Bayesian Inference

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I. Implementation of the Poisson GLM with Bayesian inference using MCMC

A. Implementation details

For this part of the assignment we implemented the Poisson GLM with Bayesian inference. Firstly we standardized the data. Next, for our prior distribution of the regression coefficients (β - as) we used the Normal distribution with large variance $\alpha = 10$. We chose this prior because then we don't have a real constraint on the bounds of the coefficients and the large variance makes the prior slightly more "uniform" so we don't really assume that the coeficients are in a very specific area. To sample from our posterior we used the Markov Chain Monte Carlo (MCMC) method. To ensure robust computation of convergence diagnostics we used 4 independent chains. We sampled 3000 samples from each chain with a burn-in period of 1000 samples.

B. Relationship between the explanatory and GoalsScored variables

To describe the relationship between the features and the target variable we plot the densities of the posteriors of the regression coefficients on Figure 1. We can see that with high probability the Score Rate of the home team is the most important feature, contributing obviously positively to the amout of goals scored. On the other hand the
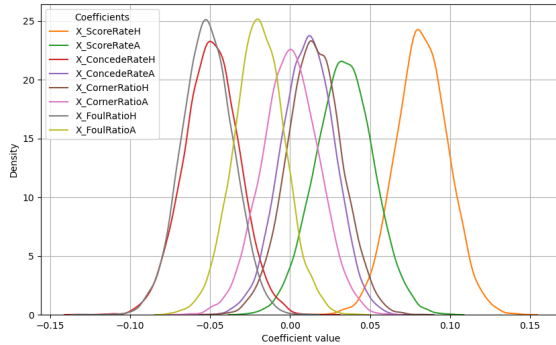

Figure 1. Densities of coefficients for the features with the exclusion of the intercept density
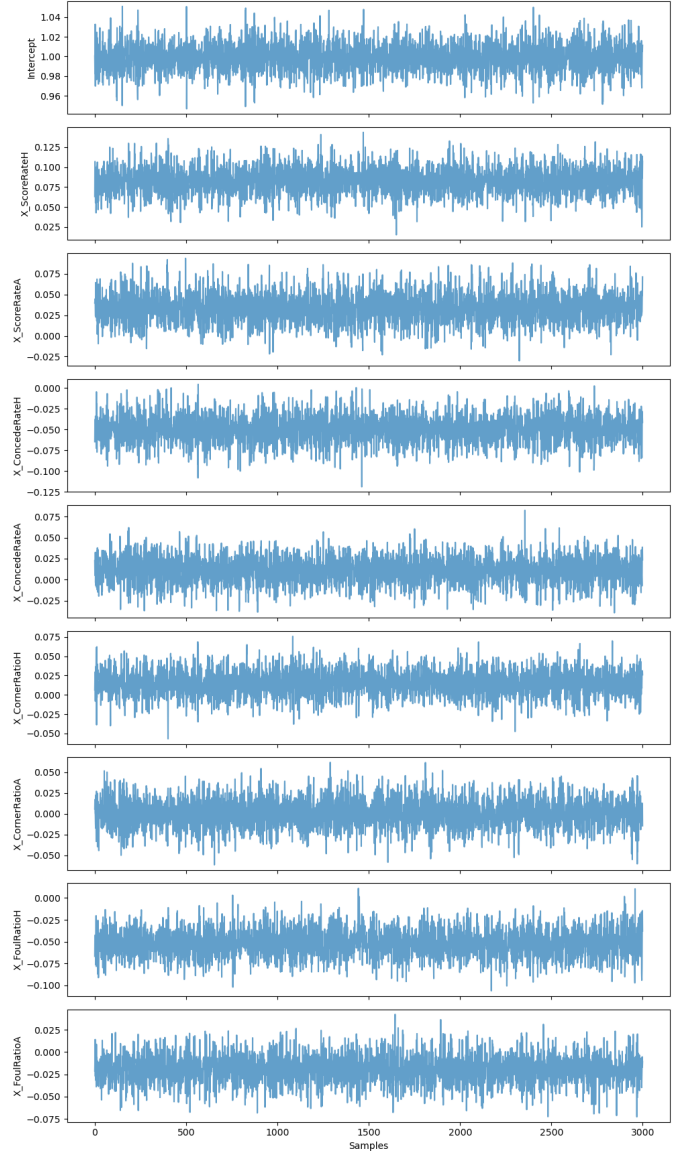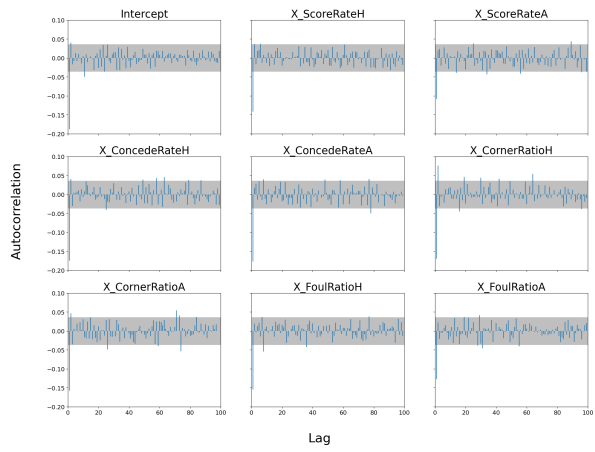
C. MCMC diagnostics

Figure 2.

Figure 3.