

Development and deployment of statistical web applications using R and shiny

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21st of September 2014

(My) Motivation



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Design studies

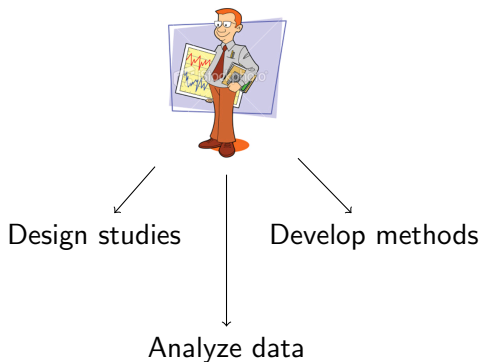
(My) Motivation



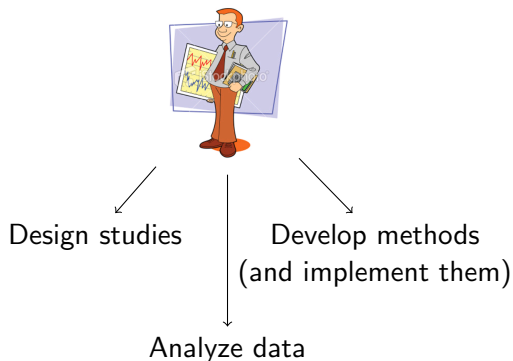
Design studies

Analyze data

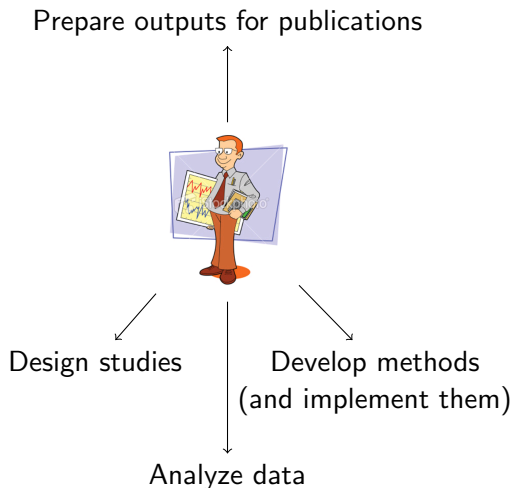
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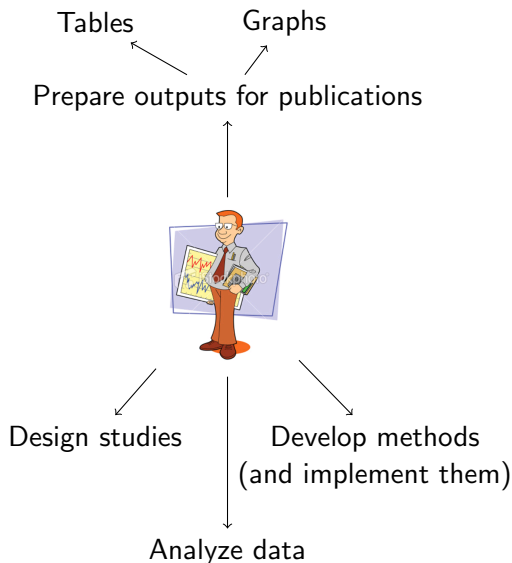
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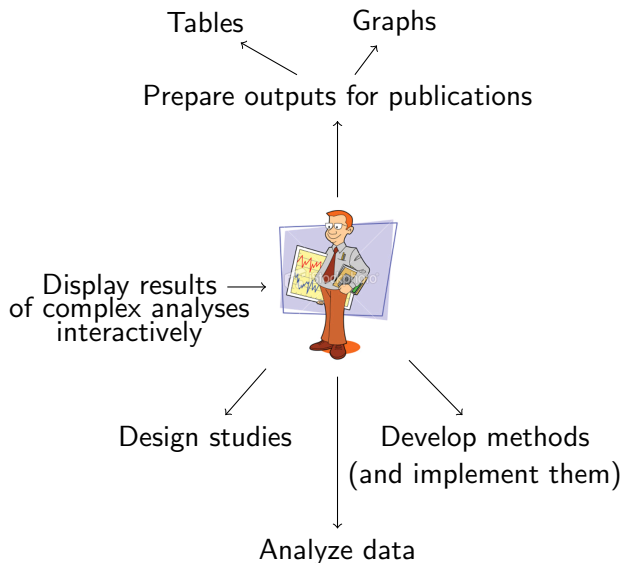
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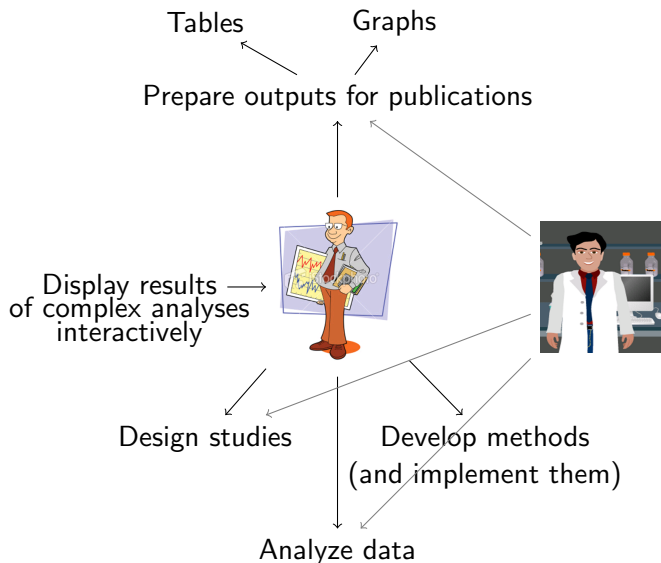
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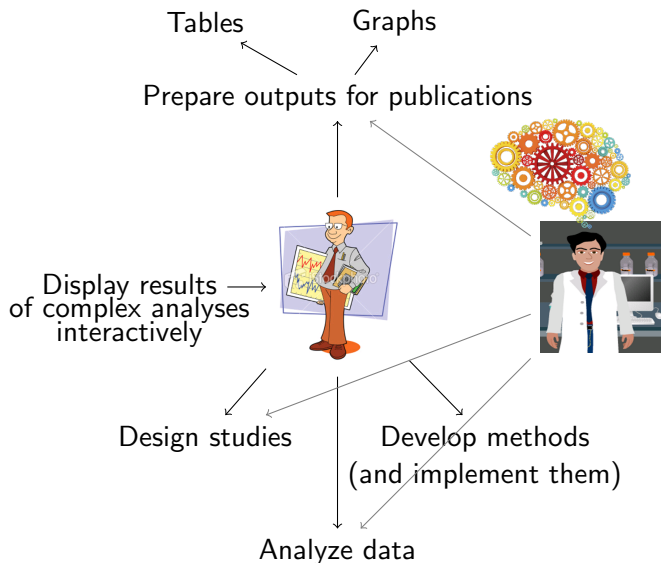
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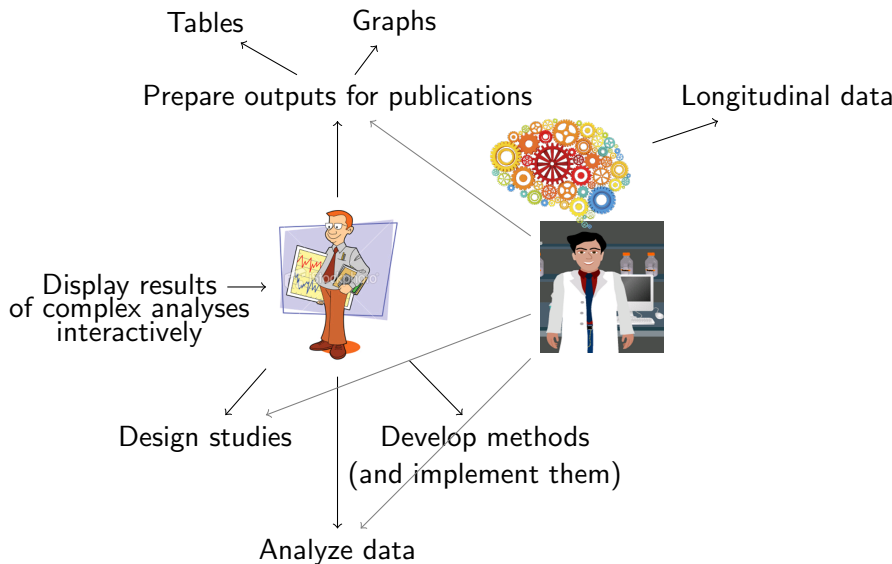
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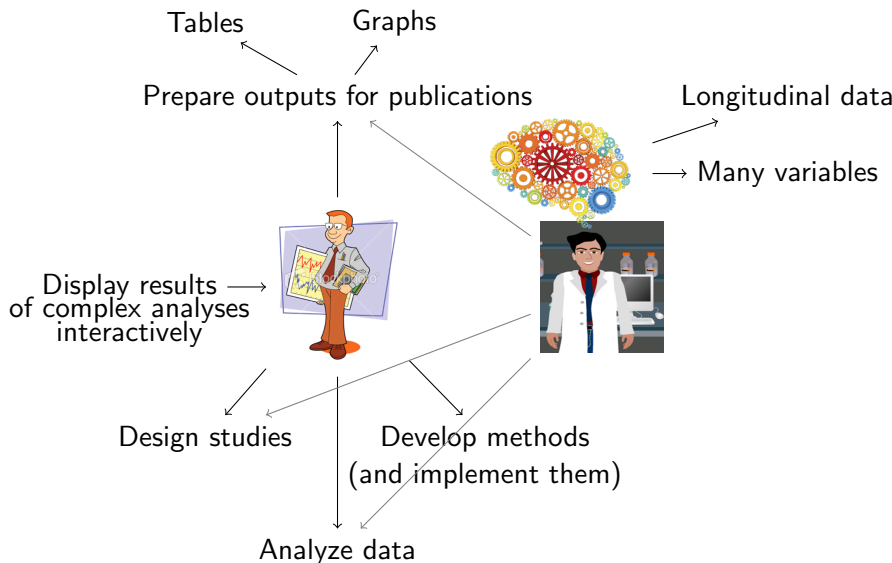
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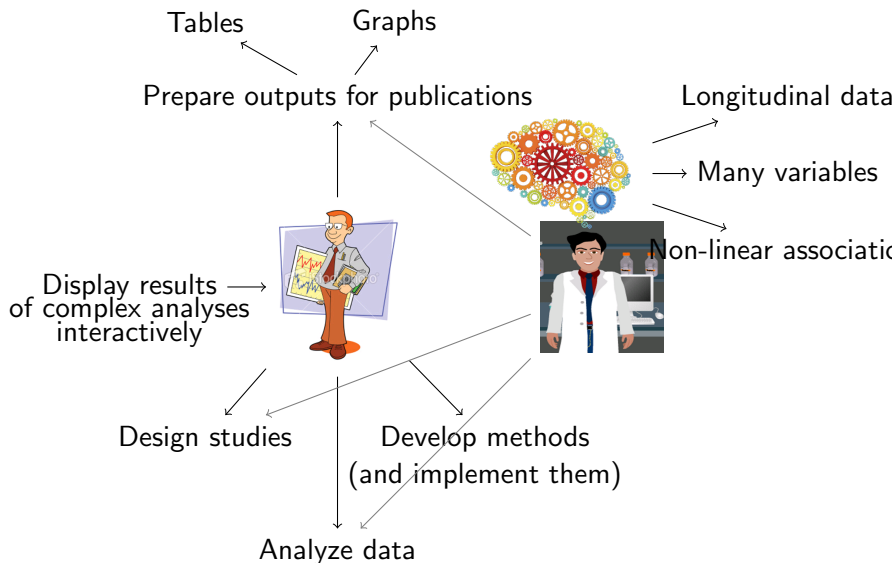
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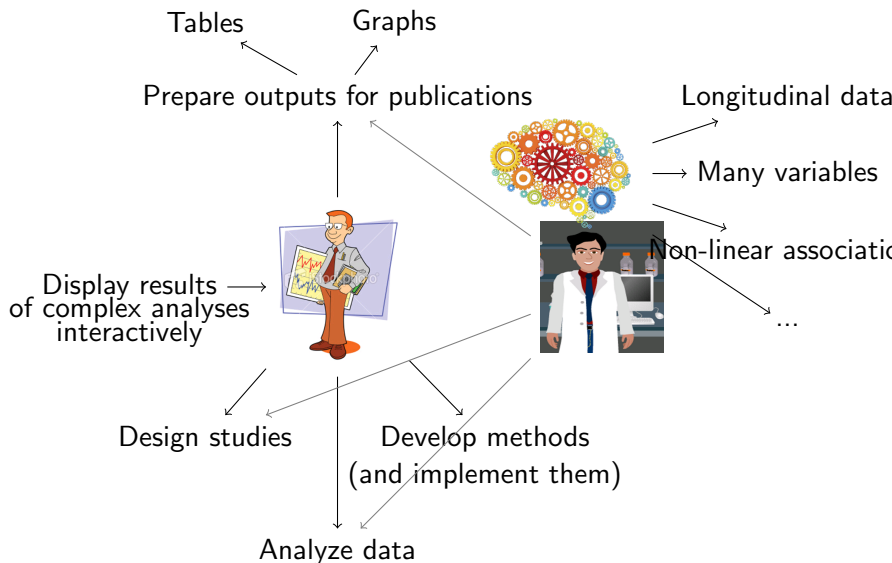
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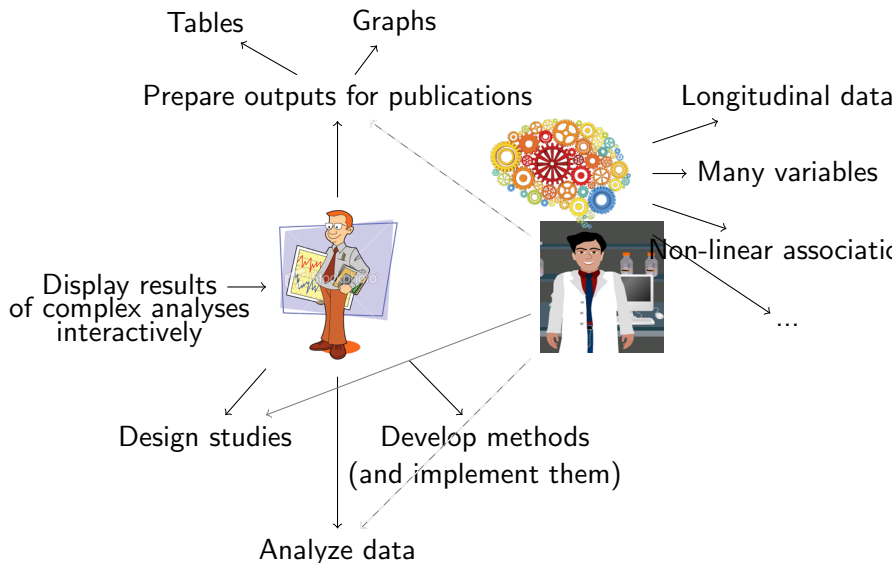
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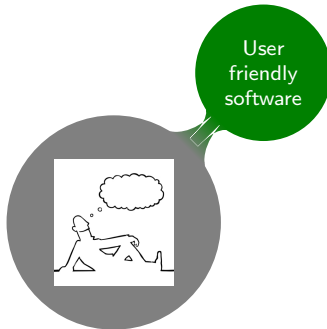
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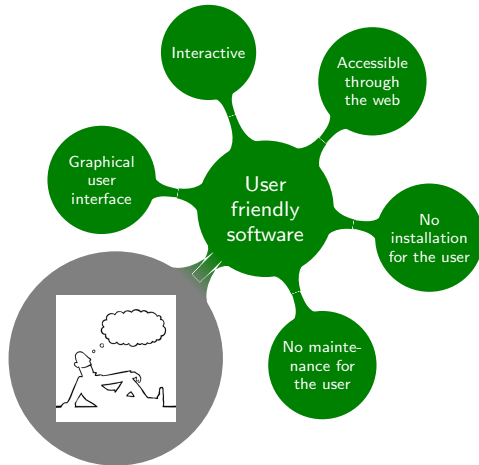
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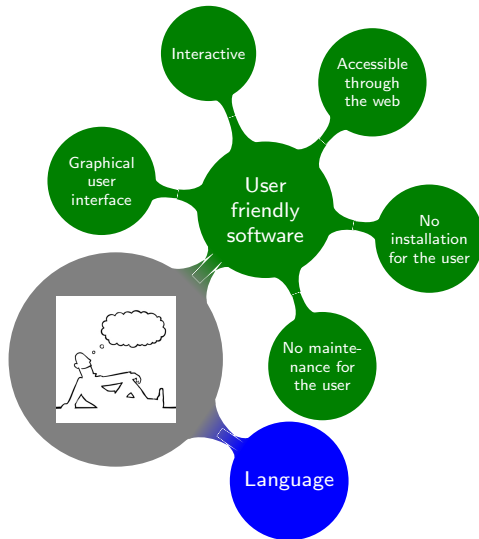
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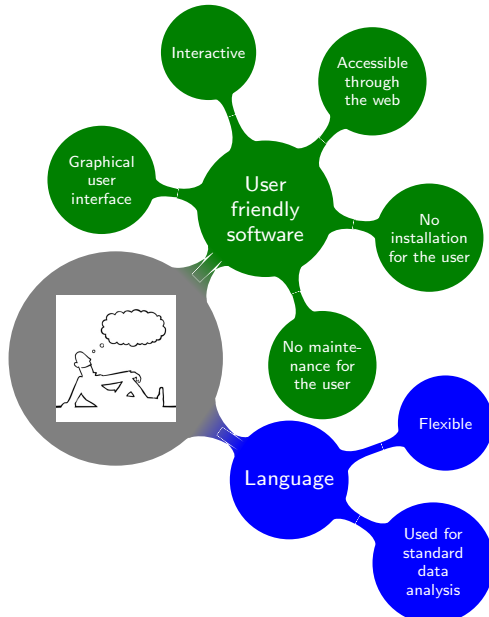
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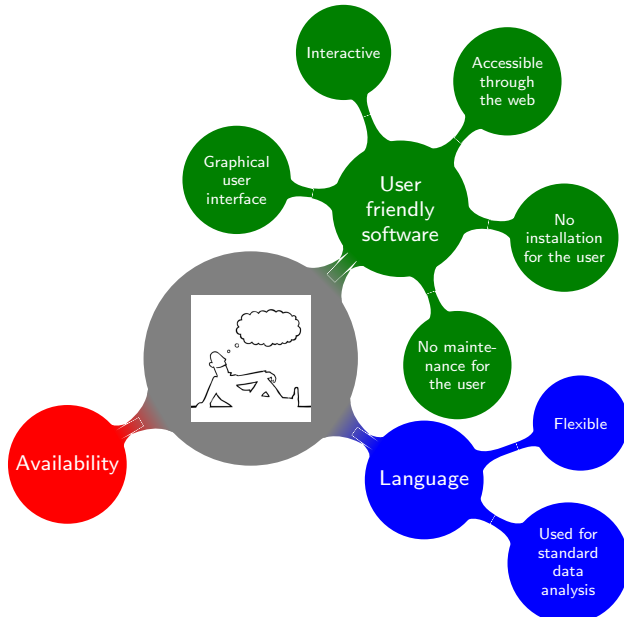
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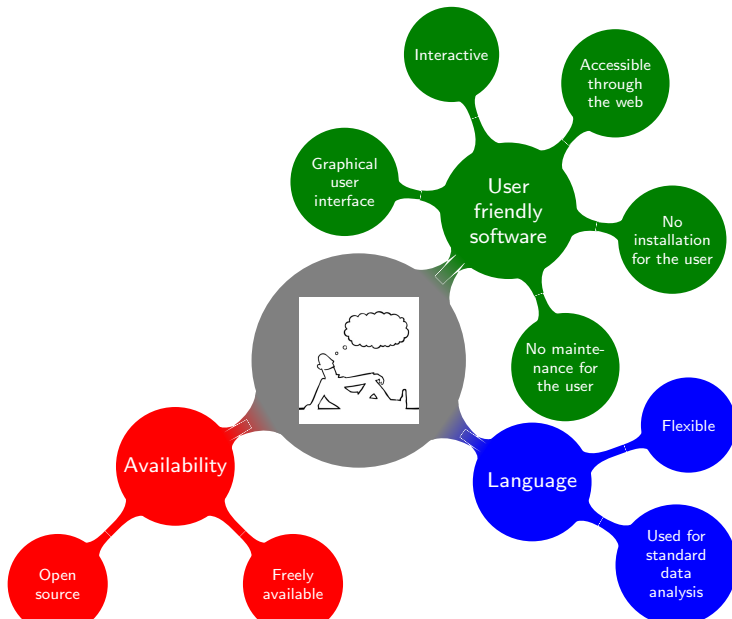
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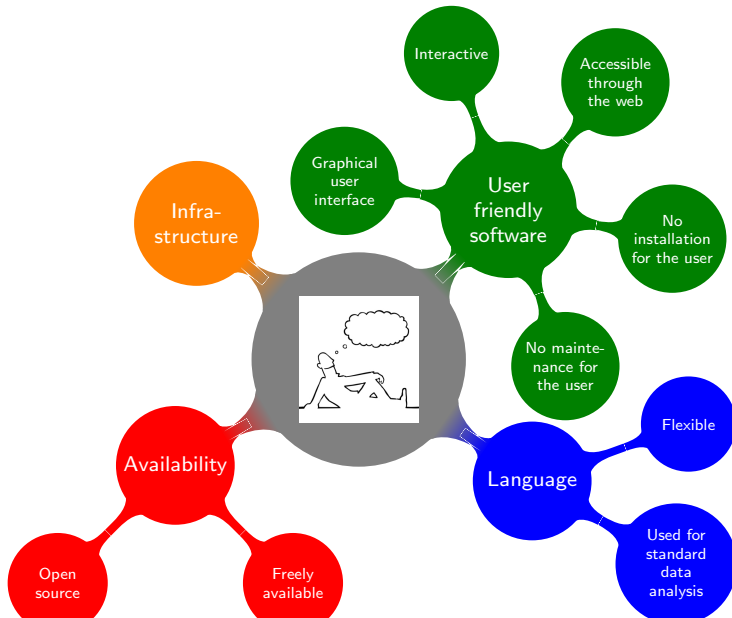
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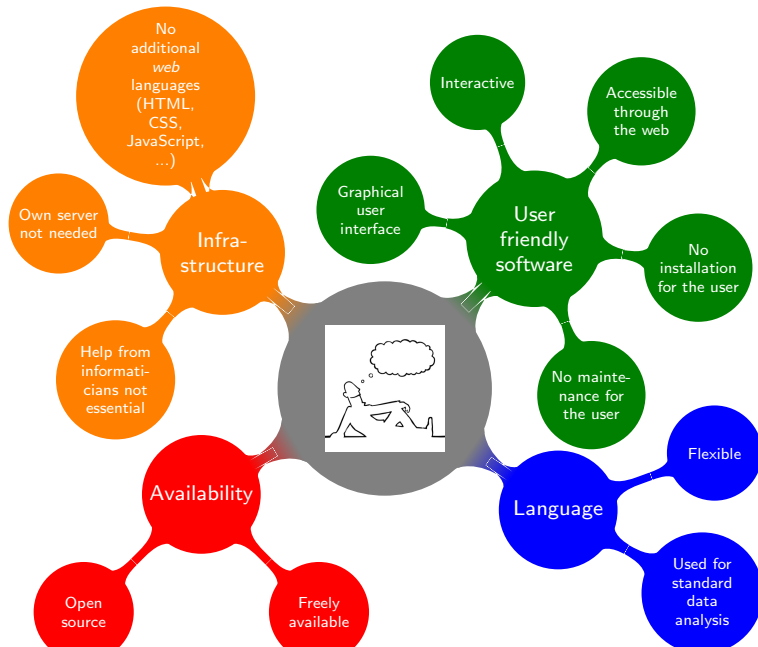
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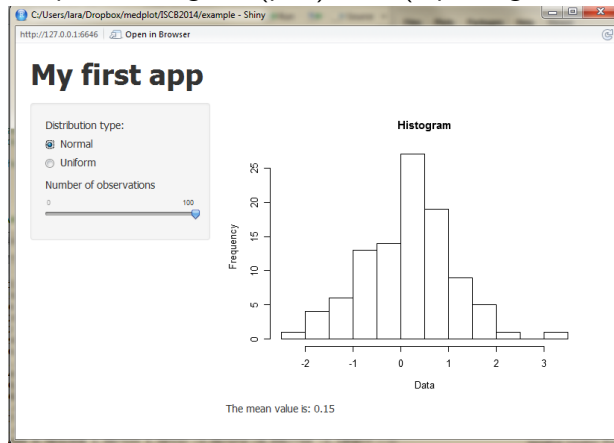


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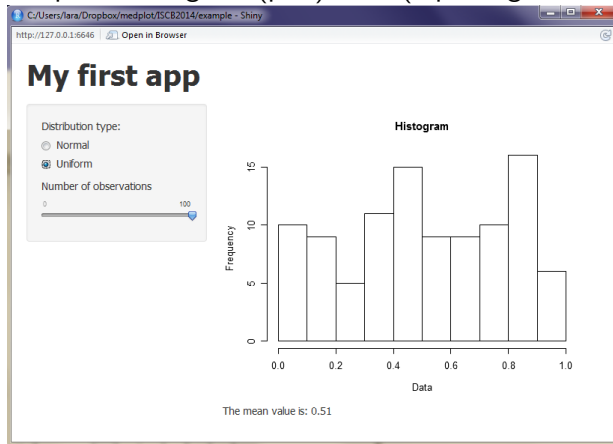
A first example using R and shiny : example0

Inputs: distribution (string), number of observations (integer).
Outputs: histogram (plot), text (reporting the average value).



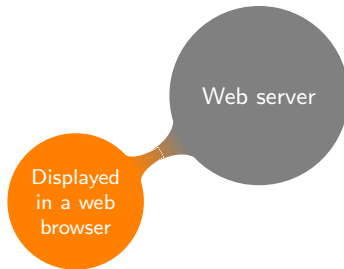
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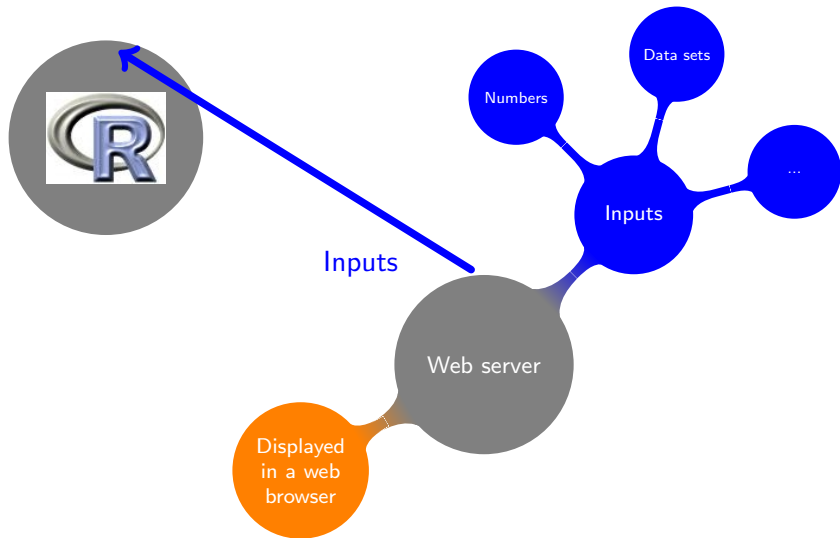


<http://www.shiny.rstudio.com>

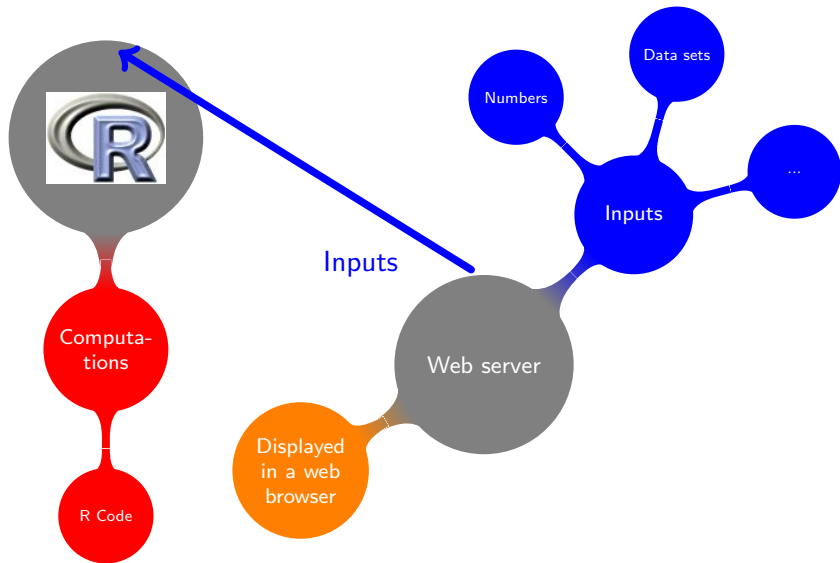
Web applications: R and shiny



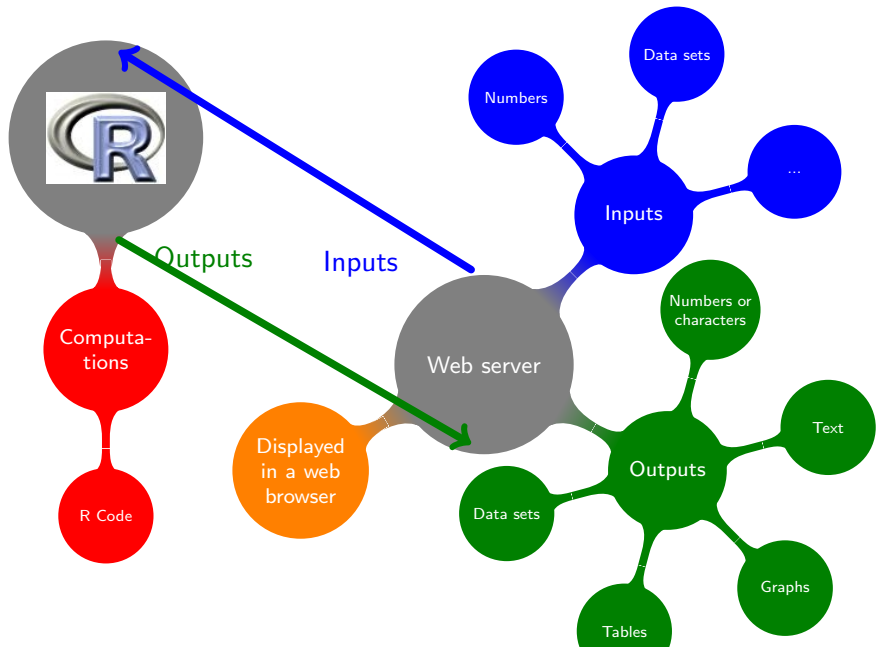
Web applications: R and shiny



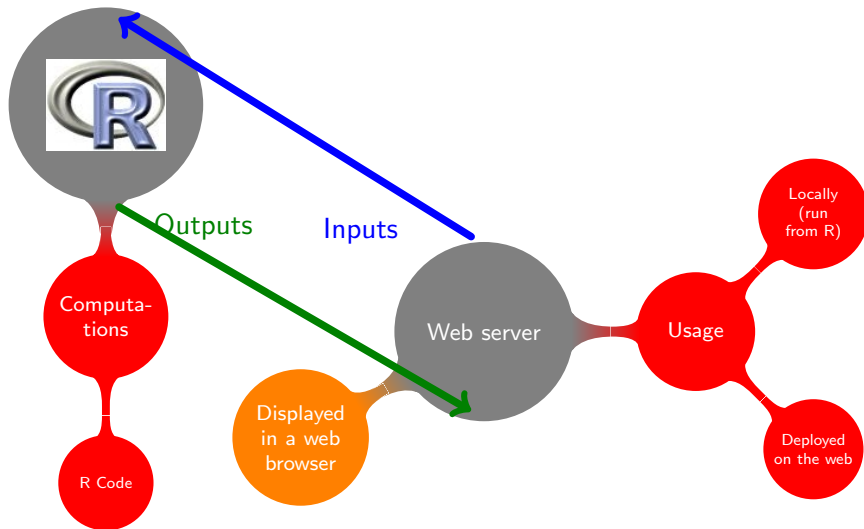
Web applications: R and shiny



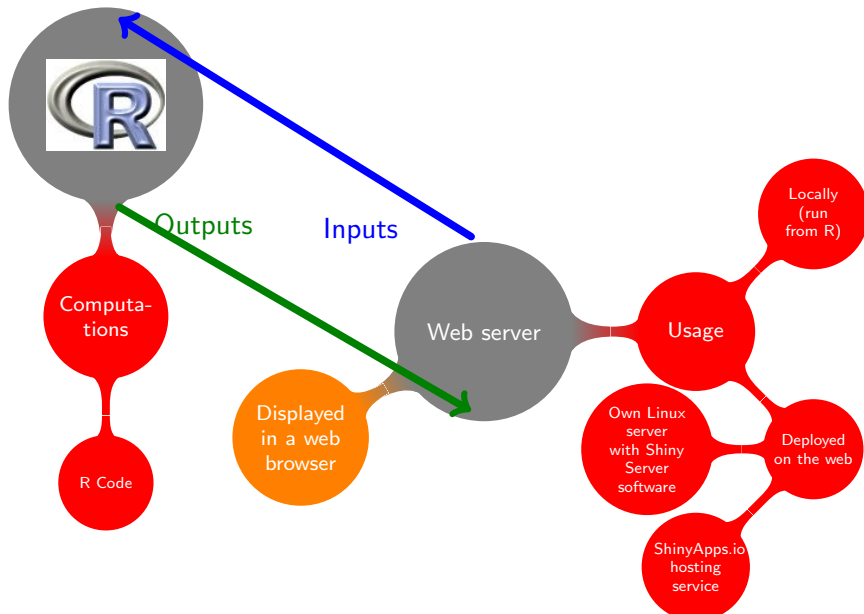
Web applications: R and shiny



Web applications: R and shiny



Web applications: R and shiny



Is the knowledge of R enough to develop an app?

ui.R (reads inputs and displays outputs)

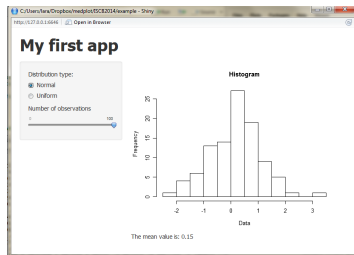
- Contains the code that defines the **user interface**.
- Defines how the web-page with the app will look.
- Usually it defines the inputs for the app.

server.R (prepares outputs)

- Contains the code that defines the **server script**, which is used for data manipulation and preparation of the results.
- It can contain
 - **reactive values**: values that can change over time;
 - **reactive expressions**: expressions that can access the reactive values; they are re-executed each time that a reactive value changes.
 - **rendering expressions**: returning output values evaluated by the executed functions (graphs, texts, numbers, ...), ready to be displayed on the user interface.

Is the knowledge of R enough to develop an app?

File with the code: Example0.pdf



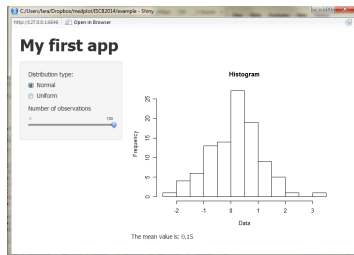
R in shiny (ui.R)

```
#select the type of distribution
radioButtons("distribution", "Distribution
type:", list("Normal" = "norm", "
Uniform" = "unif"))

#select the number of observations
sliderInput("obs", "Number of observations",
min=0, max=100, value=50)
```

Is the knowledge of R enough to develop an app?

File with the code: Example0.pdf



R in shiny (ui.R)

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#select the type of distribution
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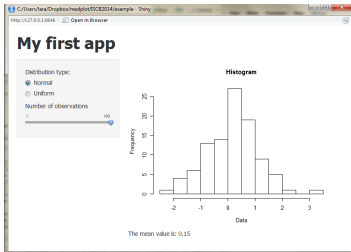
R language

```
#simulate data
my.x=function(distribution , obs){
  if(distribution=="norm")
    x=rnorm(obs) else
    x=runif(obs)
  return(x)}
}
```

R in shiny (server.R)

```
#simulate data, reactive expression
my.x=reactive({
  if(input$distribution=="norm")
    x=rnorm(input$obs) else
    x=runif(input$obs)
  return(x)})
```

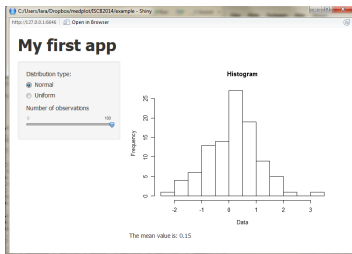
Is the knowledge of R enough to develop an app?



R in shiny (ui.R)

```
#display the outputs  
mainPanel(plotOutput("hist1"),  
           textOutput("text1"))
```

Is the knowledge of R enough to develop an app?



R in shiny (ui.R)

```
#display the outputs  
mainPanel(plotOutput("hist1"),  
           textOutput("text1"))
```

R language

```
#calculate the average of my.x  
av.my.x=round(mean(my.x), 2)  
  
#draw histogram  
hist1=hist(my.x,  
            ylab="Frequency", xlab="Data",  
            main="Histogram" )  
  
#prepare string with rounded average  
text1=paste("The mean value is: ", av  
            .my.x )
```

R in shiny (server.R)

```
#average, reactive value  
av.my.x=reactive(round(mean(my.x()), 2))  
  
#histogram, rendering expression  
output$hist1=renderPlot(  
    hist(my.x(),  
        ylab="Frequency", xlab="Data",  
        main="Histogram" ))  
  
#text, rendering expression  
output$text1=renderText(  
    paste("The mean value is: ",  
        av.my.x()))
```