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# Bayesian model selection

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Modelos Bayesianos con aplicaciones ecológicas

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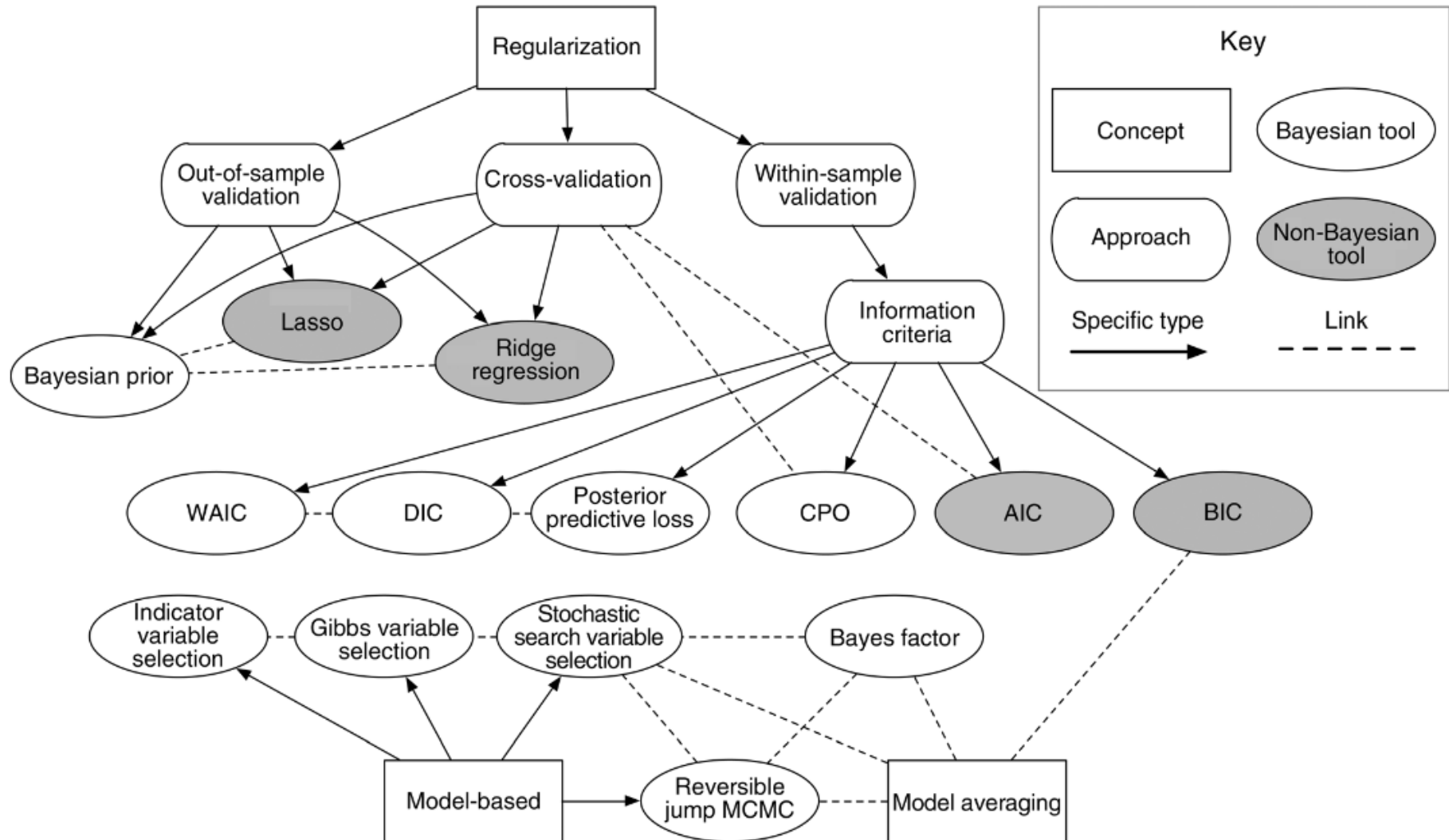
# Recap

- Usamos *posterior predictive distributions* para probar “model self-consistency”
- El modelo tuvo un dato que no era bueno
- Quizás con extra estructura con covariables el modelo puede explicar los datos
- Vamos a usar *posterior predictive distribution* y DIC

# Bayesian model selection

- Model selection is not trivial. There are many existing tools and more being developed.
- According to Hobbs & Hooten (2018)
  1. Out of sample is the best approach if possible
  2. K-fold cross validation good but slow
  3. DIC is good when prediction is important and model is slow, works best when ( $\# \text{ pars} \ll \# \text{ data}$ )
  4. WAIC good for hierarchical models

# Bayesian model selection



# Tarea

- We will try 3 versions of our binomial survival model (GLM)
- Fit3= de lectura (problema con sitio 5)
- Fit4= con covariable x1

```
x1 <- c(9.450, 8.079, 7.686, 8.003, 2.882, 11.095, 10.696, 8.263, 12.043,  
        9.238)
```

Assume  $p = \text{ilogit}(\theta + \beta_1 x_1)$

# Tarea

- Fit the 2 versions of the model (create logistic 4.jags)
- Recreate posterior predictive plots for both
- Which model does DIC select?  
(`fit3$BUGSoutput$DIC` etc.)
- [What should you use for priors on coefficients?]
- [Suggestion: Normalize the covariates]

# Tarea

- Use the results to select which model you think is most appropriate.
- Calculate the probability of survival greater than 0.8,  $P(p > 0.8)$ , for site 3
- Read the paper [http://www.scielo.org.mx/scielo.php?pid=S0185-38802009000200005&script=sci\\_arttext&tlng=pt](http://www.scielo.org.mx/scielo.php?pid=S0185-38802009000200005&script=sci_arttext&tlng=pt)
- And write down:[http://www.scielo.org.mx/scielo.php?pid=S0185-38802009000200005&script=sci\\_arttext&tlng=pt](http://www.scielo.org.mx/scielo.php?pid=S0185-38802009000200005&script=sci_arttext&tlng=pt)
  - What is the type of model?
  - What is the likelihood function?
  - What are the priors?