

Cpp code for Simulation

Bayesian Latent Factor on Image Regression with Nonignorable Missing Data

Getting Started

- Prerequisites:
 - Eigen 3.3.7
 - cmake 3.3.1
 - C++ 14
- Set eigen path in `CmakeLists.txt` by revising `include_directories(<your-path>/eigen3 .)`
- Compile and run as follows.

```
mkdir build
cd build
cmake ..
make
./exe
```

- Outputs
 - Bayesian estimation of replications are saved in `out/rep_*.txt`.
 - Posterior samples of the latest replication are saved in `out/samples_*.txt`

Documentation

- For changing simulation setting please refer to `Class Constant` including:
 - `setting` (model setup)
 - 1: Simulation 1 (with image)
 - 0: Simulation 2
 - `ssl` (Spike-and-Slab prior choice)
 - 1: Adjust SSL
 - 0: SSL
 - `model_type` (missing mechanism)
 - 1: Missing completely at random
 - 2: Missing at random
 - 3: Missing not at random
 - Sample size (N), number of eigenimages (P), number of repliations, true value, tunning parameters, hyperparameters etc.
- For data generation please refer to `Class Generate`.

- For MCMC initial values, please refer to `Class Initial`.
- All the C++ functions related to posterior sampling are contained in `Class MCMC`.

Details

- For Simulation 1
 1. Preparation (code is not provided)
 1. Matlab: read preprocessed ADNI MRIs, save as .mat.
 2. Matlab: apply `svd` function for singular value decomposition and acquire eigenscores and eigenimages, save as .txt.
 3. Python: create true image parameter, specify other true values, use the image (.mat) in step a to generate the dataset for simulation 1, save as .txt.
 2. Cpp
 1. Copy and past the simulated dataset (.txt) into Cpp folder.
 2. Set `setting` to 1 in `Constants.h`.
 3. Specify simulation setting, such as sample size, number of MCMC iteration, and true value in `Constants.h` and `Constants.cpp`.
 4. Compile and run.
- For Simulation 2
 - Set `setting` to 0 in `Constants.h`.
 - Specify simulation setting, such as sample size, number of MCMC iteration, and true value in `Constants.h` and `Constants.cpp`.
 - Compile and run.

PS: Please feel free to contact the authors if you have any questions!