Analysis of the Weights on Observations in the Process of Bayesian Prediction

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Abstract

In the process of Bayesian prediction, the assessment of credible prior distribution is a difficult and important task since we may end up with fairly different prediction depending on the assessed prior distribution. To obtain a resonable prior, we should firstly understand how the assessed prior distributions are changing depending on the weights given to the observations.

Credibility formula is extended to explain the behavior of variance reduction due to observations. We analyze Gamma priors - Poisson likelihood, and Beta priors - Binomial likelihood cases. We have found that the weight plays an important role to explain the amount of difference between prior and posterior means as well as the amount of variance reduction. Such understandings about weights can lead us to assess the resonable prior variance, which may otherwise be quite vague.