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Recent developments in PROGRESS

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Abstract: The least median of squares (LMS) regression method is highly robust to outliers in the data. It can be computed by means of PROGRESS (from Program for RObust reGRESSion). After ten years we have developed a new version of PROGRESS, which also computes the least trimmed squares (LTS) method. We will discuss the various new features of PROGRESS, with emphasis on the algorithmic aspects.

Key words: Algorithm, breakdown value, least median of squares, least trimmed squares, robust regression.

AMS subject classification: 62F35, 62J05.

1 Introduction

At the time when the least median of squares (LMS) regression method was introduced (Rousseeuw, 1984), a program was needed to compute it in practice. The first algorithm described in that paper was just for computing the LMS line in simple regression, based on scanning over possible slopes while adjusting the intercept each time.

However, it was clear from the start that an algorithm for LMS multiple regression was required. The first version of PROGRESS (from Program for RObust reGRESSion) was implemented in 1983. The 1984 paper already contained an example analyzed with PROGRESS and listed the program's computation times on a CDC 750, one of the fastest mainframes of that day but outperformed by today's PC's. During the next years, when people began requesting the program, it was made more user-friendly with interactive input and self-explanatory output. The use of the program was explained in detail in (Rousseeuw and Leroy, 1987). Because that book contained many sample outputs we refrained from making any substantial modifications to PROGRESS, which remained essentially unchanged from