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Jiwei Zhao* (zhaoj@buffalo.edu), 3435 Main Street, Buffalo, NY 14214. *A unified machine learning method of determining the minimal important difference with the linear structure.*

The minimal important difference (MID), or the minimal clinically important difference (MCID), the smallest change in a treatment outcome that an individual patient would identify as important and which would indicate a change in the patient's management, has been a fundamentally critical concept in personalized medicine and population health for decades. However, most of the currently existing methods of determining the MID are ad hoc, and cannot incorporate the covariate factors emerged dramatically as the use of the electronic health records. In this paper, we propose a principled, unified machine learning framework of estimating the MID. In particular, we focus on the MID with the linear structure primarily due to its easy accessibility and simple interpretability. We consider both the traditional low-dimensional and the practical high-dimensional cases pertaining to the covariate factors. We contrast the difference of both situations theoretically and conduct comprehensive simulation studies to reinforce these theoretical findings. We also apply our method to the study of chondral lesions in knee surgery to demonstrate the usefulness of the proposed approach. (Received August 06, 2019)