

1. Introduction

This is a Matlab implementation for the Bayesian genetic sparse factor model. This code uses a Gibbs sampler to draw samples from the posterior distribution of a multivariate linear mixed effect model, where the random effects are generally unobserved genetic values (breeding values) with known covariance (ex. based on a pedigree). The focus of the model is on estimating the matrix of genetic (and residual) covariances among traits, called the G-matrix. The code is contained in the zipped file BSF-G.zip.

2. A Brief Tutorial

Unzip the downloaded file. To start, make sure the folder "BSF-G/" is in the search path of Matlab. The ``setup.mat" file should be in the current working directory. This file contains:

Table 1: default

Parameter	description
Y	$n \times p$ data matrix
X	$b \times n$ fixed effect design matrix *
Z_1	$r \times n$ random effect design matrix for factor model
Z_2	$r2 \times n$ additional random effect design matrix*
A	$r \times r$ Additive genetic relationship matrix
U_act	$r \times p$ known genetic effect matrix ⁺
E_act	$r \times p$ known residual matrix ⁺
gen_factor_Lambda	$p \times k_1$ known genetic factor loadings matrix ⁺
error_factor_Lambda	$p \times k$ known latent factor loadings matrix ⁺
G	$p \times p$ known G-matrix ⁺
R	$p \times p$ known residual covariance matrix ⁺
h2s	$p \times 1$ known trait heritabilities ⁺
factor_h2s	$p \times k$ known latent factor heritabilities ⁺

where n is the number of individuals, r the number of genetic effects (ex. lines or individuals), r_2 is the number of 2nd random effects. Parameters marked with an * are optional. Those marked with a ⁺ are necessary if the data is from a simulation and you want to compare to the known values.

The main function is: `fast_BSF_G_sampler()`. This function reads ```setup.mat"`, and takes as input prior hyperparameters and various control parameters for the Gibbs sampler. The file ```model_setup.m"` is set up to run the analysis for either of the example datasets. Type ```help fast_BSF_G_sampler"` for more details.