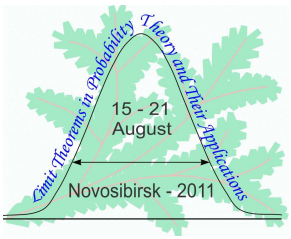

A New Approach to Construction of Non-informative Priors: Hellinger Information

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Non-informative priors play crucial role in objective Bayesian analysis. Most popular ways of construction of non-informative priors are provided by the Jeffreys rule, matching probability principle, and reference prior approach. An alternative construction of non-informative priors is suggested based on the concept of Hellinger information related to Hellinger distance. Under certain regularity conditions, limit behavior of the Hellinger distance as the difference in the parameter values goes down to zero is closely related to Fisher information. In this case our approach is equivalent to the Jeffreys rule. However, Hellinger information can be also used to describe information properties of the parametric set in non-regular situations, when Fisher information does not exist. For instance, it was applied in Shemyakin (1992) to obtain information inequalities extending the lower bounds for the Bayes risk obtained by Borovkov and Sakhanienko (1980) to the non-regular case.

Non-informative priors based on Hellinger information are studied for the non-regular class of distributions defined by Ghosal and Samanta (1997) and for some interesting examples outside of this class. It proves to be similar to that of the reference priors (see Berger, Bernardo, and Sun (2009)), however some differences are observed. Some justification for the construction is provided in terms of information geometry.