A semiparametric approach to dimension reduction

Yanyuan Ma

University of South Carolina

Abstract

We provide a novel and completely different approach to dimension-reduction problems from the existing literature. We cast the dimension reduction problem in a semiparametric estimation framework and derive estimating equations. Viewing this problem from the new angle allows us to derive a rich class of estimators, and obtain the classical dimension reduction techniques as special cases in this class. The semiparametric approach also reveals that in the inverse regression context while keeping the estimation structure intact, the common assumption of linearity and/or constant variance on the covariates can be removed at the cost of performing additional nonparametric regression. The semiparametric estimators without these common assumptions are illustrated through simulation studies and a real data example. This article has online supplementary material.