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Functional and Parametric Estimation in a Semi- and Nonparametric Model with Application to Mass-Spectrometry Data

Weiping Ma, Yang Feng, Kani Chen, Zhiliang Ying

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Motivated by modeling and analysis of mass-spectrometry data, a semi- and nonparametric model is proposed that consists of a linear parametric component for individual location and scale and a nonparametric regression function for the common shape. A multi-step approach is developed that simultaneously estimates the parametric components and the nonparametric function. Under certain regularity conditions, it is shown that the resulting estimators is consistent and asymptotic normal for the parametric part and achieve the optimal rate of convergence for the nonparametric part when the bandwidth is suitably chosen. Simulation results are presented to demonstrate the effectiveness and finite-sample performance of the method. The method is also applied to a SELDI-TOF mass spectrometry data set from a study of liver cancer patients.

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