

Double Deep Learning for Adjusting Complex Confounding Structures In Observational Data

Fei Zou

UNC-CH

E-mail: feizou@email.unc.edu

Abstract: Complex confounding structures are often embedded in observational data, including electronic medical record (EMR) data. A robust yet efficient double deep learning approach is proposed to adjust for the complex confounding structures in comparative effectiveness analysis of EMR data. Specifically, deep neural networks are employed to estimate the conditional expectations of the outcome and the treatment allocation given observed baseline covariates under a semiparametric framework. An improved estimation scheme is further developed to enhance the finite sample performance of the proposed method. Comprehensive numerical studies have shown superior performance of the proposed method, as compared with other existing methods, in terms of reduced bias and mean squared error of the treatment effect estimate.