Bayesian data analysis – reading instructions 6

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Chapter 6

Outline of the chapter 6

- 6.1 The place of model checking in applied Bayesian statistics
- 6.2 Do the inferences from the model make sense?
- 6.3 Posterior predictive checking
- 6.4 Graphical posterior predictive checks (can be skipped)
- 6.5 Model checking for the educational testing example

Demos

- demo6_1: Posterior predictive checking - light speed
- demo6_2: Posterior predictive checking - sequential dependence
- demo6_3: Posterior predictive checking - poor test statistic
- demo6_4: Posterior predictive checking - marginal predictive p-value

Find all the terms and symbols listed below. When reading the chapter, write down questions related to things unclear for you or things you think might be unclear for others.

- model checking
- sensitivity analysis
- external validation
- posterior predictive checking
- joint posterior predictive distribution
- marginal (posterior) predictive distribution
- self-consistency check
- replicated data
- y^{rep}, $\tilde{y}$, $\tilde{x}$
- test quantities
- discrepancy measure
- tail-area probabilities
- classical p-value
- posterior predictive p-values
- multiple comparisons
- marginal predictive checks
- cross-validation predictive distributions
- conditional predictive ordinate

Replicates vs. future observation

Predictive $\tilde{y}$ is the next not yet observed possible observation. y^{rep} refers to replicating the whole experiment (with same values of x) and obtaining as many replicated observations as in the original data.

Additional reading

The following preprint article has some useful discussion and examples also about the model checking.

- Jonah Gabry, Daniel Simpson, Aki Vehtari, Michael Betancourt, and Andrew Gelman (2018). *Journal of the Royal Statistical Society Series A*, accepted for publication Visualization in Bayesian workflow. arXiv preprint arXiv:1709.01449. https://arxiv.org/abs/1709.01449.