**LAPORAN TUGAS BESAR II**

**IF4021 PEMODELAN DAN SIMULASI**



|  |  |
| --- | --- |
| Doddy Aditya Wiranugraha | 13517008 |

Oleh:

**PROGRAM STUDI TEKNIK INFORMATIKA**

**SEKOLAH TEKNIK ELEKTRO DAN INFORMATIKA**

**INSTITUT TEKNOLOGI BANDUNG**

**2021**

1. **Deskripsi Model**
2. Cluster

Cluster yang digunakan pada pemodelan ini memiliki garis berwarna kuning dengan bentuk persegi panjang sebesar 2 x radius.

1. Agent

Agent memiliki properties seperti num\_interact\_days (jumlah hari agent telah berinteraksi dengan agent lain yang memiliki kemungkinan terpapar COVID19), num\_treated\_days (jumlah hari agent telah dirawat setelah divonis positif COVID19), have\_vaccine? (agent telah menjalani vaksin atau belum), untreated? (agent belum menjalani perawatan), ever\_interact\_with\_positive? (apakah agent pernah berinteraksi dengan positif COVID19), ever\_pass\_cluster? (apakah agent pernah melewati area cluster).

Tipe agent yang digunakan pada pemodelan ini terbagi menjadi 3 yaitu:

1. Agent yang negatif COVID19

Agent ini memiliki warna hijau yang menandakan tidak terpapar COVID19.

1. Agent yang positif COVID19

Agent ini memiliki warna merah yang menandakan positif COVID19.

1. Agent yang pernah berinteraksi

Agent ini memiliki warna selain hijau dan merah yang menandakan pernah berinteraksi dengan agent lain yang memiliki kemungkinan positif COVID19.

1. Event Vaksinasi

Event ini dilakukan pada saat setup agent, dimana besaran populasi yang divaksin diawal simulasi ditentukan oleh nilai %vaccination yang ada pada slider.

1. Event Infeksi

Event ini akan melakukan pengecekan kepada agent yang pernah berinteraksi apakah agent tersebut berinteraksi di area cluster atau di luar area cluster. Setelah itu akan dilakukan pengecekan apakah agent tersebut pernah berinteraksi dengan agent lain yang terbukti divonis positif COVID19, jika terbukti benar maka setelah 14 hari status agent tersebut akan ditentukan dengan variable %infectiousness. Persentase ini bergantung pada tingkah laku agent, jika agent pernah melakukan interaksi dengan agent lain di area cluster maka nilai %infectiousness akan bertambah sebesar 10%, sedangkan jika agent telah divaksin maka kemungkinan terpapar COVID19 menjadi 5%.

1. Event Karantina

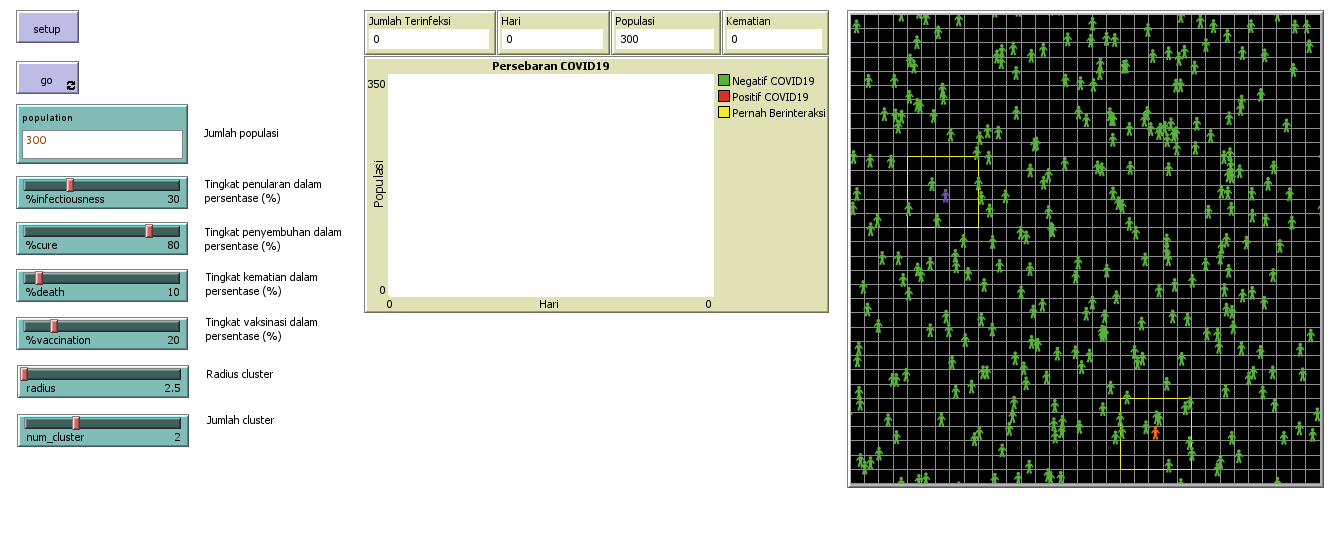
Event ini akan melakukan pengubahan properties agent yaitu untreated? menjadi bernilai false sehingga agent akan memiliki perilaku untuk tidak bergerak dan tidak dapat menginfeksi agent lainnya.

1. Event Penyembuhan atau Meninggal

Event ini akan melakukan pengecekan kepada agent yang terpapar COVID19 dan telah dirawat selama lebih dari atau sama dengan 28 hari apakah telah sembuh atau belum. Penentuan apakah agent tersebut sembuh atau belum bergantung pada variable %cure. Jika agent tersebut tidak sembuh maka akan ada penentuan apakah agent tersebut meninggal atau tidak. Penentuan apakah agent tersebut meninggal atau tidak bergantung pada variable %death.

1. **Source Code**

|  |
| --- |
| globals [  populations  death  init\_people  is\_there\_positive?  is\_there\_cluster?  cluster\_coordinate  vaccine\_quota  ]  turtles-own [  num\_interact\_days  num\_treated\_days  have\_vaccine?  untreated?  ever\_interact\_with\_positive?  ever\_pass\_cluster?  ]  to setup  clear-all  reset-ticks  set init\_people []  set cluster\_coordinate []  set vaccine\_quota ((%vaccination \* population / 100) - num\_cluster)  create-turtles population  [  setxy random-xcor random-ycor  set shape "person"  set color green  set num\_interact\_days 0  set num\_treated\_days 0  set have\_vaccine? false  set untreated? true  set ever\_interact\_with\_positive? false  set ever\_pass\_cluster? false  ]  draw-grid  let cluster\_left num\_cluster  let colors base-colors  while [cluster\_left > 0]  [  set is\_there\_cluster? false  ask turtle random population  [  foreach cluster\_coordinate  [  [coordinate] ->  ifelse (abs ((item 0 coordinate) - (pxcor)) >= (2 \* radius)) or (abs ((item 1 coordinate) - (pycor)) >= (2 \* radius))  [  ; do nothing  ]  [  set is\_there\_cluster? true  ]  ]  if not is\_there\_cluster?  [  draw-cluster pxcor pycor  set cluster\_left cluster\_left - 1  set cluster\_coordinate lput (list pxcor pycor) cluster\_coordinate  ]  set color one-of remove red remove green colors  set colors remove color colors  set init\_people lput who init\_people  ]  ]  vaccinate  set populations population  set death 0  set is\_there\_positive? false  end  to draw-grid  ask patches  [  sprout 1  [  set color gray  set heading 0  fd 0.5  rt 90  pen-down  repeat 4  [  fd 0.5 rt 90 fd 0.5  ]  die  ]  ]  end  to draw-cluster [cx cy]  ask patch cx cy  [  sprout 1  [  set color yellow  set heading 0  fd radius  lt 90  pen-down  repeat 4  [  fd radius  lt 90  fd radius  ]  die  ]  ]  end  to vaccinate  while [vaccine\_quota > 0]  [  ask turtle random population  [  if (color != blue) and (not have\_vaccine?)  [  set have\_vaccine? true  set vaccine\_quota (vaccine\_quota - 1)  ]  ]  ]  end  to check\_position [who\_turtle]  foreach cluster\_coordinate  [  [coordinate] ->  ask patch (item 0 coordinate) (item 1 coordinate)  [  sprout 1  [  set heading 0  fd (radius - 0.5)  lt 90  fd (radius - 0.5)  set heading 90  let counter 1  repeat (2 \* radius)  [  if any? turtles-here with [who = who\_turtle]  [  ask turtle who\_turtle  [  set ever\_pass\_cluster? true  ]  ]  repeat ((2 \* radius) - 1)  [  fd 1  if any? turtles-here with [who = who\_turtle]  [  ask turtle who\_turtle  [  set ever\_pass\_cluster? true  ]  ]  ]  ifelse (counter mod 2) != 0  [  rt 90  fd 1  rt 90  ]  [  lt 90  fd 1  lt 90  ]  set counter (counter + 1)  ]  die  ]  ]  ]  end  to infect  set is\_there\_positive? false  ask turtles with [color != green and color != red]  [  let current\_turtle who  let current\_color color  ask other turtles-here with [color = green]  [  set color current\_color  create-link-with turtle current\_turtle  let found? false  check\_position who  if found?  [  set ever\_pass\_cluster? true  ]  ]  ask link-neighbors  [  ask turtle who  [  if color = red  [  set is\_there\_positive? true  ]  ]  ]  if is\_there\_positive?  [  set ever\_interact\_with\_positive? true  ]  ]  ask turtles with [(color != green and color != red) and num\_interact\_days >= 14]  [  let infectiousness\_rate %infectiousness  ifelse ever\_interact\_with\_positive?  [  if ever\_pass\_cluster?  [  set infectiousness\_rate (infectiousness\_rate + 10)  ]  if have\_vaccine?  [  set infectiousness\_rate 5  ]  ifelse random 100 < (infectiousness\_rate)  [  set color red  ]  [  ask my-links  [  die  ]  set color green  set num\_treated\_days 0  set num\_interact\_days 0  set untreated? true  set ever\_interact\_with\_positive? false  set ever\_pass\_cluster? false  ]  ]  [  ask my-links  [  die  ]  set color green  set num\_treated\_days 0  set num\_interact\_days 0  set untreated? true  set ever\_interact\_with\_positive? false  set ever\_pass\_cluster? false  ]  ]  end  to cure  ask turtles with [color = red and num\_treated\_days >= 28]  [  ifelse random-float 100 < %cure  [  ask my-links  [  die  ]  set color green  set num\_treated\_days 0  set num\_interact\_days 0  set untreated? true  set ever\_interact\_with\_positive? false  set ever\_pass\_cluster? false  ]  [  if random-float 100 < %death  [  set populations (populations - 1)  set death (death + 1)  die  ]  ]  ]  end  to treat  ask turtles with [color = red and untreated?]  [  set untreated? false  ]  end  to increment\_num\_days  ask turtles with [color = red and not untreated?]  [  set num\_treated\_days (num\_treated\_days + 1)  ]  ask turtles with [color != green and color != red]  [  set num\_interact\_days (num\_interact\_days + 1)  ]  end  to go  if (count turtles with [color = red] = populations) or (count turtles with [color = green] = populations) or (ticks > 14 and not any? turtles with [color = red])  [  stop  ]  ask turtles with [color != red]  [  rt random-float 180 lt random-float 180 fd 1  ]  foreach init\_people  [  ? -> ask turtle ?  [  if num\_interact\_days >= 14  [  set color red  set init\_people remove ? init\_people  ]  ]  ]  infect  treat  cure  increment\_num\_days  tick  end  to-report %infected  ifelse any? turtles  [  report count turtles with [color = red]  ]  [  report 0  ]  end |

1. **Tampilan Layar Program**