Handling Sparsity using Random Imaginary Data

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One of the main approaches used to construct prior distributions for objective Bayes methods is the concept of random imaginary observations. The Power–Expected–Posterior (PEP) prior framework provides us a convenient and objective method to deal with variable selection problems, under the Bayesian perspective, in regression models. Under the PEP prior methodology, an initial (usually default) baseline prior is updated using random imaginary data. The PEP prior inherits all of the advantages of Expected–Posterior–Prior. Furthermore, it avoids the need of selection of imaginary design matrices and mitigates the effect of the random generated imaginary response data over the final posterior. In this work, focus is given in normal regression models when the number of observations is smaller than the number of explanatory variables. We introduce the PEP prior methodology using different baseline shrinkage priors, we present computational methods and we perform comparisons in simulated and real-life datasets.