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12. Probability and Statistics

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Asymptotic behauviour of Bayes estimates under possibly incorrect models

We prove that the posterior distribution in a possibly incorrect parametric model a. s. concentrates in a strong sense on the set of pseudo-true parameters determined by the true distribution. As a consequence we obtain in the case of a unique pseudo–true parameter the strong consistency of pseudo–Bayes estimators w. r. t. general loss functions. Further we present a simple example based on normal distributions and having two different pseudo–true parameters, where pseudo–Bayes estimators have an essentially different asymptotic behaviour than the pseudo–maximum likelihood estimator. While the MLE is strongly consistent, the sequence of posterior means is strongly inconsistent and a. s. almost all its accumulation points are not pseudo–true.