Model 1 Simple BMPF with gaussian priors

$$X_{ij} \sim N(Z_i \cdot W_j^T, \sigma_{zw})$$

$$Z \sim N(\mu_z, \sigma_z)$$

$$W \sim N(\mu_w, \sigma_w)$$

$$\sigma_{zw} \sim \text{gamma}(a_0, b_0)$$

User defined parameters: $a_0, b_0, \mu_z, \mu_w, \sigma_z, \sigma_w$

Model 2: Same as Model 1, but with a bias variable b_i for every user

$$X_{ij} \sim N(Z_i \cdot W_j^T + b_i, \sigma_{zw})$$

$$Z \sim N(\mu_z, \sigma_z)$$

$$W \sim N(\mu_w, \sigma_w)$$

$$\sigma_{zw} \sim \text{gamma}(a_0, b_0)$$

$$b_i \sim N(\mu_b, \sigma_b)$$

user defined variables: $a_0, b_0, \mu_b, \sigma_b, \mu_z, \mu_w, \sigma_z, \sigma_w$

Model 3: Same as model 1 But now with individual priors for the mean of every row vector z_i μ_{zi}

$x_{ij} \sim N(z_i \cdot w_j^T, \sigma_{zw})$

$z_i \sim N(\mu_{zi}, \sigma_z)$

$w \sim N(\mu_w, \sigma_w)$

$\mu_{zi} \sim N(a1, b1)$

$\sigma_{zw} \sim \text{gamma}(a0, b0)$

With user defined variables:

$a0, b0, a1, b1, \mu_w, \sigma_w, \mu_{zi}, \sigma_z$