# appendix_section

Danny Luo

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## Hyper Prior elicitation for V for package mixAK

MixAK only allows a uniform parameter $V$, and gives the option to specify $V$ only through specifying the hyperprior parameters of a Gamma distribution.[@R-mixAK] According to the documentation page of the package, matrix $V$ is assumed to be diagonal with $\gamma_1, \gamma_2, ..., \gamma_p$ on the diagonal, and for each $\gamma_j$, $\gamma_j^{-1} \sim Gamma(g_j, h_j)$.

We checked that the covariance matrix of some ramdom subset of the population are approximatley diagonal. Since matrix $V$ is the scale matrix oarameters of the Wishart prior placed on cluster covariance matrix $\Sigma_j$ and that it does not change with different groups, we performed the following elicitation:.

- Draw 1000 random samples of size 1000 from the dataset and calulated the 5 by 5 covariance matrix $C_i$ for $i = 1, 2, ...1000$.
- For j =1,2,..,5, extract samples $L_j = \{C_i[j,j]\}_{i=1}^{1000}$.
- Forj =1,2,..,5, fit a gamma distribution using $L_j$, using the r package $fitdistrplus$. [@R-fitdistrplus] [@R-fitdistrplus-article] and using the estimation from the output to be our $\{g_j, h_j\}$

The fitting was highly accurate as we checked the Q-Q plot to be almost matching.

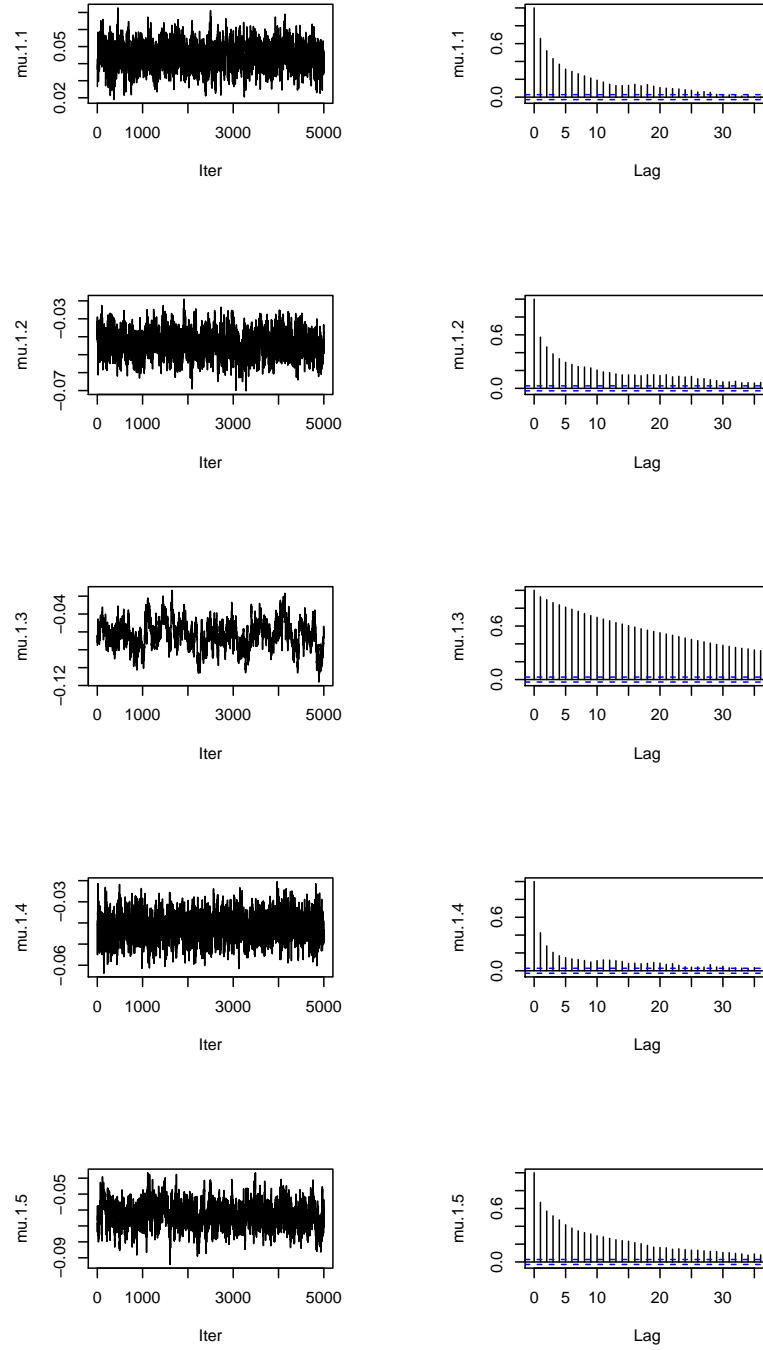## MCMC Diagnostics for cluster means and weights

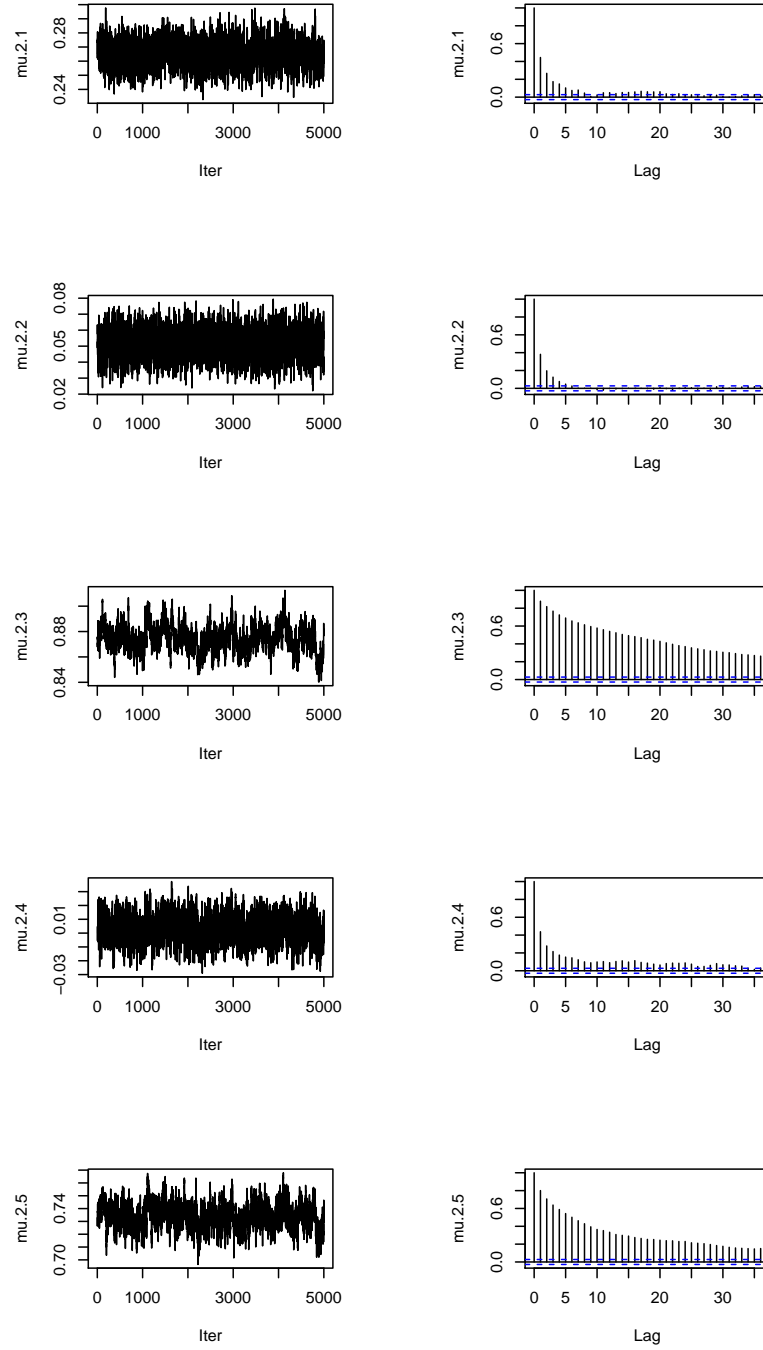Figure 1: Traceplots and Autocorrelation plots for cluster means

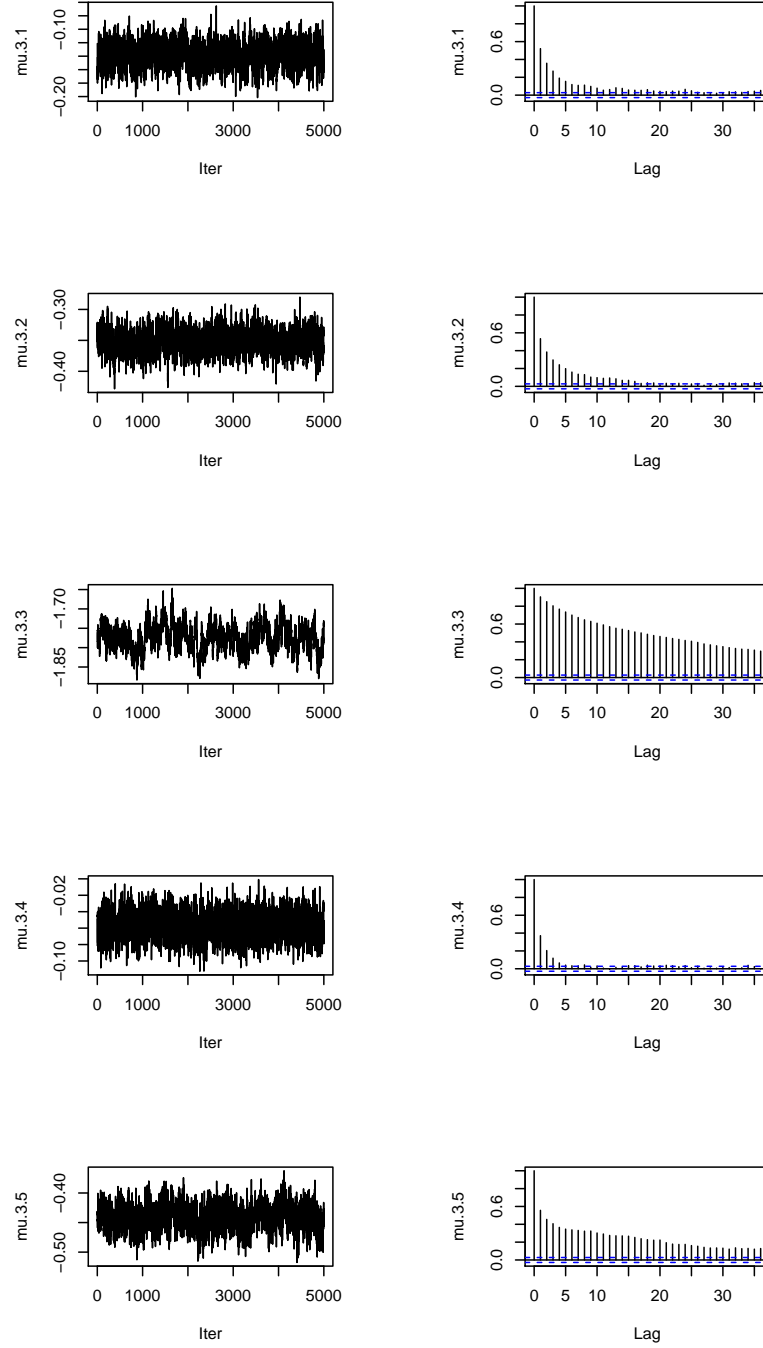Figure 2: Traceplots and Autocorrelation plots for cluster means

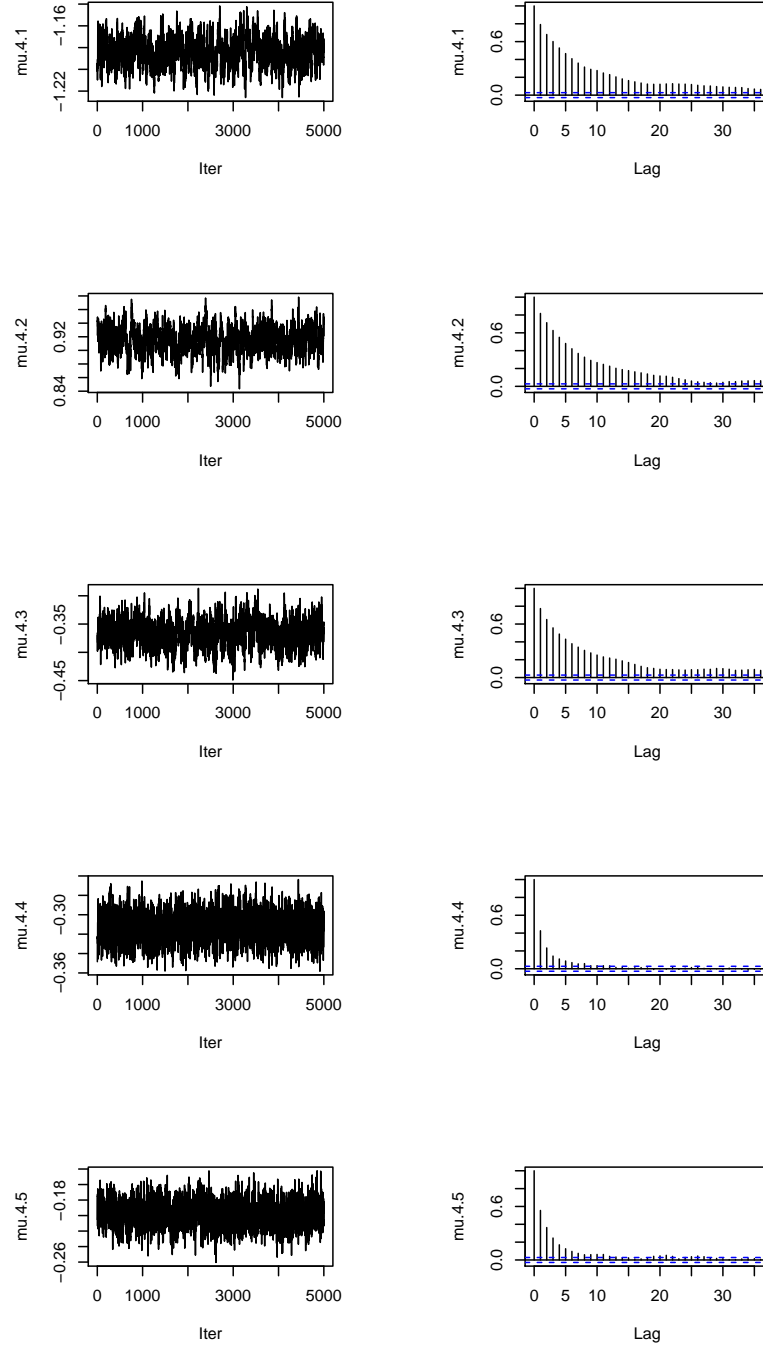Figure 3: Traceplots and Autocorrelation plots for cluster means

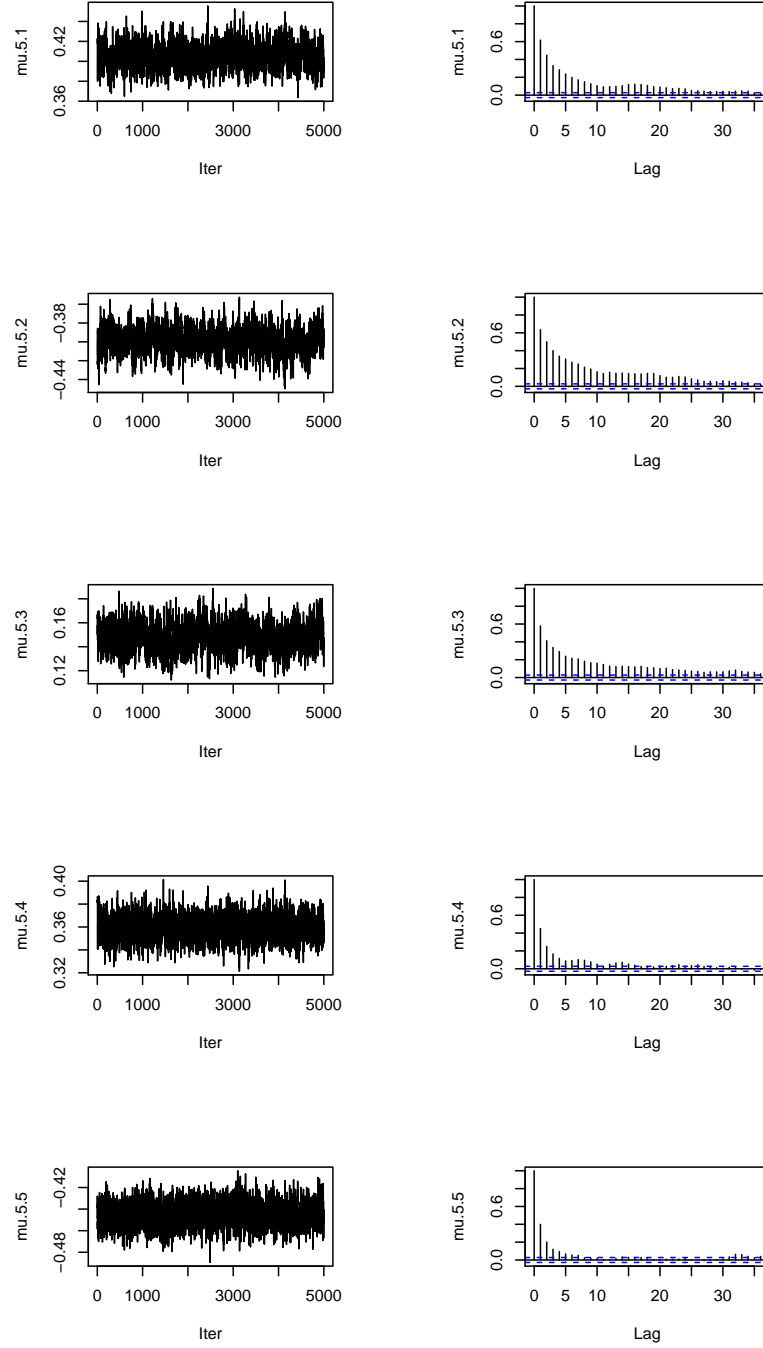Figure 4: Traceplots and Autocorrelation plots for cluster means
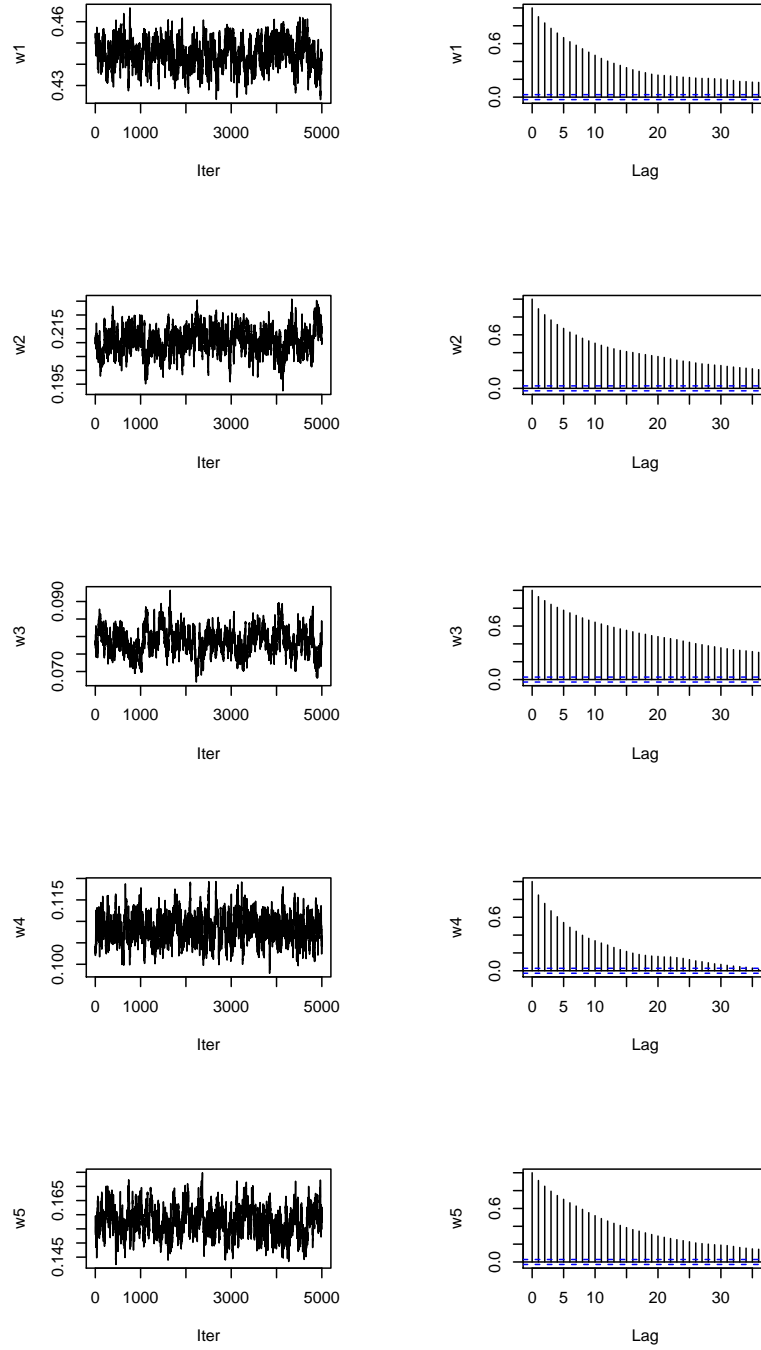
Figure 5: Traceplots and Autocorrelation plots for cluster means

Figure 6: Traceplots and Autocorrelation plots for weights