

Introduction to Bayesian Data Analysis with brms

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By the end of the workshop, participants will:

- Understand the fundamental principles of Bayesian data analysis.
- Gain experience in using the brms package for modelling and inference.
- Gain practical experience through hands-on exercises.
- Be equipped to apply Bayesian methods to their own research or data analysis projects.

We will provide a) workshop slides and notes, b) example datasets and R scripts used in the workshop, as well as c) access to additional resources for further learning.

Content:

1. Introduction to Bayesian statistics
 - a. What is Bayesian Inference?
 - b. Bayes' theorem
2. Core concepts
 - a. Priors and posterior distributions
 - b. Likelihood function
 - i. Definition and role in Bayesian Inference
 - c. Posterior distribution
 - i. Calculation and interpretation
 - d. Bayesian toy models
3. Computational Methods in Bayesian Analysis
 - a. The need for numerical approximations.
 - b. What are Stan and brms?
 - c. Bayesian R environment: other packages.
4. Short hands-on session
5. Regression models
 - a. Linear regression
 - b. Generalized linear models
 - c. Hierarchical models
6. Short hands-on session
7. Model Checking and Diagnostics
 - a. Posterior predictive checks
 - b. Convergence diagnostics
8. Model comparison
 - a. ELPD
 - b. Cross validation
9. General prior specification
10. Short hands-on session

11. Q&A Discussion
 - a. Addressing participant's questions
 - b. Common challenges in Bayesian Analysis
12. Wrap-up and Takeaways
 - a. Summary of Key Concepts
 - b. Additional resources and further reading

Requirements:

The workshop is suitable for participants with various levels of experience in Bayesian analysis. There are the following prerequisites:

- Basic understanding of statistics.
- Familiarity with R is recommended.

Software details and assistance will be provided before the workshop. The participants are required to bring their own notebook.

Additional Information:

If you have any questions or specific requests related to the workshop content, please feel free to contact us. We are committed to making this workshop valuable and engaging for all participants.