**Vaccine Allocation Software Overview** 5/12/22

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github: https://github.com/Stonepaw90/international-vaccine-allocation

**Data files**

Passengers\_2020.csv

Description: airline passengers by country

Source: web (ICAO)

Pop.csv

Description: country populations since 1820

Source: web (Our World in Data)

Vaccinations.csv

Description: vaccinations by country by day

Format: CSV

Source: web (Our World in Data)

Owid-covid-data.zip

Description: zipped file of various covid-related information by country by day.

Source: web (Our World in Data)

vax\_budget.csv

Description: Total vaccines administered by day

Source: created by Data Manipulation.Rmd

Mid\_vaccine\_params.csv

Description: Parameters for each of 166 countries

Source: created by Data Manipulation.Rmd

Four\_mid\_seir\_data.py

Description: list of 4 area aggregated parameters

Source: copied down from Data Manipulation.Rmd printed output

Vaccine Allocation parameters.xlcs

Description: model inputs not by area. Also known as Table 1.

Source: edited

Four\_mid\_params.py

Description: Model inputs not by area for four areas. Copied from Vaccine Allocation Parameters but slightly adjusted.

Source: edited

Mid\_params\_real.py

Description: Model inputs not by area for the 166 area simulation. Copied from Vaccine allocation parameters.

Source: edited

User\_input\_params.py

Description: code that allows the user to input parameters for the four area case

User\_input\_params\_real.py

Description: code that allows the user to input parameters for the 166 country case

State history CSVs (global and four areas)

Description: state variables by day. Global csvs are used in simulation\_pipeline\_global.R and four area csv are used in simulation\_pipeline.R

Source: global\_seir.py

Plots

Description: Plots of state variables over time

Source: simulation\_pipeline\_global.R or simulation\_pipeline.R

**Programs**

Data Manipulation.Rmd

Description: Country preprocessor. combines by country data files, aggregates countries into areas. Finds global vaccination budget by day. Prints parameters for 4 areas, saves parameters for 166 countries into a .csv.

Language: R (Markdown)

Inputs: Passengers\_2020, pop, vaccinations, owid-covid-data CSV files

Outputs: vax\_budget.csv, mid\_vaccine\_params.csv, information written in four\_mid\_seir\_data.py

Mid\_process\_df.py

Description: Opens the 166 country .csv files for use in the global\_seir.py file

Inputs: vax\_budget.csv, mid\_vaccine\_params.csv

Outputs: file variables in python which are used in mid\_seir\_data\_real.py to access area parameters

Mid\_seir\_data\_real.py

Description: Loads vaccine parameters into variables, using the file that was opened in mid\_process\_df.py

Inputs: mid\_process\_df.py

Outputs: variables for global\_seir.py

Global\_seir.py

Description: simulates SEIR equations. If optimizing over vaccine allocation, repeatedly simulates and calls Gurobi linear program solver.

Inputs: mid\_process\_df.py, mid\_seir\_data\_real.py, mid\_params\_real.py, user\_input\_params\_real.py, four\_mid\_params.py, four\_mid\_seir\_data.py, user\_input\_params.py

Outputs: optimal vaccine allocation, State history as a .csv

Simulation\_pipeline\_global.R and simulation\_pipeline.R

Description: plots state variables over time

Inputs: State history DATA, day of variant, lag parameter

Outputs: plots

Diagram of SEIR OPT overview

Diagram

Description automatically generated