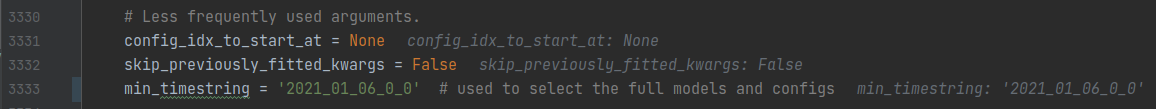
Analysis model\_experiments.py

*run\_many\_models\_in\_parallel* will write the configs into a pkl file, and the following *fit\_and\_save\_one\_model* will select one config from teh pkl file according to the config idx.



1. Read the arguments

set necessary arguments



Psi is what?

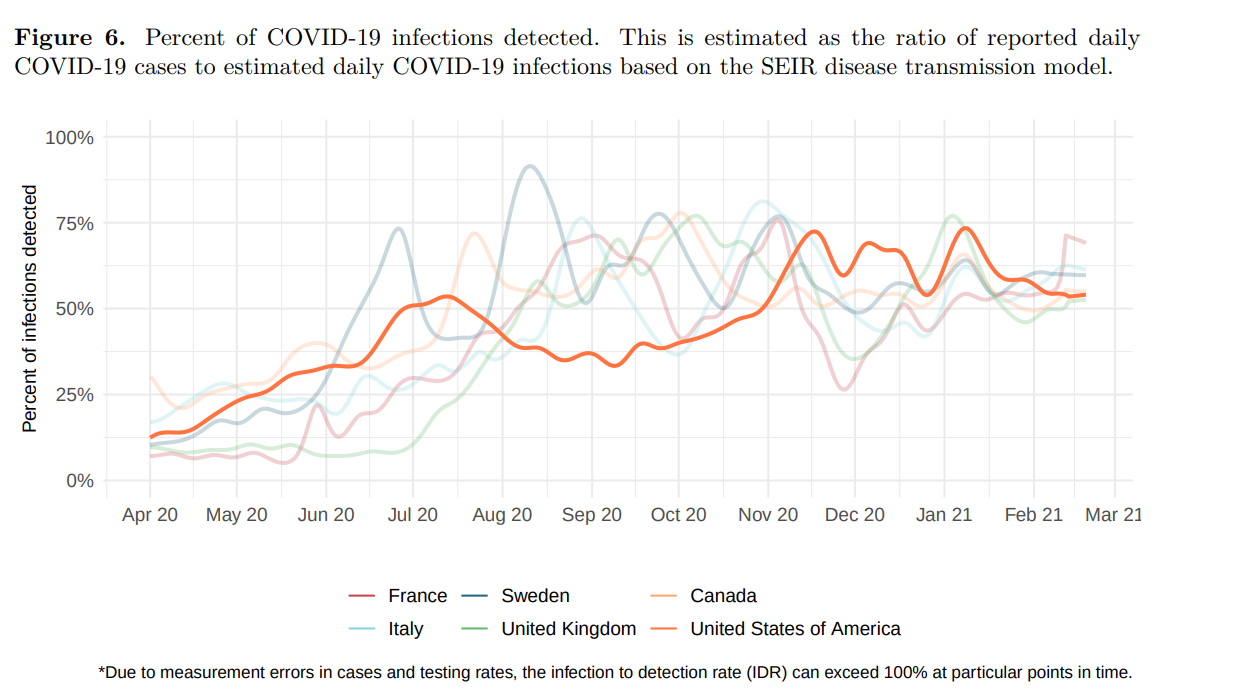
fit\_disease\_model\_on\_real\_data()

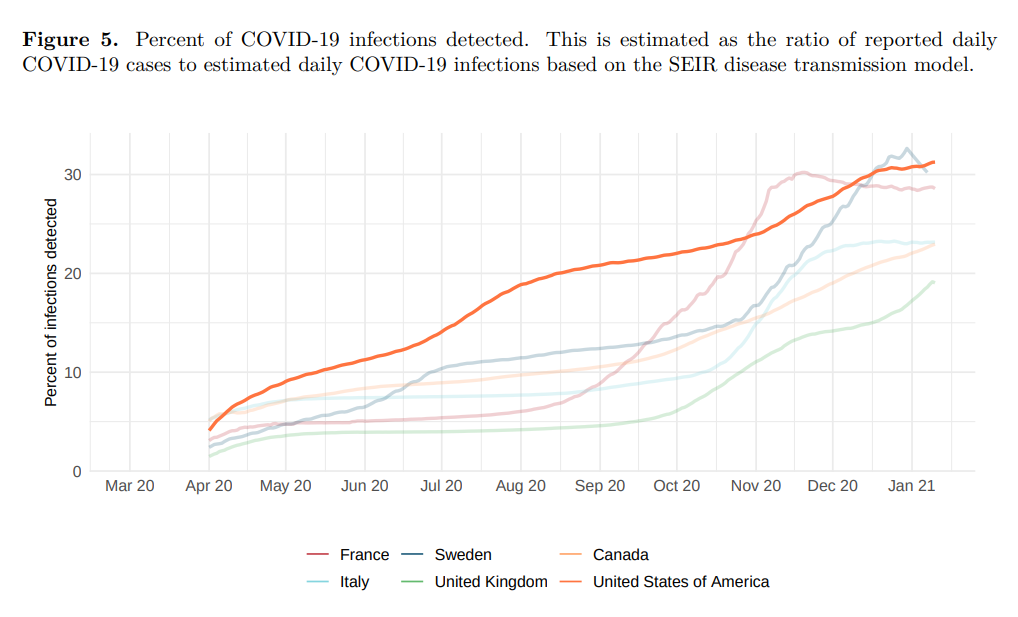
init\_exogenous\_variables():

initial\_conditions: ['E', 'I', 'R']

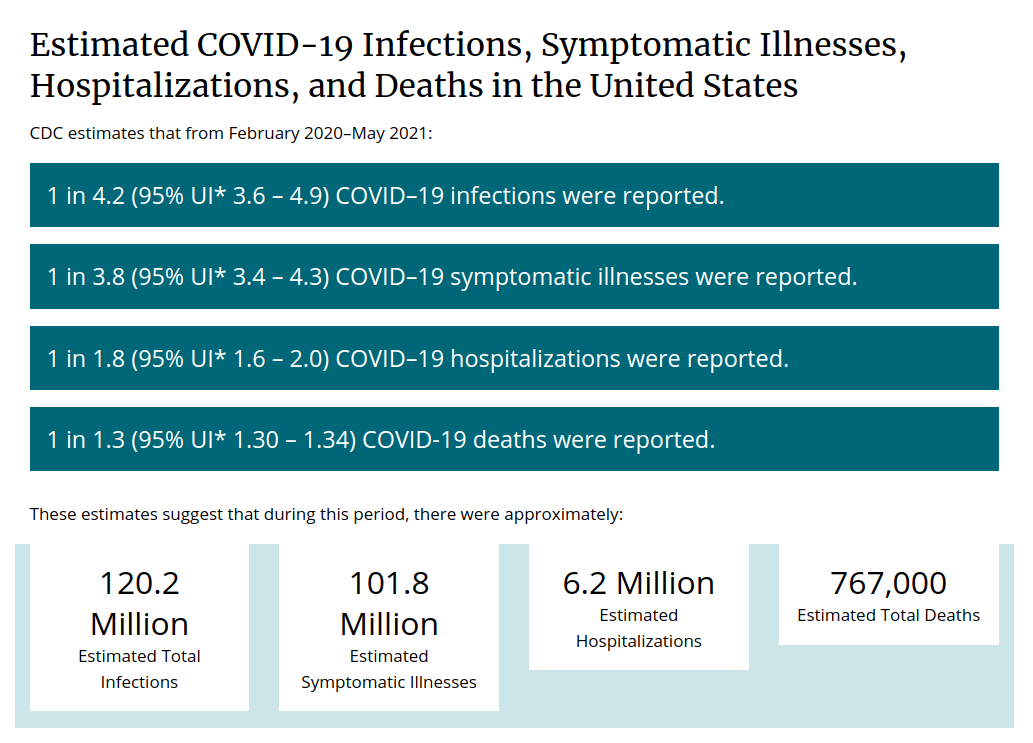
num\_seeds: seems the iteration times of simulation.

Different daily rates:





<https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/burden.html>



http://www.healthdata.org/sites/default/files/files/Projects/COVID/2021/briefing\_US\_20210114.pdf

<http://www.healthdata.org/sites/default/files/files/Projects/COVID/2021/102_briefing_United_States_of_America_2.pdf>

ISSUE: detected rate is not sure: 0.25 ~ 0.3 ~ 0.6

daily\_E\_to\_I = smoothed\_daily\_counts / rate\_over\_time

hourly\_E\_to\_I[t] = daily\_E\_to\_I[d] / 24

I\_s = E[s\_index - latency\_period]

R\_s = np.sum(hourly\_E\_to\_I[:s\_index - infectious\_period])

S\_s = total\_pop - E\_s - I\_s - R\_s

total\_pop = np.sum(pop\_sizes)

conda run python model\_experiments.py run\_many\_models\_in\_parallel calibrate\_r0

conda run python model\_experiments.py run\_many\_models\_in\_parallel normal\_grid\_search

conda run python model\_experiments.py run\_many\_models\_in\_parallel test\_retrospective\_counterfactuals

conda run python model\_experiments.py run\_many\_models\_in\_parallel rerun\_best\_models\_and\_save\_cases\_per\_poi

conda run python -u model\_experiments.py fit\_and\_save\_one\_model calibrate\_r0 --timestring Huan\_R0\_only --config\_idx 29

fit\_and\_save\_one\_model normal\_grid\_search --timestring Huan\_normal\_grid\_search --config\_idx 15

#### PARAMETERS FOR 2021 EXPERIMENTS #### # Huan: for: python model\_experiments.py run\_many\_models\_in\_parallel calibrate\_r0  
# MIN\_DATETIME = datetime.datetime(2020, 12, 28, 0) # the acutall data date.  
MIN\_DATETIME = datetime.datetime(2021, 1, 1, 0) # the acutall data date.  
  
MAX\_DATETIME = datetime.datetime(2021, 1, 17, 23) # the acutall data date.

N: CBG\_count:

M: POI\_count

# Huan modified  
for home\_beta in home\_betas:  
 configs\_with\_changing\_params.append({'home\_beta':home\_beta, 'poi\_psi':2500, 'p\_sick\_at\_t0':1e-4})  
for poi\_psi in poi\_psis:  
 configs\_with\_changing\_params.append({'home\_beta':0.001, 'poi\_psi':poi\_psi, 'p\_sick\_at\_t0':1e-4})

BETA\_AND\_PSI\_PLAUSIBLE\_RANGE = {"min\_home\_beta": 0.0001,  
 "max\_home\_beta": 0.02,  
 "min\_poi\_psi": 100,  
 "max\_poi\_psi": 500}

R0: 2.838

self.HOME\_BETA: 0.02 PSI: 250

R0: 2.473

self.HOME\_BETA: 0.0002 PSI: 500R0: 1.233

self.HOME\_BETA: 0.0001 PSI: 250

R0: 2.898

self.HOME\_BETA: 0.005 PSI: 500

R0: 0.503

self.HOME\_BETA: 0.0002 PSI: 100R0: 1.240

self.HOME\_BETA: 0.0002 PSI: 250R0: 1.264

self.HOME\_BETA: 0.0005 PSI: 250

R0: 2.534

self.HOME\_BETA: 0.001 PSI: 500

R0: 0.525

self.HOME\_BETA: 0.0005 PSI: 100

R0: 2.037

self.HOME\_BETA: 0.01 PSI: 250

R0: 2.067

self.HOME\_BETA: 0.02 PSI: 100

R0: 0.564

self.HOME\_BETA: 0.001 PSI: 100R0: 1.396

self.HOME\_BETA: 0.002 PSI: 250

R0: 0.492

self.HOME\_BETA: 0.0001 PSI: 100

R0: 2.468

self.HOME\_BETA: 0.0001 PSI: 500

R0: 0.879

self.HOME\_BETA: 0.005 PSI: 100

R0: 2.493

self.HOME\_BETA: 0.0005 PSI: 500R0: 1.314

self.HOME\_BETA: 0.001 PSI: 250

R0: 2.613

self.HOME\_BETA: 0.002 PSI: 500

R0: 0.644

self.HOME\_BETA: 0.002 PSI: 100R0: 1.654

self.HOME\_BETA: 0.005 PSI: 250R0: 1.288

self.HOME\_BETA: 0.01 PSI: 100

# Imprtant dates

# Imprtant initial variables

# ??????????????

BETA\_PLAUSIBLE\_RANGE = (0.7, 1.3)

# use to normal grid search

After clipping, 10262 POIs

After dropping for missing CBG home data, 9924 POIs

After dropping for missing avg\_median\_dwell, 9924 POIs

After dropping for missing area, 9924 POIs

After dropping for missing any hours, 6550 POIs; kept 94.70% of visits

After dropping CBGs that appear in < 100 POIs, 910 CBGs (2.3%)

After dropping CBGs with population size 0 in ACS data, 904 CBGs

FINAL: number of CBGs (N) = 904, number of POIs (M) = 6550

Num connected POI-CBG pairs (E) = 522762, network density (E/N) = 578.277

Dwell time correction factors: mean = 0.16, min = 0.01, max = 0.73

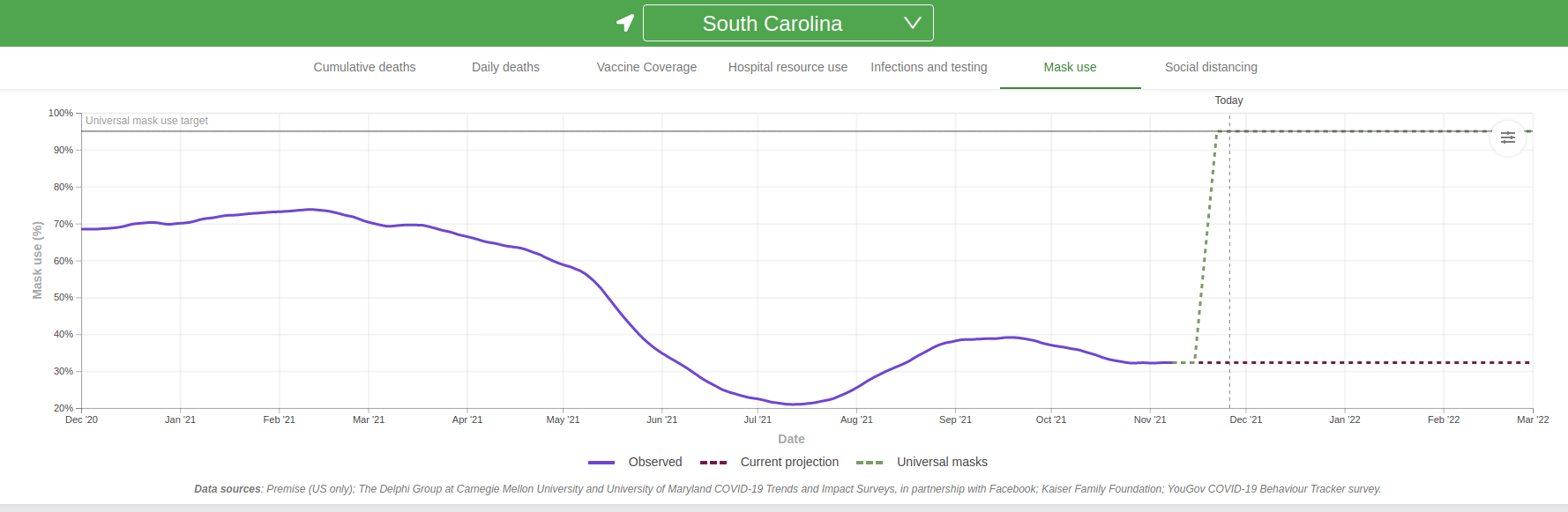
Change the correction factor.

# use South Carolina population to obtain the correction factor.  
state\_population = 5149000  
state\_unique\_visitors = 415034 # 2021-02-03  
correction\_factor = state\_population / state\_unique\_visitors  
print(  
 "Total state population of South Carolina: %i; total safegraph visitor count in South Carolina: %i; correction factor for POI visits is %2.3f" %  
 (total\_us\_population\_in\_50\_states\_plus\_dc,  
 safegraph\_visitor\_count,  
 correction\_factor))

Population

|  |  |
| --- | --- |
| [Richland County](https://www.southcarolina-demographics.com/richland-county-demographics) | 416,147 |
| [Lexington County](https://www.southcarolina-demographics.com/lexington-county-demographics) | 293,991 |
| [Kershaw County](https://www.southcarolina-demographics.com/kershaw-county-demographics) | 65,403 |
| [Fairfield County](https://www.southcarolina-demographics.com/fairfield-county-demographics) | 20,948 |
| [Saluda County](https://www.southcarolina-demographics.com/saluda-county-demographics) | 18,862 |
| [Calhoun County](https://www.southcarolina-demographics.com/calhoun-county-demographics) | 14,119 |

After dropping CBGs that appear in < 100 POIs, 910 CBGs (2.3%)



https://covid19.healthdata.org/united-states-of-america/south-carolina?view=mask-use&tab=trend

