First and Second Order Sensitivity Analysis of MLP

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Abstract

Multi-layered perceptrons (MLP) can build accurate classification and function mapping models; however, they have also been labeled a "black box" because they provide little explanatory insight into the contributions of the input variables in the prediction model. In this study, we derived the first and second order effect index and importance index through the differential statistical method. To verify these indexes, this study employed two man-made examples and two real application examples to test the performance of these indexes. The results showed that these indexes can really identify important variables and discover the relations between input and output variables; therefore, they give MLP some explanation ability, and raise the transparency of MLP model to overcome its black-box model shortcomings.

Keyword：multi-layered perceptrons, non-linear model, explanation ability, variable importance