

Data

The data in ‘ElectricCarData_Clean.csv’ (from Kaggle) represent quantitative characteristics of a sample of $n = 103$ electric vehicles available in Europe. For this homework assignment, we seek to construct a Bayesian regression model to predict vehicle price (**PriceEuro**; in Euros) based on range (**Range_Km**; in kilometers) and number of seats (**Seats**).

Questions

Prepare a written response to the following, using Overleaf. The assignment shouldn’t be longer than 10 (double-spaced, excluding title page, references, and appendices). Due Thurs., Feb. 17, at the beginning of the class period. Please submit the assignment as a PDF through CANVAS.

1. Develop a MCMC algorithm to fit a Bayesian regression model using a normal likelihood, multivariate normal prior for the coefficients β , and normal prior for $\log(\sigma)$. Use a random walk proposal for $\log(\sigma)$ in the Metropolis-Hastings updates for $\log(\sigma)$.
2. Conduct a Bayesian regression analysis based on the data set using vehicle price as the response variable and the three sets of covariates below. Compare the 3 models using DIC.
 - (a) **Range_Km** and **Seats**
 - (b) **Range_Km**
 - (c) **Seats**
3. For the best performing model based on DIC, make inference about your findings using the associated MCMC sample.

4. For a new EV that is not in the data set but has `Range_Km = 500` and `Seats = 4`, predict the vehicle price using the best performing model you identified above.

References

- <https://www.kaggle.com/kkhandekar/cheapest-electric-cars>