DIFFERENTIABILITY OF LIKELIHOOD RATIOS WITH RATES

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Abstract: Call a function $differentiable\ at\ some\ rate$ if the difference quotient approximates the derivative at this rate. Consider some root of the density of a one-parameter family of probability measures as a function of the parameter. We characterize differentiability of this root in some (not necessarily corresponding) mean at a certain rate by an appropriate differentiability of an arbitrary other root at the same rate. In particular, we characterize Hellinger differentiability at some rate in terms of differentiability of the densities. This allows us to compare Hellinger differentiability at some rate with a differentiability concept of Pfanzagl and Wefelmeyer [11], which is necessary and sufficient for local asymptotic normality in the i.i.d. case at a certain rate.

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