Homework 5

November 16, 2020

1. Using the marketing data, which contains the impact of the amount of money spent on three advertising medias (youtube, facebook and newspaper) on sales, follow the steps of the radon example given in class to run a linear regression analysis with response variable sales (include intercept).

```
install.packages("datarium")
library("datarium")
data("marketing", package = "datarium")
```

   (a) Clearly determine the parameters of interest and their meaning in the context of linear regression.

   (b) Write down the full conditionals.

   (c) Using R, estimate the parameters using a Gibbs sampler algorithm with number of simulations 25,000, a burn-in of 5,000, and thinning of 30.

   (d) Summarize the distribution of each parameter using meaningful quantiles, the posterior mean, and the posterior standard deviation.

   (e) Based on quantiles previously computed, construct a 95% credible interval for the parameters; based on them, comment on the significance of the parameters.

   (f) Run 5 different simulations using the same starting points and check for convergence by computing $\hat{R}$ and traceplots of all 5 MCMC chains for all parameters.