

Linear Regression Model with Image Input

Zhangsheng Yu

Shanghai Jiao Tong University
E-mail: yuzhangsheng@sjtu.edu.cn

Abstract: We propose to apply the convolutional neural network for the linear model analysis with both parametric and nonparametric components where the nonparametric component is a projection of images. An estimation procedure is proposed and the asymptotic properties of the parametric coefficients and the convergence of the generalization error were derived. Simulation studies show the performance of the parametric coefficient estimator when CNN is applied is better (smaller bias and variance) compared to other approaches using spline, principle component analysis, or LASSO. We applied this procedure to analyze an Alzheimer disease study with brain image.