Bayesian Computing

Name : Preksha Ashok Patel
sapid : 60004210126
Branch : Computer Engineering
Div : C2

Experiment no. 10

Aim : Study of R to interface with winBugs, a stand-alone software program for the windows operating system.

Theory :

Introduction to WinBUGS :

The BUGs project is focused on the development of software to facilitate Bayesian fitting of complex statistical models using MCMC algorithms. WinBugs is a program for sampling from a general posterior distribution of a Bayesian model by use of Gibbs sampling and a general class of proposal densities. To describe the use of winBugs in a very simple setting, support you observe y distributed binomial (n, p) and a beta (α, β) prior is placed on p when $\alpha = 0.5$ and $\beta = 0.5$. you observe $y = 7$ successes in a sample of $n = 50$ and you wish to construct a 90% interval estimate for p. The Bayesian model for this taste can be developed using the following winBUGS model script : model {

$$y \sim dbin(p, n)$$
$$p \sim dbeta(alpha, beta)$$
}

Once model, data, and initial values are defined, the sample monitor Tool in winBugs can be used to monitor parameters in simulation.

An R interface to WinBUGS : R/ winBugs is an R interface to winBugs which allows the use of win Bugs using R. It is easy to define Bayesian problem for winBUGs by use of R interface. There are 4 necessary inputs that are similar to the inputs requi

within the winBUGS programs

1. **Model** ~ One describes statiscal model by means of a "model" till that describes model in the BUGS language.

2. **Data** ~ One inputs data directly into R in the form of constents, vectors, matrices and model parameters.

3. **parameters** ~ when within R, one specifies the parameters to be monitored in simulation run.

4. **Initial values** ~ One specifies initial values of parameters in R console. The defined model can be simulated using following (:) command.

```
> model.sim ← bugs (data, inits, parameters, "model.bug")
```

Conclusion :

In this study, we examined integration of R with winBUGS, a widely used software for Bayesian computation using Markow chain Monte Carlo (MCMC) methods. In conclusion, the study found that employing R as an interface to winBUGS offers a convenient and adaptable approach to perform Bayesian analysis using MCMC methods.