness of the structure of regression problems, particularly with regard to the role of individual and groups of observations. However, for progress beyond linear models and a more complete understanding of past results, ad hoc reasoning no longer seems sufficient. Competing goals must be carefully weighed and influence measures must be formulated with a broader base. Likelihood is the foundation for many analyses and in the long term we should strive for methods that directly reflect the difference between the full sample likelihood and the likelihood obtained after deletion. From a Bayesian perspective, the pioneering work of Johnson and Geisser (1982, 1983, 1985) is relevant.

Broadening the concept of influence to include more than the deletion of observations is a second direction that may prove fruitful. Deletion can be viewed as just one of many ways of perturbing a problem formulation to assess influence. Minor modifications of the values of a selected explanatory variable in linear or nonlinear regression, for example, can uncover relevant structure in the data that would not normally be detected by deletion, and lead to fresh interpretations of certain patterns in added variable plots. These and related issues are addressed in Cook (1986).

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Comment: Aspects of Diagnostic Regression Analysis

A. C. Atkinson

1. INTRODUCTION

The rapidity of acceptance of the group of techniques known as regression diagnostics is remarkable. The methods are already included in many regression packages and there are at least three books devoted to the subject. The emphasis of each book is distinct. Belsley, Kuh, and Welsch (1980) are primarily concerned with applications in economics; Cook and Weisberg (1982) are the most mathematical of the three; Atkinson (1985) includes much material on transformations. In addition, an introduction is given by Weisberg (1985, Chapters 5 and 6). Now we have the present review article by Chatterjee and Hadi. In my comments I shall go beyond the area defined by their title, to describe several recent developments which reflect important aspects of diagnostic regression analysis. An example of the use of these methods is given in Section 5.

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Diagnostic procedures are essentially concerned with the detection of disagreements between the model and the data to which it is fitted. As Chatterjee and Hadi suggest, the variety of such procedures can be bewildering. There are, however, some underlying ideas which provide a framework for comparisons. A succinct summary of principles is given by Weisberg (1983). Among other aspects he stresses: 1) the relationship with score tests for parameterized departures from assumptions, 2) the importance of graphical methods, and 3) influence analysis, that is calculation of the effect of individual observations on inferences drawn from the data.

2. GENERALIZATIONS

Chatterjee and Hadi's discussion is almost entirely concerned with the normal theory linear model. Pregibon (1981) gives the extension of diagnostic methods to generalized linear models, although his detailed discussion and examples concentrate on the analysis of binary data. Chapter 12 of McCullagh and Nelder (1983), Model Checking, also describes the extension