ALPHA-INTEGRATION OF STOCHASTIC EVIDENCES

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It is known that the Bayes predictive distribution is the one that minimizes the expectation of KL divergence from the true distribution. This is the mixture of candidate distributions with weights given by the posterior probabilities of parameters. Which distribution is optimal when we use other types of divergence measure? We show that the alpha-predictive distribution, which is the mixture of the alpha-representation of probability distributions, is optimal for the alpha-divergence measure. More generally, given a number of probability distributions with weights of their reliabilities, there are many ways of combining these to give an integrated distribution. The alpha-family is useful for this purpose. We give some optimality results and the characteristics of the alpha-integration depending on alpha. These ideas are useful for elucidating neural computation.