

JASA A&CS Reproducibility Initiative - Author Contributions Checklist Form

Data

Abstract

We have included the real data set in the file `./data/data.csv`. It can be loaded via `read.csv(file = ./data/data.csv)`. The data set is described in Section 2 of the main paper. It is in the format of a matrix with 7800 rows and 6 columns, where each row corresponds to a trial. The columns contents are given below:

- **ind**: label denoting the participants (from 1 to 20)
- **block**: variable denoting the block in which the trial belongs to (from 1 to 10)
- **trial**: trial number within each block (each block has 40 trials)
- **s**: input stimulus, $s \in \{1, 2, 3, 4\}$
- **d**: decision category, $d \in \{1, 2, 3, 4\}$
- **r_time**: response time (in seconds), in the main paper denoted with τ

ind	block	trial	s	d	r_time
1	1	1	2	1	1.10
1	1	2	1	1	0.97
1	1	3	4	2	0.81
...

In the table above, we display the first three trial for the first individual. The first and the third trials represent a misclassified tone ($s \neq d$), whereas the second trial represents a correct classification ($s=d=1$).

Code

Abstract

The codes are written in R and in C++ (some functions in C++ are called within R). The codes comprise three main programs:

- a) **drift_diff Imm main.R**: This is the main script that runs the analysis by calling the functions included in the other files. This script reproduces the results summarized in Section 6 of the main paper.
- b) **drift_diff fcts.R**: This file contains all the R functions needed to run the main script, including the main MCMC function.
- c) **drift_diff fcts.cpp**: This file contains all the C++ functions that are called by the other programs.

Description

The codes are included in a zipped file. The main file to run is **drift_diff Imm main.R**. The main file calls functions that are also included in the zipped file. The implementation is highly automated - the main function implementing the longitudinal drift-diffusion mixed model takes in

the data matrix (as described above) as an argument and a few additional parameters with default recommended values.

The MCMC algorithm takes around 10 hours on a Dell machine with 16 Gb RAM. Alternatively, the user can load the results from a previous run of the algorithm (instructions in the body of the R script). Additional descriptions and instructions are included as detailed comments in the body of the R scripts.

Optional Information

The following R libraries are utilized and have to be pre-installed:

- Rcpp 1.0.4.6
- RcppArmadillo 0.9.880.1.0
- RcppProgress 0.4.2
- rgen 0.0.1
- ggplot2 3.3.1
- tidyr 1.1.0
- reshape2 1.4.4
- latex2exp 0.4.0
- RColorBrewer 1.1-2
- plyr 1.8.6
- tidyverse 1.3.0
- gtools 3.8.2
- mvtnorm 1.1-0
- LaplacesDemon 16.1.4

OS X users must install Command Line Tools in order to compile and run the C++ code.

Instructions for Use

Reproducibility

The file `drift_diff_Imm_main.R` reproduces the descriptive statistics of Section 2, the results presented in Section 5 as well as most of the results in the Supplementary Materials. On top of every plot command in the main R script, there is a header describing where that plot appears in the manuscript.