🔒 JimDuggan / **seirR** Private

Branch: master ▾   **seirR** / data-raw / Examples / **01 Run Model** /   Create new file   Upload files   Find file   History

🐙 **Jim Duggan** and **Jim Duggan** Update to test README   Latest commit d2f2e45 2 hours ago

📁 ..

📁 README_files/figure-gfm	Update polymod location	2 hours ago
📄 .DS_Store	Updates for first relase	17 hours ago
📄 README.Rmd	Update polymod location	2 hours ago
📄 README.md	Update to test README	2 hours ago

📖 README.md   ✏️

Running a model

In order to run a model, the following steps should be taken.

- First, load in the libraries, and include **ggplot2** for visualisation

```
library(seirR)
```

```
## Welcome to package seirR v0.0.0.1

## Checking https://covid.ourworldindata.org/data/ecdc/full_data.csv  for data update...

## Loading https://covid.ourworldindata.org/data/ecdc/full_data.csv  to global environment data_env
```

```
library(ggplot2)
library(dplyr)
```

```
##
## Attaching package: 'dplyr'

## The following object is masked from 'package:seirR':
##
##     explain

## The following objects are masked from 'package:stats':
##
##     filter, lag

## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

- Next, call the constructor to create an S3 model object

```
mod <- create_seir_p()
```

The **mod** variable has the following S3 structure.

```
class(mod)
```

```
## [1] "seir_p" "seir"   "list"
```

The **mod** variable has three list elements, as follows:

```
str(mod)
```

```
## List of 4
##  $ params  :Classes 'tbl_df', 'tbl' and 'data.frame':    28 obs. of  9 variables:
##   ..$ ParameterName: chr [1:28] "init_seeds" "total_population" "init_susceptible" "start_day" ...
##   ..$ ParameterType: chr [1:28] "InitialCondition" "InitialCondition" "InitialCondition"
## "InitialCondition" ...
##   ..$ Description  : chr [1:28] "The initial number of people infected" "Total number of people in
## all compartments" "Initial number susceptible" "Start day of epidemic, see variable ValueS" ...
##   ..$ Value        : num [1:28] 1e+00 5e+06 5e+06 1e+00 3e+02 ...
##   ..$ UpperEstimate: num [1:28] 1e+00 5e+06 5e+06 0e+00 0e+00 ...
##   ..$ LowerEstimate: num [1:28] 1e+00 5e+06 5e+06 0e+00 0e+00 ...
##   ..$ Varying      : logi [1:28] FALSE FALSE FALSE FALSE FALSE FALSE ...
##   ..$ Source       : chr [1:28] "Use for data calibration process" "National Statistics" "Arbitrary
## value" "Depends on country" ...
##   ..$ ValueS       : chr [1:28] NA NA NA "2020-02-29" ...
##  $ pulse   : chr "TBD"
##  $ sim_date:Classes 'tbl_df', 'tbl' and 'data.frame':    300 obs. of  2 variables:
##   ..$ SimTime: int [1:300] 1 2 3 4 5 6 7 8 9 10 ...
##   ..$ Date   : Date[1:300], format: "2020-02-29" ...
##  $ POLYMOD :List of 3
##   ..$ matrix      : num [1:4, 1:4] 1.916 0.624 0.494 0.145 1.243 ...
##   .. ..- attr(*, "dimnames")=List of 2
##   .. .. ..$                 : NULL
##   .. .. ..$ contact.age.group: chr [1:4] "[0,5)" "[5,15)" "[15,65)" "65+"
##   ..$ demography  :Classes 'data.table' and 'data.frame':    4 obs. of  3 variables:
##   .. ..$ lower.age.limit: num [1:4] 0 5 15 65
##   .. ..$ population      : num [1:4] 351883 700216 3220526 727349
##   .. ..$ upper.age.limit: num [1:4] 5 15 65 80
##   .. ..- attr(*, ".internal.selfref")=<externalptr>
##   .. ..- attr(*, "sorted")= chr "lower.age.limit"
##   ..$ participants:Classes 'data.table' and 'data.frame':    4 obs. of  3 variables:
##   .. ..$ age.group   : chr [1:4] "[0,5)" "[5,15)" "[15,65)" "65+"
##   .. ..$ participants: int [1:4] 95 204 656 56
##   .. ..$ proportion  : num [1:4] 0.094 0.2018 0.6489 0.0554
##   .. ..- attr(*, ".internal.selfref")=<externalptr>
##  - attr(*, "class")= chr [1:3] "seir_p" "seir" "list"
```

The first is a tibble with the parameters for the simulation run.

```
mod$params
```

```
## # A tibble: 28 x 9
##    ParameterName ParameterType Description   Value UpperEstimate
##    <chr>         <chr>         <chr>         <dbl>         <dbl>
##  1 init_seeds    InitialCondi… The initia… 1.00e+0             1
##  2 total_popula… InitialCondi… Total numb… 5.00e+6       4999974
##  3 init_suscept… InitialCondi… Initial nu… 5.00e+6       4999973
##  4 start_day     InitialCondi… Start day … 1.00e+0             0
##  5 end_day       InitialCondi… End day of… 3.00e+2             0
```

```
## 6 beta          Transmission  Transmissi… 1.12e+0        1.04
## 7 beta_mult_h   Transmission  Multiplica… 2.10e-1        0.75
## 8 beta_mult_i   Transmission  Multiplica… 8.00e-2        0.0101
## 9 beta_mult_j   Transmission  Multiplica… 1.20e-1        0.177
## 10 beta_mult_k  Transmission  Multiplica… 1.00e+0        1
## # … with 18 more rows, and 4 more variables: LowerEstimate <dbl>,
## #   Varying <lgl>, Source <chr>, ValueS <chr>
```

The second will contain information on pulse policies that can be activated/deactivated.

```
mod$pulse
```

```
## [1] "TBD"
```

The third contains a mapping from the simulation time to the calendar date

```
mod$sim_date
```

```
## # A tibble: 300 x 2
##    SimTime Date
##      <int> <date>
## 1        1 2020-02-29
## 2        2 2020-03-01
## 3        3 2020-03-02
## 4        4 2020-03-03
## 5        5 2020-03-04
## 6        6 2020-03-05
## 7        7 2020-03-06
## 8        8 2020-03-07
## 9        9 2020-03-08
## 10      10 2020-03-09
## # … with 290 more rows
```

The third contains a mapping fof contacts based on the polymod study

```
mod$POLYMOD
```

```
## $matrix
##        contact.age.group
##            [0,5)     [5,15)   [15,65)        65+
##    [1,] 1.9157895 1.2425307 4.516886 0.3003448
##    [2,] 0.6244151 7.9460784 6.048153 0.5063152
##    [3,] 0.4935266 1.3150068 9.169207 0.9526663
##    [4,] 0.1453033 0.4874277 4.218177 1.7142857
##
## $demography
##    lower.age.limit population upper.age.limit
## 1:               0     351883                5
## 2:               5     700216               15
## 3:              15    3220526               65
## 4:              65     727349               80
##
## $participants
##    age.group participants proportion
## 1:     [0,5)           95 0.09396637
## 2:    [5,15)          204 0.20178042
## 3:   [15,65)          656 0.64886251
## 4:       65+           56 0.05539070
```

- A model can then be run based on the **mod** object by calling the function **run()** In this example, we run the model twice, and alter a parmeter using the **set_params()** function

```
out1 <- run(mod)
mod <- set_param(mod,"distancing_flag",1)
out2 <- run(mod)
```

The output from these models is a tibble, containing a good deal of simulation information.

```
glimpse(out1)
```

```
## Observations: 300
## Variables: 60
## $ Date                                  <date> 2020-03-01, 2020-03…
## $ SimDay                                <dbl> 1, 2, 3, 4, 5, 6, 7,…
## $ Country                               <chr> "Ireland", "Ireland"…
## $ ReportedNewCases                      <dbl> 1, 0, NA, 1, 4, 7, 5…
## $ ReportedNewDeaths                     <dbl> 0, 0, NA, 0, 0, 0, 0…
## $ ReportedTotalCases                    <dbl> 1, 1, NA, 2, 6, 13, …
## $ ReportedTotalDeaths                   <dbl> 0, 0, NA, 0, 0, 0, 0…
## $ AsymptomaticInfected01                <dbl> 0.00000000, 0.068471…
## $ AsymptomaticInfected02                <dbl> 0.00000000, 0.016656…
## $ AwaitingResults01                     <dbl> 0.0000000, 0.1983170…
## $ AwaitingResults02                     <dbl> 0.00000000, 0.027947…
## $ CumulativeImmediateIsolation          <dbl> 0.00000000, 0.013172…
## $ CumulativeInfectiousAsymptomatic      <dbl> 0.00000000, 0.087814…
## $ CumulativeNotQuarantined              <dbl> 0.00000000, 0.018441…
## $ CumulativeModelInfected               <dbl> 0.000000, 1.090863, …
## $ CumulativeTestIncidence               <dbl> 0.00000000, 0.033512…
## $ CumulativeTestsPositive               <dbl> 0.0000000, 0.2318298…
## $ ExpectedICUExits                      <dbl> 0, 0, 0, 0, 0, 0, 0,…
## $ Exposed01                             <dbl> 0.0000000, 0.8532268…
## $ Exposed02                             <dbl> 0.0000000, 0.2052171…
## $ InHospital01                          <dbl> 0, 0, 0, 0, 0, 0, 0,…
## $ InHospital02                          <dbl> 0, 0, 0, 0, 0, 0, 0,…
## $ InHospital03                          <dbl> 0, 0, 0, 0, 0, 0, 0,…
## $ InHospitalSevere                      <dbl> 0, 0, 0, 0, 0, 0, 0,…
## $ InfectedPresymptomatic01              <dbl> 1.0000000, 0.2928923…
## $ InfectedPresymptomatic02              <dbl> 0.0000000, 0.3882697…
## $ NotQuarantineInfectious01             <dbl> 0.00000000, 0.014378…
## $ NotQuarantineInfectious02             <dbl> 0.000000000, 0.00349…
## $ PhysicalDistancingSmoothedValue       <dbl> 1.0000000, 1.0000000…
## $ RemovedAsymptomatic                   <dbl> 0.000000000, 0.00268…
## $ RemovedAwaitingResults                <dbl> 0.000000e+00, 5.5650…
## $ RemovedHospital                       <dbl> 0, 0, 0, 0, 0, 0, 0,…
## $ RemovedNotQuarantine                  <dbl> 0.000000e+00, 5.6420…
## $ RemovedSevereCasesHospital            <dbl> 0, 0, 0, 0, 0, 0, 0,…
## $ RemovedSevereCasesICU                 <dbl> 0, 0, 0, 0, 0, 0, 0,…
## $ RemovedSymptomaticImmediateIsolation  <dbl> 0.0000000000, 0.0004…
## $ SevereCasesHospital01                 <dbl> 0, 0, 0, 0, 0, 0, 0,…
## $ SevereCasesHospital02                 <dbl> 0, 0, 0, 0, 0, 0, 0,…
## $ SevereCasesICU01                      <dbl> 0, 0, 0, 0, 0, 0, 0,…
## $ SevereCasesICU02                      <dbl> 0, 0, 0, 0, 0, 0, 0,…
## $ Susceptible                           <dbl> 4999973, 4999972, 49…
## $ SymptomaticImmediateIsolation01       <dbl> 0.00000000, 0.010270…
## $ SymptomaticImmediateIsolation02       <dbl> 0.000000000, 0.00249…
## $ EffectofPhysicalDistancingonBeta      <dbl> 1, 1, 1, 1, 1, 1, 1,…
## $ PhysicalDistancingFractionalReductionAmount <dbl> 1.0, 1.0, 1.0, 1.0, …
## $ CheckSumPopulation                    <dbl> 4999974, 4999974, 49…
## $ Beta                                  <dbl> 1.12, 1.12, 1.12, 1.…
## $ Beta_h                                <dbl> 0.21, 0.21, 0.21, 0.…
```

```
## $ Beta_i                         <dbl> 0.08, 0.08, 0.08, 0.…
## $ Beta_j                         <dbl> 0.12, 0.12, 0.12, 0.…
## $ Beta_k                         <dbl> 1, 1, 1, 1, 1, 1, 1,…
## $ Lambda                         <dbl> 2.240012e-07, 2.0599…
## $ IR                             <dbl> 1.120000, 1.029960, …
## $ TotalExposed                   <dbl> 0.000000, 1.058444, …
## $ TotalInfectious                <dbl> 1.000000, 1.023200, …
## $ TotalRemoved                   <dbl> 0.000000e+00, 9.2188…
## $ TotalSevereinNonICUHospital    <dbl> 0, 0, 0, 0, 0, 0, 0,…
## $ TotalSevereinICU               <dbl> 0, 0, 0, 0, 0, 0, 0,…
## $ V53                            <dbl> 0, 0, 0, 0, 0, 0, 0,…
## $ ReportedIncidence              <dbl> 0.00000000, 0.099158…
```

Any of these variables can then be printed.

```
ggplot()+geom_line(out1,mapping=aes(x=SimDay,y=ReportedIncidence),colour="red")+
  geom_line(out2,mapping=aes(x=SimDay,y=ReportedIncidence),colour="blue")
```