User Manual for corona seiirqd program - version 1.0

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This is a preliminary version of the user manual for the corona seiirqd C program. Details on the model can be found on the preprint *Covid-19 Belgium: Extended SEIR-QD model with nursing homes and long-term scenarios-based forecasts* `https://doi.org/10.1101/2020.09.07.20190108`. Additional informations can be obtained by writing to nicolas.franco@unamur.be

1. Installation

The program requiers the GNU Scientific Library (GSL). Please install it first.

The compilation can be done using the makefile, or by compiling with a C compiler all *.c files with the flags: −lm −lgsl −lgslcblas.

On a low memory computer, an additional linkage flag should be added:
−Wl,−stack_size,0xc0000000,−stack_addr,0xc0000000 −O3 −mfpmath=sse −msse2.

The program can be run by the command: ./corona.

2. Running calibration/simulation

The following two files contain all the necessarily elements to configure for performing different runs of the program:

- command.h
- scenario.c

In the command.c file, you can fix useful elements like duration of the runs (burning, mcmc), speed/approximation of the algorithm, standard deviation for the steps, number of outputs, name of some output files, etc.

The command.c file also allows to chose between one or both of the two modes of the program: calibration from data or/and running scenarios from calibration. The scenarios can be performed using no parameter, or using additional parameters (change/change2) which can be defined either by loops or by passing arguments to ./corona.

In the scenario.c file, you can define the timeline for the scenarios.

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3. Output files

The following output files are produced:

- inputparameters.txt: This file contains as output all the estimated parameters for each run and can serve as input file for scenario runs (when the mode JUST_PLOT_MCMC is selected). The first line is the number of subsequent lines. Then each line contains the value of the parameters according to the order in the corona.h file.
- result_parameters.txt: This file contains a summary of the results of the runs, with several calculations and parameters with confidence interval. The name is modified if PARTNAME and/or change/change2 parameters are used.
- reimpout.txt: Contains the estimation of reimportation from travellers
- Files in the plot folder (or in the plotcs folder for PARTNAME/change/change2 runs): each ventile of the simulation. The structure is first column= number of the day and the remaining columns are each compartments in the order of the corona.h file, first half in prevalence and second half in incidence. We refer to the corona.h file for the correspondence column-compartment.

An exemple of a Gnuplot script reading the files in the plot folder is provided.

4. Input files

The program needs two mandatory input files and one optional.

- data.txt (mandatory): must contain the data with the following structure by column:
  1. Number of the day (1=February 29, 2020)
  2. Cumulative positive PCR tests
  3. New hospitalisations incidence
  4. New hospitalisations cumulative
  5. Change in hospitalisation prevalence
  6. Hospitalisation prevalence
  7. Discharged incidence
  8. Discharged cumulative
  9. Deaths hospital incidence
  10. Deaths hospital cummulative
  11. Deaths nursing homes incidence
  12. Deaths nursing homes cummulative
  13. Total deaths incidence
  14. Total deaths cumulative
  15. Deaths 0-24 incidence
  16. Deaths 25-44 incidence
  17. Deaths 45-64 incidence
  18. Deaths 65-74 incidence
  19. Deaths 75+ incidence
  20. Deaths 0-24 cumulative

21. Deaths 25-44 cumulative
22. Deaths 45-64 cumulative
23. Deaths 65-74 cumulative
24. Deaths 75+ cumulative

An exemple file is given (with data up to October 30, 2020)

- reimp.txt (mandatory): must contain the proportion of infections from travellers during the period July-September 2020. The file is provided.
- priors.txt (optional): The program can run from refined informed priors. The structure is similar to the inputparameters.txt file structure (hence any inputparameters.txt can be used as priors.txt file)