INFORMATION GEOMETRY OF BAYESIAN INFERENCE

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We investigate prior densities for constructing Bayesian predictive distributions. Kullback-Leibler divergence from the true distribution to a predictive distribution is adopted as a loss function. It is shown that there exist shrinkage predictive distributions asymptotically dominating Bayesian predictive distributions based on the Jeffreys prior or other vague priors if the model manifold satisfies some differential geometric conditions. Asymptotic decision theoretic properties such as asymptotic minimaxity of Bayesian predictive distributions are studied in the framework of information geometry. The relation between the main results here and several previous studies on Bayesian theory is discussed from asymptotic and information theoretic viewpoints.