

# B-MASTER Reproducibility Instructions

We describe the reproducibility instructions in three sections. Please refer to the following list to see which section describes the reproducibility of the tables and figures below.

## Figures

- Figure 1: NA (concept diagram).
- Figure 2: refer to Simulation study 2.
- Figure 3: refer to Simulation study 1.
- Figure 4: NA (concept diagram).
- Figure 5,6: refer to Real data analysis.

## Tables

- Table 1: refer to Simulation study 1.
- Table 2: refer to Simulation study 2.
- Table 3: refer to Real data analysis.

## 1. Simulation study 1

1. **Create Dummy data:** Go to [Simulation study 1 / Dummy Real Data / Generate\\_Dummy\\_Real\\_via\\_BMASTER](#).
2. Run [BMASTER\\_MockRealDataGenerate.m](#) to generate estimated coefficient matrix, which is considered as the True coefficient matrix for the rest of this simulation study.
3. Outputs are generated within [Generate\\_Dummy\\_Real\\_via\\_BMASTER / Data](#).
4. The generated data is copied and placed in [Simulation study 1 / Dummy Real Data](#) (already copied, no need to copy again).

5. In [Dummy Real Data](#), run [GENERATE\\_Y\\_DATA.m](#) to generate 10 realizations of  $Y$  based on  $X$  and earlier estimated  $B$  (“True beta”). Now data generation is completed.
6. Copy the generated datasets to the sub-folders within [Simulation study 1](#), namely, [BMASTER](#), [SSLasso](#), [mSSL](#), [Remmap](#) (already copied, no need to copy again).
7. **B-MASTER results:** Run [BMASTER](#) / [BMASTER\\_on\\_simReal\\_v3.m](#).
8. **SSLasso results:** Run [SSLasso](#) / [SSLASSO\\_on\\_simReal.R](#).
9. **mSSL results:** Run [mSSL](#) / [mSSL\\_dpe\\_on\\_simReal.R](#) (for dpe method), and [mSSL](#) / [mSSL\\_dCpe\\_on\\_simReal.R](#) (for dcpe method).
10. **Remmap results:** Run [Remmap](#) / [remMAP\\_on\\_simReal.R](#) (for original method), and [Remmap](#) / [remMAPBic\\_on\\_simReal.R](#) (for BIC-based approximation method).
11. Copy all the outputs to [Simulation study 1](#) / [Summary Table and Plots](#) (already copied, no need to copy again).
12. Run [Summary Table and Plots](#) / [Summary\\_tables\\_plots.R](#) to generate **Table 1** outputs, and **Figure 3 (bottom right)**.
13. Run [Summary Table and Plots](#) / [Post\\_analysis\\_plot.R](#) to generate **Figure 3 (up; bottom left)**.

## 2. Simulation study 2

1. Go to [Simulation study 2](#) and open [BMASTER\\_scalability.m](#).
2. Setting `IsRhoNonZero = 0` run it for  $P = (20, 50, 100, 200, 500, 1000, 2000)$ .
3. Setting `IsRhoNonZero = 1` run it for  $P = (20, 50, 100, 200, 500, 1000, 2000)$ .
4. Run [Simulation study 2](#) / [Summary\\_comp\\_time.R](#), that generates **Figure 2(c)**, and two csv files corresponding to the **upper and lower halves of Table 2**.
5. Go to [Simulation study 2](#) / [remMap scalability](#).
6. Run [BMASTER\\_v\\_remmap.m](#) thrice setting `SampleMultFactor = 1, 5, 10`.
7. Run [remMAP\\_scalability.R](#) thrice setting `SampleMultFactor = 1, 5, 10`.
8. Run [Comparison\\_plot.R](#). That generates **Figure 2(a) and 2(b)**.

### 3. Real data analysis

1. Go to [Real Data Analysis](#). Run [BMASTER\\_Real\\_Data.m](#).
2. Run [Extraction\\_subset\\_for\\_analysis.R](#).
3. Run [Overall\\_plots.R](#). That generates **Figure 5(a), 5(b) and S1**.
4. Run [Post\\_analysis\\_subset\\_1\\_NEW.R](#). That generates **Figure 6(a)**.
5. Run [Post\\_analysis\\_subset\\_2\\_NEW.R](#). That generates **Figure 6(b)**.
6. Run [CCA\\_subset\\_plots.R](#). That generates **Figure S2**.
7. Go to [Real Data Analysis / Validation on real data](#).
8. Run [BMASTER\\_Real\\_Data\\_validation.m](#). Also run [SSLASSO\\_RealData\\_validation.R](#), [mSSL\\_dCpe\\_RealData\\_validation.R](#), [remMAPBic\\_RealData\\_validation.R](#). This sequence of executions generate 4 outputs csv files corresponding to corresponding methods; which results are assembled and presented in **Table 3**.