# flowdiagramr

An efficient way to make good-looking diagrams

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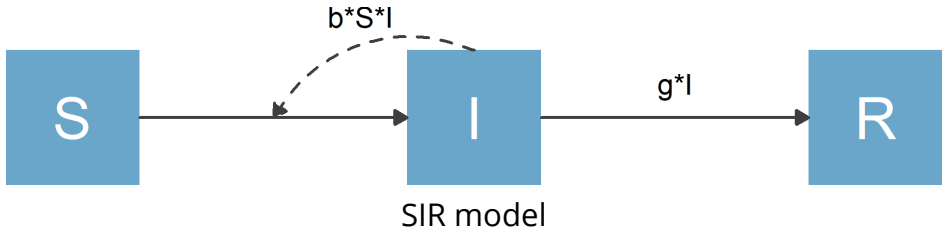
# Motivation

- Many areas of science use models that can be represented by variables (compartments/nodes) and flows (processes).
- Flow diagrams are often good ways to communicate these models.
- SIR model as example

$$\begin{aligned} \text{Susceptible Individuals} \quad & \dot{S} = -bSI \\ \text{Infected Individuals} \quad & \dot{I} = bSI - gI \\ \text{Recovered Individuals} \quad & \dot{R} = gI \end{aligned}$$



SIR model

# Motivation

- Generally, one needs to create such diagrams manually using some type of graphical software.
- We wanted to provide a way to produce nice diagrams with a few lines of R code.
- We also wanted the ability to fully customize the plots if needed, and to make plots using ggplot2.
- Our (Andrew Tredennick and Andreas Handel) new package **flowdiagramr** allows one to do that.

# flowdiagramr basics

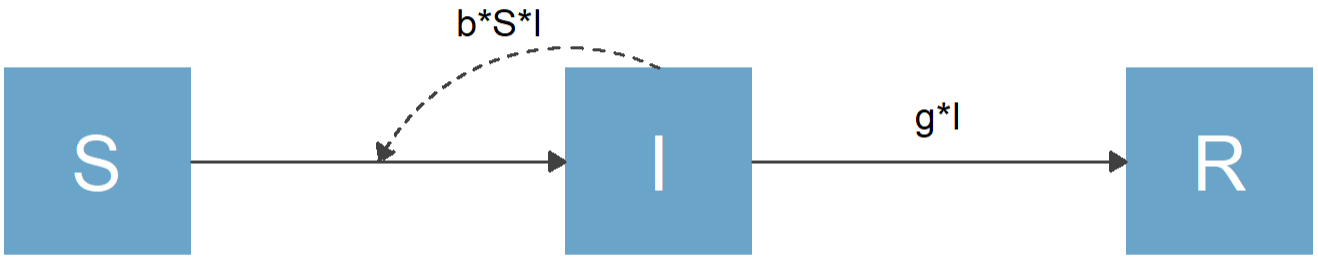
Specify a model:

```
library(flowdiagramr)
varlabels = c("S","I","R")
flows     = list(S_flows = c("-b*S*I"),
                 I_flows = c("b*S*I","-g*I"),
                 R_flows = c("g*I"))
sirmodel = list(varlabels = varlabels, flows = flows)
```

# flowdiagramr basics

Let **flowdiagramr** turn it into a nice diagram (in 2 steps):

```
# prepare diagram
sir_diagram_list <- prepare_diagram(sirmodel)
# make diagram
sir_diagram <- make_diagram(sir_diagram_list)
plot(sir_diagram)
```



# Customize your diagram

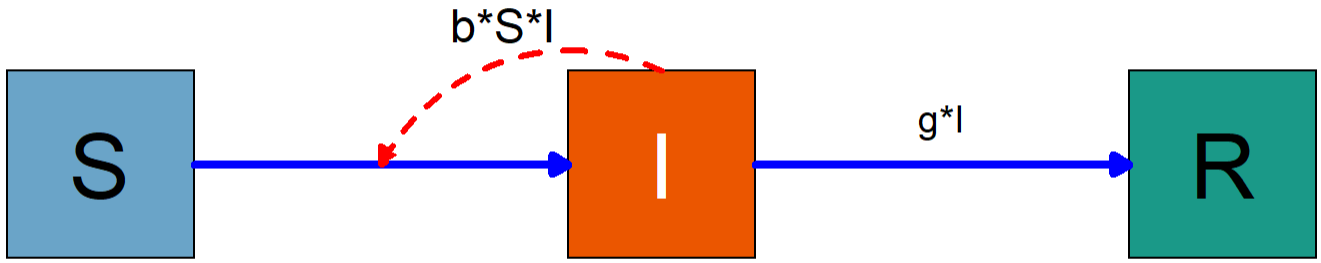
Specify settings to be passed to function `make_diagram(diagram_list, diagram_settings)`

```
sir_diagram_settings <- list(
    var_outline_color = "black",
    var_fill_color = c("#6aa4c8", "#eb5600", "#1a9988"),
    var_label_color = c("black","white","black"),
    var_label_size = 12,
    main_flow_color = "blue",
    main_flow_size = 1.5,
    interaction_flow_label_size = 6,
    interaction_flow_color = "red",
    interaction_flow_size = 1.2)
```

# Customize your diagram

Create diagram with customized settings

```
sir_diagram <- make_diagram(sir_diagram_list, sir_diagram_settings)
plot(sir_diagram)
```



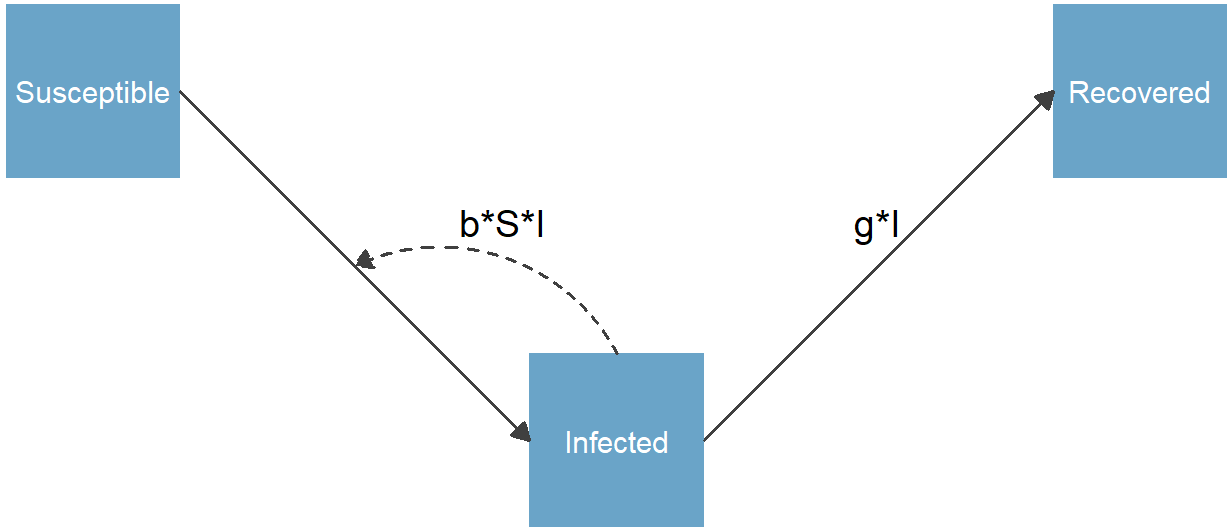
# More customizations

Specify settings to be passed to function `prepare_diagram(model_list, model_settings)`

```
model_settings =
  list(varnames  = c("Susceptible","Infected","Recovered"),
       use_varnames = TRUE,
       var_label_size = 4,
       varlocations = matrix(data = c("S", "", "R",
                                      "", "I", "" ),
                             nrow = 2, ncol = 3, byrow = TRUE)
      )
```

# More customizations

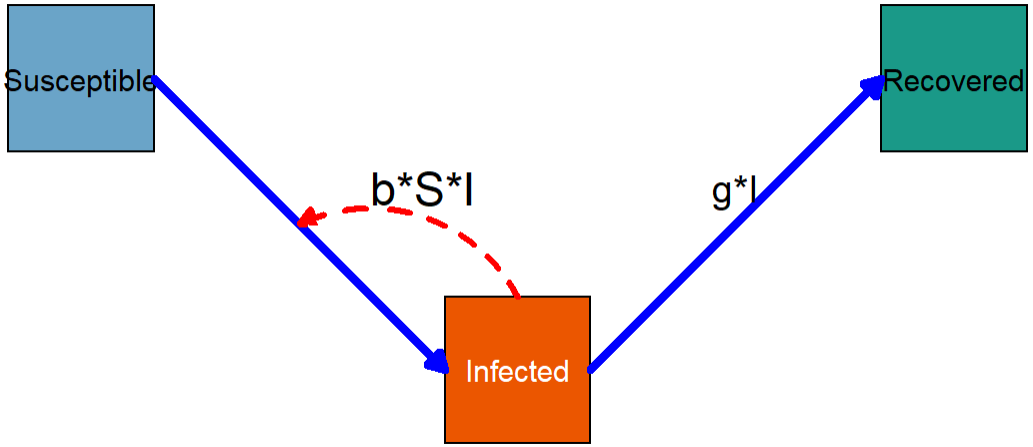
```
sir_diagram_list2 <- prepare_diagram(sirmodel, model_settings)
sir_diagram2 <- make_diagram(sir_diagram_list2)
plot(sir_diagram2)
```



# More customizations

You can combine settings for `prepare_diagram` and `make_diagram`

```
sir_diagram_settings$var_label_size = 4 #reduce to make text fit
sir_diagram3 <- make_diagram(sir_diagram_list2,
                             sir_diagram_settings)
plot(sir_diagram3)
```



# Even more customization

`prepare_diagram` returns a list of data frames that specify variable and flow location and styling.

```
print(sir_diagram_list2$variables)
```

```
##   label        name xmin xmax ymin ymax labelx labely  plot_label color    fill
## 1     S Susceptible -0.5  0.5 -0.5  0.5      0      0 Susceptible    NA #6aa4c8
## 2     I    Infected  2.5  3.5 -2.5 -1.5      3     -2    Infected    NA #6aa4c8
## 3     R   Recovered  5.5  6.5 -0.5  0.5      6      0   Recovered    NA #6aa4c8
##   label_color label_size
## 1       white          4
## 2       white          4
## 3       white          4
```

# Even more customization

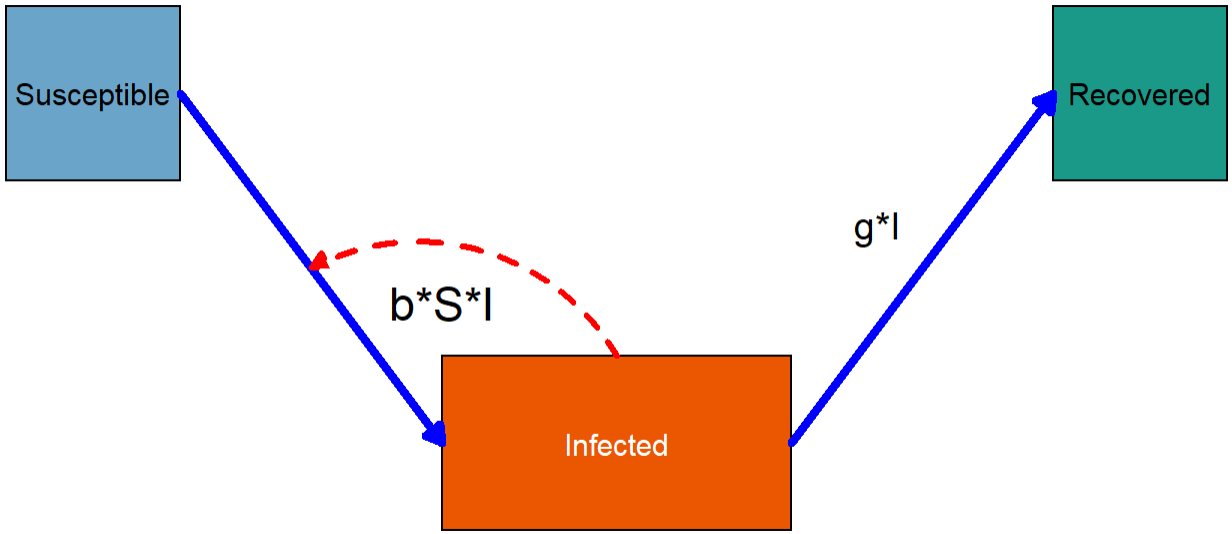
You can edit the object produced by `prepare_diagram` before calling `make_diagram`.

```
#increase the I box a bit both on left and right
sir_diagram_list2$variables$xmin[2] = 2 #was 2.5
sir_diagram_list2$variables$xmax[2] = 4 #was 3.5
#modify inflow and outflow arrows to align with new box size
sir_diagram_list2$flows$xend[1] = 2 #was 2.5
sir_diagram_list2$flows$xstart[2] = 4 #was 3.5
#move the b*S*I arrow end a bit
sir_diagram_list2$flows$xend[3] = 1.25 #was 1.5
#move the b*S*I label
sir_diagram_list2$flows$labelx[3] = 2 #was 2.35
sir_diagram_list2$flows$labely[3] = -1.2 #was -0.75
```

# Even more customization

With those modifications, the resulting diagram looks like this

```
sir_diagram4 <- make_diagram(sir_diagram_list2, sir_diagram_settings)
plot(sir_diagram4)
```



# Get the full code

- **`flowdiagramr`** can produce an `R` script containing the complete code to produce the diagram.

```
write_diagram(sirmodel, filename ="sirmodel_diagram_code.R")
```

- You can run the code to reproduce the figure in a stand-alone manner. You can also fully edit the code to make any tweaks you like.
- You can provide `write_diagram` all your modifications implemented in `model_settings`, `diagram_list` and `diagram_settings`.

# Further Resources

The **`flowdiagramr`** website provides a lot of additional information (https://andreashandel.github.io/flowdiagramr/):

- Several detailed vignettes with examples illustrating options for customization.
- Explanation for making non-model based flow diagrams.
- Comparison to other R packages (e.g. `DiagrammeR`).
- And much more 😄

**Feedback is appreciated:**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