Information Based Inference with Set-valued Predictions or Observations*

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Abstract

We analyze inference on partially identified parameters in possibly misspecified incomplete models. Misspecification can make identified sets of parameters spuriously tight or even empty, which raises a challenge for interpreting identification results. This paper puts forward an information-based method that delivers a non-empty pseudo-true set of parameters and a confidence set that remains valid for both correctly and incorrectly specified models. A key observation is that, for each parameter value, one can find a density that is closest to the data generating process with respect to the Kullback-Leibler information criterion (KLIC) by solving a convex program. This leads to a novel asymptotically valid confidence set for each pseudo-true parameter value. Key features of our confidence set are: (i) it is constructed using Rao's score statistic, which is asymptotically pivotal and satisfies an orthogonality property with respect to the conditional density function of the observed data; (ii) its implementation remains the same for both correctly and incorrectly specified models; (iii) it is computationally tractable; and (iv) it seamlessly uses all information of discrete and continuous covariates.

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