

Projection pursuit regression for moderate non-linearities

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Received November 1991

Revised July 1992

Abstract: We present methods specially designed to be effective with moderately non-linear regression relationships. The model fitted is of the Projection Pursuit Regression (PPR) type with a smooth, non-parametric link function connecting the mean response to a linear combination of the regressors. New algorithms, close to ordinary linear regression, are developed. Considerable numerical evidence is given to substantiate the claims that the new methods outperform standard PPR when the non-linearity is moderate and the signal to noise ratio small.

Keywords: Nonparametric regression; Smoothing; Projection pursuit regression.

1. Introduction

Consider the regression model

$$y = f(\mathbf{x}) + \epsilon, \quad (1)$$

where y is the univariate response, \mathbf{x} a p -dimensional predictor and ϵ independent additive noise. The 1980's saw the emergence of a number of non-parametric techniques for fitting this model, notably the PPR, ACE, AVAS, TURBO and MARS methods presented in Friedman and Stuetzle (1981), Breiman and Friedman (1985), Tibshirani (1987), Friedman and Silverman (1988) and Friedman (1991). The great strength in all these methods is their ability to identify non-linear relationships without the need for a specific parametric form in advance.

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This work was supported by the Norwegian Research Council (NAVF) and by the Royal Norwegian Council for Scientific and Industrial Research (NTNF).