

The aim of this thesis is to present some semiparametric methods used for estimating an unknown regression function. All approaches are based on a minimization of an objective function, which is formulated as the sum of a loss and a penalization function. We present a reformulation of unsolvable problems due to infinite dimensionality as problems which are of finite dimensions, in the form of classical ridge or lasso regression. A crucial part in these methods plays a penalization parameter used to obtain a balance between the bias and the variability of the estimate. Techniques devoted to finding the optimal values of the penalization parameter are shown. Finally, applications of the mentioned methods on two simulated datasets are displayed. We focus on the local adaptivity of individual approaches, as well as the computational intensity, which we shall compare. In addition, we analyse a new method proposed to find the optimal value of the penalization parameter.