Bayesian paradigm

Continuous Bayes' theorem

- parametric (probabilistic) model $f(y|\theta)$
- parameters heta
- probability distribution π

Continuous Bayes' theorem:

$$p(\theta|y) = \frac{f(y|\theta)\pi(\theta)}{\int f(y|\theta)\pi(\theta) \,\mathrm{d}\theta} = \frac{f(y|\theta)\pi(\theta)}{f(y)}$$

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Intro to Bayesian statistics

Bayesian modeling

Bayesian Inference 0000000000 Conclusion DO

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Pierre-Simon de Laplace !

Parameters are random variables ! - no "true" value

 \Rightarrow induces a marginal probability distribution $\pi(\theta)$ on the parameters: the **prior** distribution

😑 allows to **formally** take into account hypotheses in the modeling

😕 necessarily introduces **subjectivity** into the analysis

12/50

Bayesian vs. Frequentists: a historical note

- Bayes + Laplace ⇒ development of statistics in the 18-19th centuries
- 2 Galton & Pearson, then Fisher & Neymann ⇒ frequentist theory became dominant during the 20^{th} century
- 3 turn of the 21th century: rise of the computer ⇒ Bayes' comeback



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Bayesian paradigm

Bayesian vs. Frequentists: an outdated debate

Fisher firmly rejected Bayesian reasoning ⇒ community split in 2 in the 20th century Course presentation

Bayes in biomedical research I

Intro to Bayesian statistics

Bayesian paradigm

Bayesian vs. Frequentists: an outdated debate

Fisher firmly rejected Bayesian reasoning

 \Rightarrow community split in 2 in the 20th century

To be, or not to be, Bayesian, that is no longer the question: it is a matter of wisely using the right tools when necessary

Gilbert Saporta

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