

How to Run Simple Models with the Broadwick Framework

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Broadwick Examples

- Simple models have been written in the Broadwick Framework
- They have been compiled (built) together with the Broadwick Framework into one jar file

BroadwickExamples-1.0-SNAPSHOT.one-jar.jar

- Get the files from GitHub (see)
<http://epicscotland.github.io/broadwick.html>

Configuration Files

- Models in the “one-jar” file are run using XML configuration files
 - Broadwick_with_DummyModel.xml
 - Broadwick_with_BasicSIRModel.xml
 - Broadwick_with_IndividualSIRModel.xml
 - Broadwick_with_IndividualNetworkModel.xml

Command Line Operation

- Broadwick is designed to be run from the command line, and/or in batch scripts
- Bring up your command line:
 - Windows: Start -> (search) “prompt” -> command prompt
 - Mac: (Launch Pad) -> Terminal
- Go to the directory of the jar and xml files
- To run a model type this (all one line):

```
java -jar BroadwickExamples-1.0-SNAPSHOT.one-jar.jar  
-c Broadwick_with_BasicSIRModel.xml
```

Broadwick_with_DummyModel.xml

Command:

```
java -jar BroadwickExamples-1.0-SNAPSHOT.one-jar.jar -c Broadwick_with_DummyModel.xml
```

Expected results:

lots of:

```
[JarClassLoader] INFO: findResources..
```

```
[main] INFO Running broadwick Version 1.1 Build (SJLDELL - unknown : 2014-06-14 11:49)
```

```
[main] INFO Running broadwick for the following models [Broadwick Project]
```

```
[pool-1-thread-1] INFO Running Broadwick Project [epic.broadwickexamples.DummyModel]
```

```
[pool-1-thread-1] INFO Initialise Dummy Model
```

```
[pool-1-thread-1] INFO Run Dummy Model
```

```
[pool-1-thread-1] INFO stringParam=ABCDEFGF
```

```
[pool-1-thread-1] INFO intParam=1
```

```
[pool-1-thread-1] INFO doubleParam=2.0
```

```
[pool-1-thread-1] INFO Finalise Dummy Model
```

```
[pool-1-thread-1] INFO END
```

```
[main] INFO Simulation complete. 0:00:00.056
```

SUCCESS !

Broadwick_with_BasicSIRModel.xml

Command:

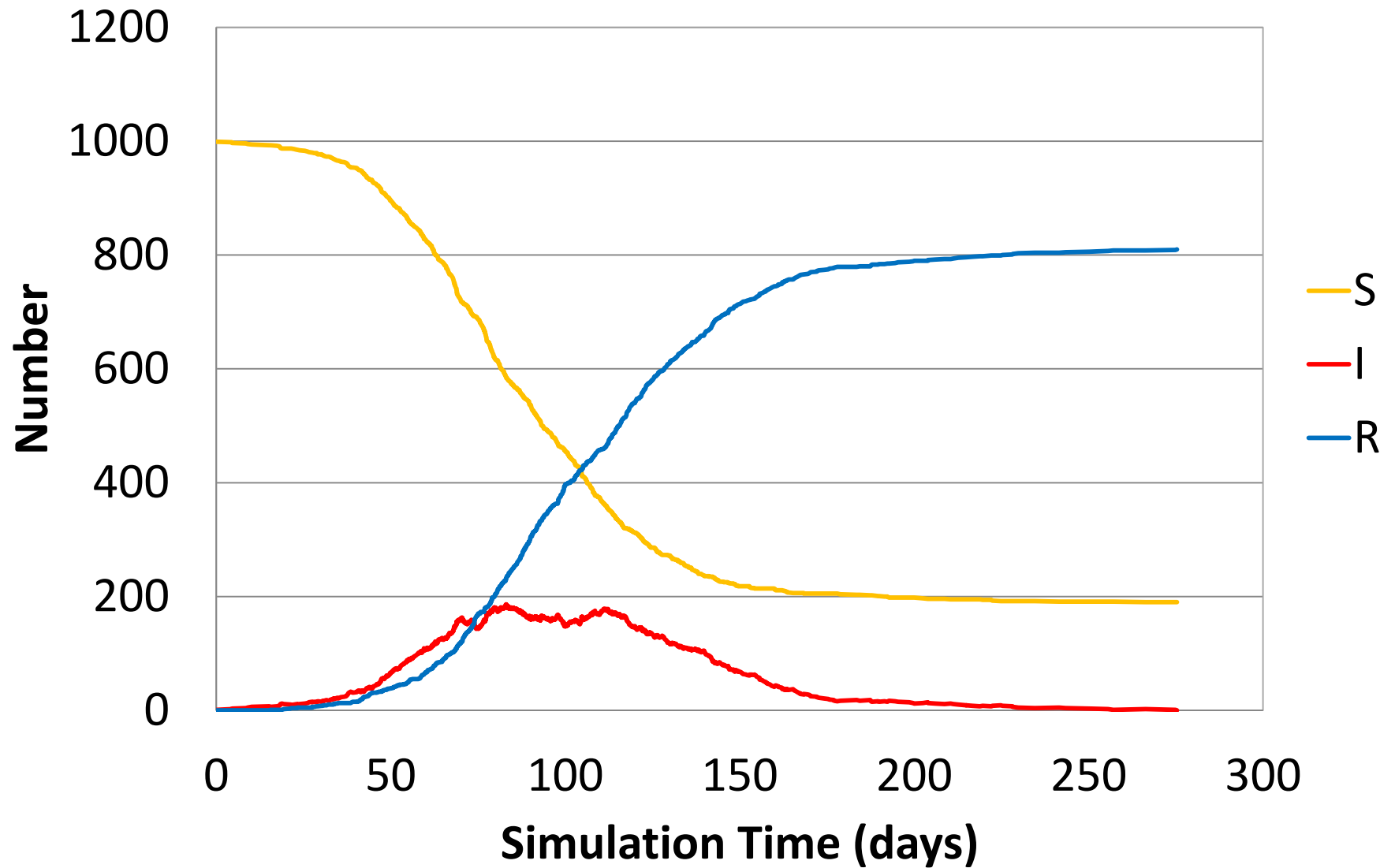
```
java -jar BroadwickExamples-1.0-SNAPSHOT.one-jar.jar -c Broadwick_with_BasicSIRModel.xml
```

Expected results – also written to log file epic.basic.BasicSIRModel.log

```
[main] INFO Running broadwick Version 1.1 Build (SJLDELL - unknown : 2014-06-14 11:49)
[main] INFO Running broadwick for the following models [Broadwick Project]
[pool-1-thread-1] INFO Running Broadwick Project [epic.basic.BasicSIRModel]
[pool-1-thread-1] INFO BasicSIRModel - init
[pool-1-thread-1] INFO seed      = 12345
[pool-1-thread-1] INFO maxTime= 1000000.0
[pool-1-thread-1] INFO tauStep  = 0
[pool-1-thread-1] INFO N        = 1000
[pool-1-thread-1] INFO initI    = 1
[pool-1-thread-1] INFO beta     = 0.1
[pool-1-thread-1] INFO gamma    = 0.05
[pool-1-thread-1] INFO BasicSIRModel - run
[pool-1-thread-1] INFO BasicSIRModel - final simulation time = 275.3055756207629
[main] INFO Simulation complete. 0:00:00.246
```

and output file = basicsir_test.txt

Basic SIR Model



Broadwick_with_IndividualSIRModel.xml

Command:

```
java -jar BroadwickExamples-1.0-SNAPSHOT.one-jar.jar -c Broadwick_with_IndividualSIRModel.xml
```

Expected results – also written to log file epic.sir.IndividualSIRModel.log

```
[main] INFO Running broadwick Version 1.1 Build (SJLDELL - unknown : 2014-06-14 11:49)
```

```
[main] INFO Running broadwick for the following models [Broadwick Project]
```

```
[pool-1-thread-1] INFO Running Broadwick Project [epic.sir.IndividualSIRModel]
```

```
[pool-1-thread-1] INFO IndividualSIRModel - init
```

```
[pool-1-thread-1] ERROR Could not find parameter susceptibility in configuration file.
```

```
[pool-1-thread-1] INFO Optional parameter susceptibility (=waning immunity) is not set, but this is OK
```

```
[pool-1-thread-1] INFO seed      = 12347
```

```
[pool-1-thread-1] INFO maxTime= 1000000.0
```

```
[pool-1-thread-1] INFO tauStep  = 0
```

```
[pool-1-thread-1] INFO N        = 1000
```

```
[pool-1-thread-1] INFO initI    = 1
```

```
[pool-1-thread-1] INFO IndividualSIRModel - run
```

```
[pool-1-thread-1] INFO IndividualSIRModel - final simulation time = 319.6001125147772
```

```
[pool-1-thread-1] INFO IndividualSIRModel - SUSCEPTIBLE:249    INFECTED:0    RECOVERED:751
```

```
[main] INFO Simulation complete. 0:00:00.356
```

and output files:

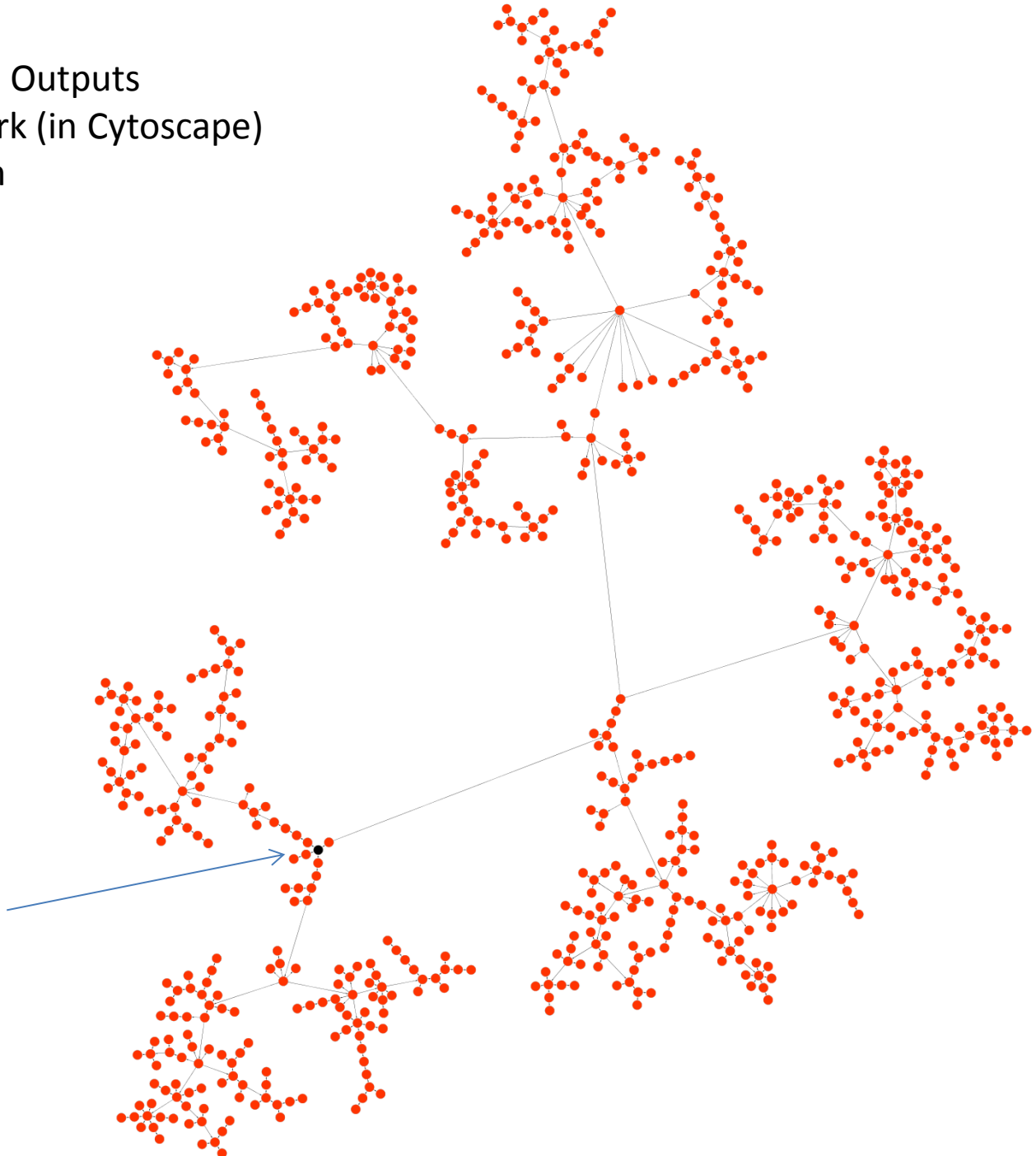
individualsir_test_modelState.txt, individualsir_test_transmissions.txt, individualsir_test_allEvents.txt

Individual SIR Model Outputs

- *ModelState.txt
 - Numbers of S, I, R over time
- *allEvents.txt
 - Record of all events, e.g.:
 - Time, Event Name, From:State -> To:State
 - 20.26,INFECTION,IA000000059:INFECTED -> IA000000132:INFECTED
 - 21.23,RECOVERY,IA000000260:INFECTED -> IA000000260:RECOVERED
- *transmissions.txt
 - Record of the transmission events (who infected whom) only

Individual SIR Model Outputs
Transmission Network (in Cytoscape)
Who infected Whom

Index case
(black)



Broadwick_with_IndividualNetworkModel.xml

Command:

(example_UK_cities.txt, example_UK_cities_links.txt must be in the same directory as the jar file)
java -jar BroadwickExamples-1.0-SNAPSHOT.one-jar.jar -c Broadwick_with_IndividualNetworkModel.xml

Expected results – also written to log file epic.sir.IndividualNetworkModel.log

```
[main] INFO Running broadwick Version 1.1 Build (SJLDELL - unknown : 2014-06-14 11:49)
[main] INFO Running broadwick for the following models [Broadwick Project]
[pool-1-thread-1] INFO Running Broadwick Project [epic.network.IndividualNetworkModel]
[pool-1-thread-1] INFO IndividualNetworkModel - init
[pool-1-thread-1] ERROR Could not find parameter susceptibility in configuration file.
[pool-1-thread-1] INFO Optional parameter susceptibility (=waning immunity) is not set, but this is OK
[pool-1-thread-1] INFO Network Model locationsFile = example_UK_cities.csv
[pool-1-thread-1] INFO Network Model linksFile = example_UK_cities_links.csv
[pool-1-thread-1] INFO Network Model locationType = LATLONG
[pool-1-thread-1] INFO 170 locations read from file
[pool-1-thread-1] INFO 181 links read from file
[pool-1-thread-1] INFO Initialising infection from CN000111,Stoke-on-Trent,53.0,-2.13
[pool-1-thread-1] INFO Number of susceptibles in network = 106
[pool-1-thread-1] INFO Number of infecteds in network = 1
[pool-1-thread-1] INFO seed = 12349
[pool-1-thread-1] INFO maxTime          = 1000000.0
[pool-1-thread-1] INFO tauStep              = 0
[pool-1-thread-1] INFO N              = 107
[pool-1-thread-1] INFO initI          = 1
[pool-1-thread-1] INFO IndividualNetworkModel - run
[pool-1-thread-1] INFO IndividualNetworkModel - final simulation time = 152.54159155869897
[pool-1-thread-1] INFO IndividualNetworkModel - SUSCEPTIBLE:3      EXPOSED:0    INFECTED:0    RECOVERED:104
[main] INFO Simulation complete. 0:00:00.710
```

Individual Network Model Outputs

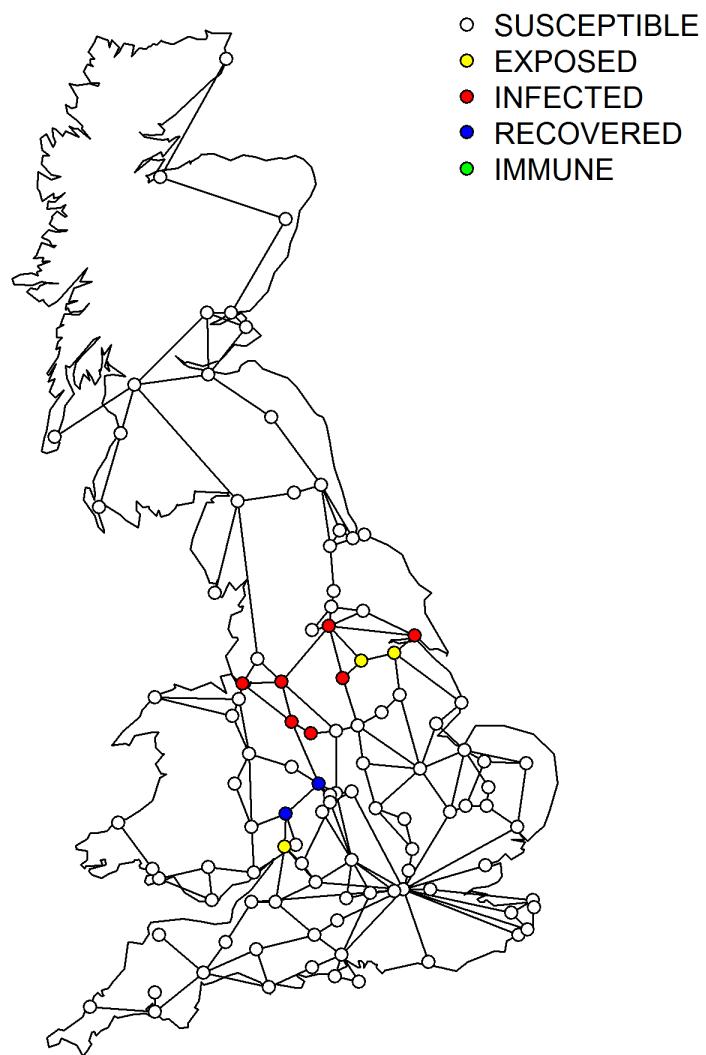
- *modelState.txt, *allEvents.txt, *transmissions.txt
 - Same as in Individual SIR Model outputs
- *locations.txt
 - The locations of the network nodes (one line = one vertex):
Name,Location,Latitude,Longitude
CN000144,Edinburgh,55.95,-3.35
CN000145,Glasgow,55.8667,-4.43333
CN000146,Inverness,57.5333,-4.05
- *initialNetwork.net
 - The (undirected) links between the network nodes (one line = one edge):
Name,Location,Latitude,Longitude,Name,Location,Latitude,Longitude
CN000145,Glasgow,55.8667,-4.43333,CN000142,Campbeltown,55.4333,-5.6
- *individualStates_initial.txt, *individualStates_final.txt,
*individualStates_[number].txt
 - The infection state of each network node at each simulation step (one file per step), e.g:
Name,Location,Latitude,Longitude,State
CN000144,Edinburgh,55.95,-3.35,SUSCEPTIBLE

individualnetwork_test_individualStates_initial.txt

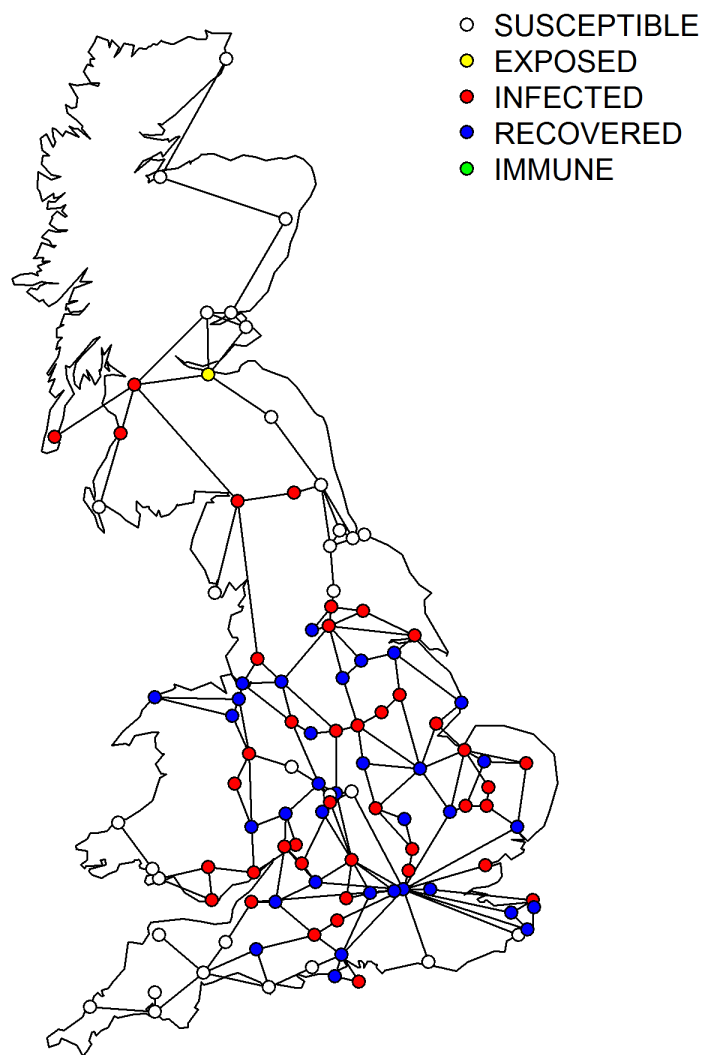


Plot individual states output using R script: plotGBDiseaseMap.R (one image per step)

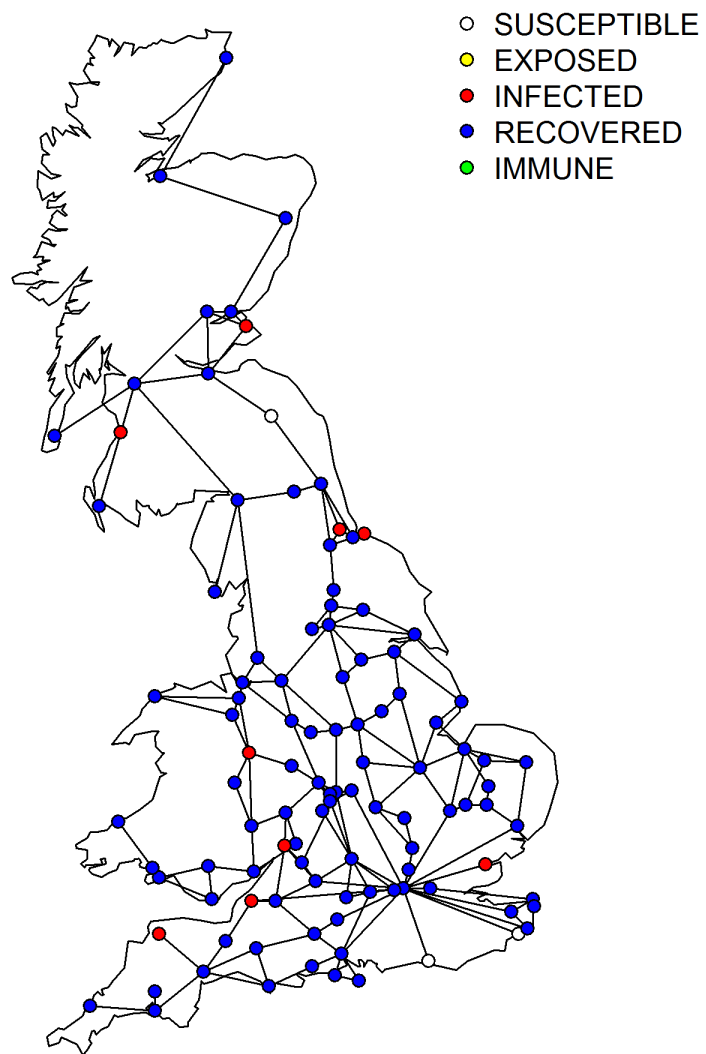
individualnetwork_test_individualStates_000000020.txt



individualnetwork_test_individualStates_000000182.txt



individualnetwork_test_individualStates_000000300.txt



individualnetwork_test_individualStates_final.txt

