

Task 4

Task 2: With the estimated model parameters and covariate values, you can calculate the predicted wind speed for each time point using the model equation. This way, you can track the hurricane and compare the predicted wind speeds with the actual wind speeds recorded during the hurricane. Please evaluate how well the estimated Bayesian model can track individual hurricanes.

Solution

First import parameters from task 1 & 2.

```
# load parameters
beta_list = read.csv("./data/B_list_partial.csv")
mu_list = read.csv("./data/mu_list.csv")
Sigma_list = read.csv("./data/Sigma_matrix_list.csv")
gamma_list = read.csv("./data/gamma_list.csv")
sigma_list = read.csv("./data/sigma_list.csv")$x

burn = 500 # burn in the MC chains. change this based on the resulting plots
index = (burn + 1):10000 # index of useful samples (used for estimates & CIs)
beta_sample = beta_list[index,]
mu_sample = mu_list[index,]
gamma_sample = gamma_list[index,]
```

Prediction of wind speed for each hurricane.

```
para_beta = rbind(colMeans(beta_sample))
para_mu = rbind(colMeans(mu_sample))
para_gamma = rbind(colMeans(gamma_sample))

# prediction function
Windspeed_Predict = function(index_hurricane, index_time){
  predict_speed = Z[[index_hurricane]][index_time,] %*% para_beta[index_hurricane:(index_hurricane + 4),]
  return(predict_speed)
}

# functional test
Windspeed_Predict(2, 6)

##           [,1]
## [1,] 11.53962
```