

Variable selection is central to sparse modeling, and many methods have been proposed under various model assumptions. As opposed to most existing methods based on an explicit functional relationship, this paper is concerned with model-free variable selection method which attempts to identify informative variables that are related to the response by simultaneously examining the sparsity in multiple conditional quantile functions. It does not require specification of the underlying model for the response, which is appealing in sparse modeling with a relatively large number of variables. The proposed method is implemented via an efficient computing algorithm, which couples the majorize-minimization algorithm and the proximal gradient descent algorithm. Its asymptotic estimation and variable selection consistencies are established without explicit model assumption, which assure that the truly informative variables are correctly identified with high probability. The effectiveness of the proposed method is also supported by a variety of simulated and real-life examples.