Programming for Cognitive Science

Lecture 5 – Documentation for reproducibility and R web applications

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Plan for today

01 **Data reproducibility**

R markdown

02 **R web applications**

Shiny

Part 1

Data reproducibility

Why bother with documentation?

Reproducibility

Closeness of the agreement between the results of measurements of the same measurand carried out with same methodology described in the corresponding scientific evidence. The reproduced measurement may be based on the raw data and computer programs provided by researchers.

https://en.wikipedia.org/wiki/Reproducibility

Session information

```
> sessionInfo()
R version 4.1.0 (2021-05-18)
Platform: x86_64-w64-mingw32/x64 (64-bit)
Running under: Windows 10 x64 (build 19043)

Matrix products: default

locale:
[1] LC_COLLATE=Polish_Poland.1250  LC_CTYPE=Polish_Poland.1250    LC_MONETARY=Polish_Poland.1250 LC_NUMERIC=C
[5] LC_TIME=Polish_Poland.1250

attached base packages:
[1] stats     graphics  grDevices utils     datasets  methods   base

other attached packages:
[1] seqinr_4.2-16

loaded via a namespace (and not attached):
[1] MASS_7.3-54    compiler_4.1.0 tools_4.1.0    ade4_1.7-19
```

knitr

R engine for dynamic report generation.
The purpose of `knitr` is to allow reproducible research in R through the means of Literate Programming.

knitr – R Markdown code chunks

```
```{r}
print("Hello world!")
```
```

knitr - options

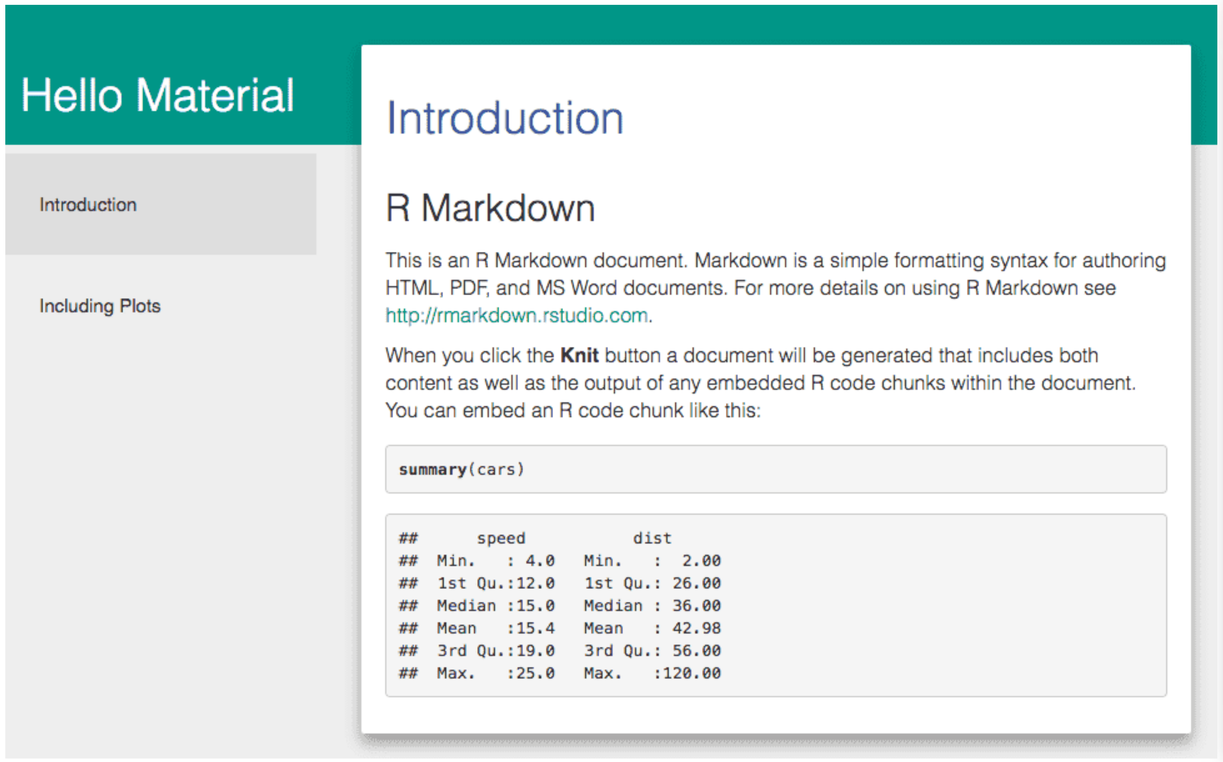
`eval=`	should the code be evaluated
`echo=`	should the code be shown
`fig.height=, fig.width=`	figure parameters
`results=`	result presentation mode
`warning=, message=`	should warnings/messages be suppressed

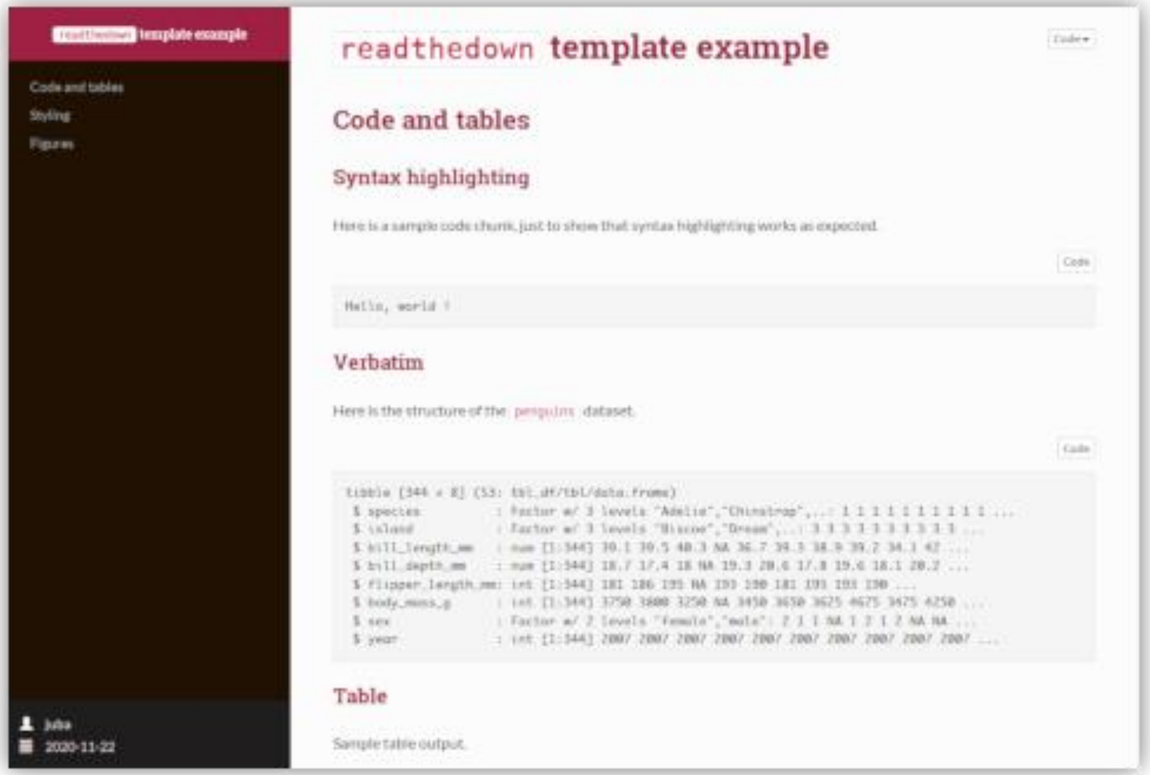
knitr - report formats

The reports may be generated in one of the following formats:

- PDF
- MD
- DOC
- HTML
- PPTX
- ...

knitr - examples





Barnier, Julien. 2021. *Rmdformats: HTML Output Formats and Templates for Rmarkdown Documents*. https://github.com/juba/rmdformats.

Let’s move on to coding...

Part 2

R web applications

In the old days...

Sharing R scripts

+ Open to modifications
- Only advanced users (programmers) had the ability to manage

R Markdown report

+ Control over the analysis content and pipeline
- No possibility for others to interact with the results

These days...

https://shiny.rstudio.com/tutorial/

Shiny

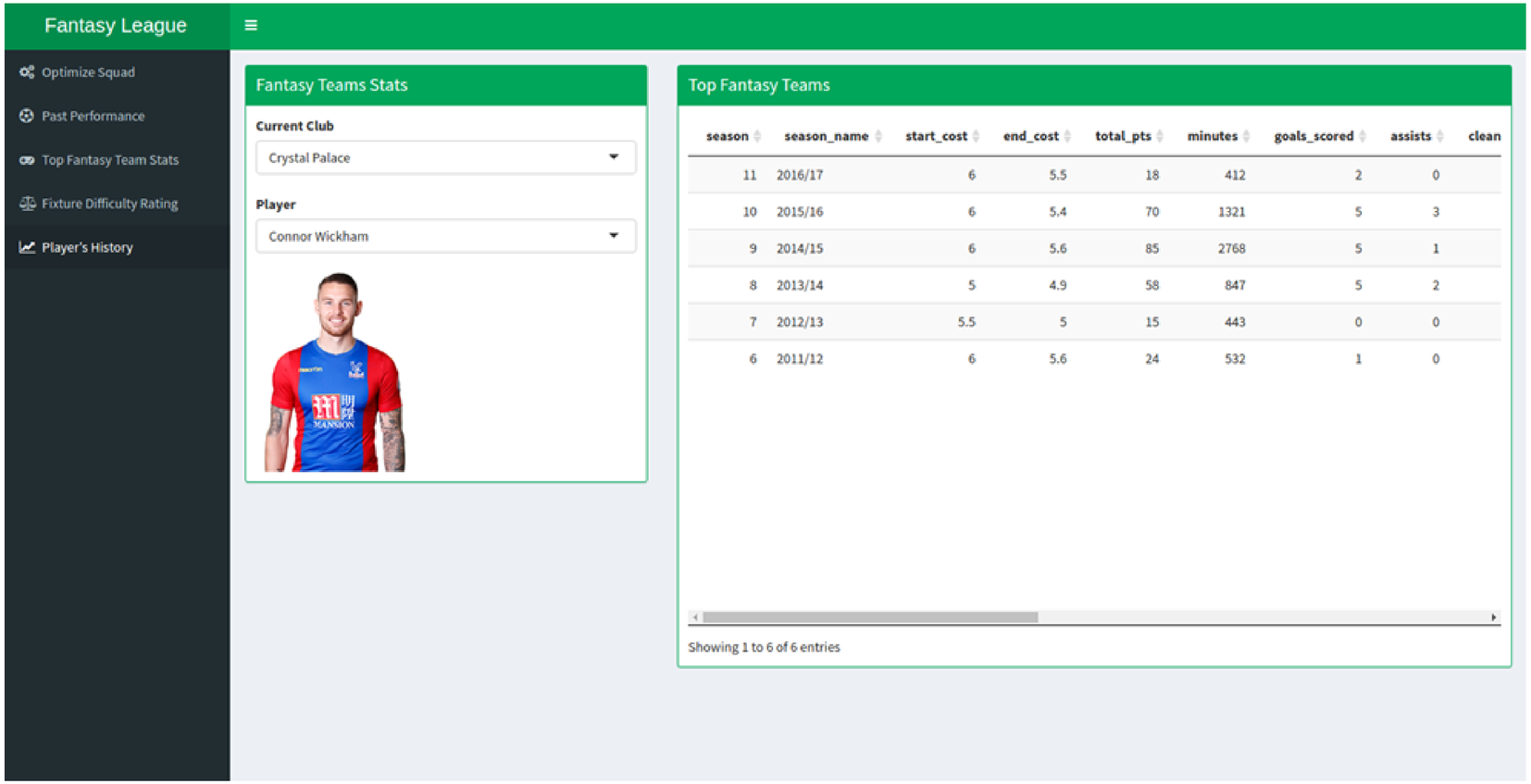
R package made for facilitating building interactive web apps from R.
The possibilities include:

- Hosting standalone apps
- Embedding in R Markdown
- Building dashboards
- Extensions with CSS themes, htmlwidgets and JavaScript

Examples

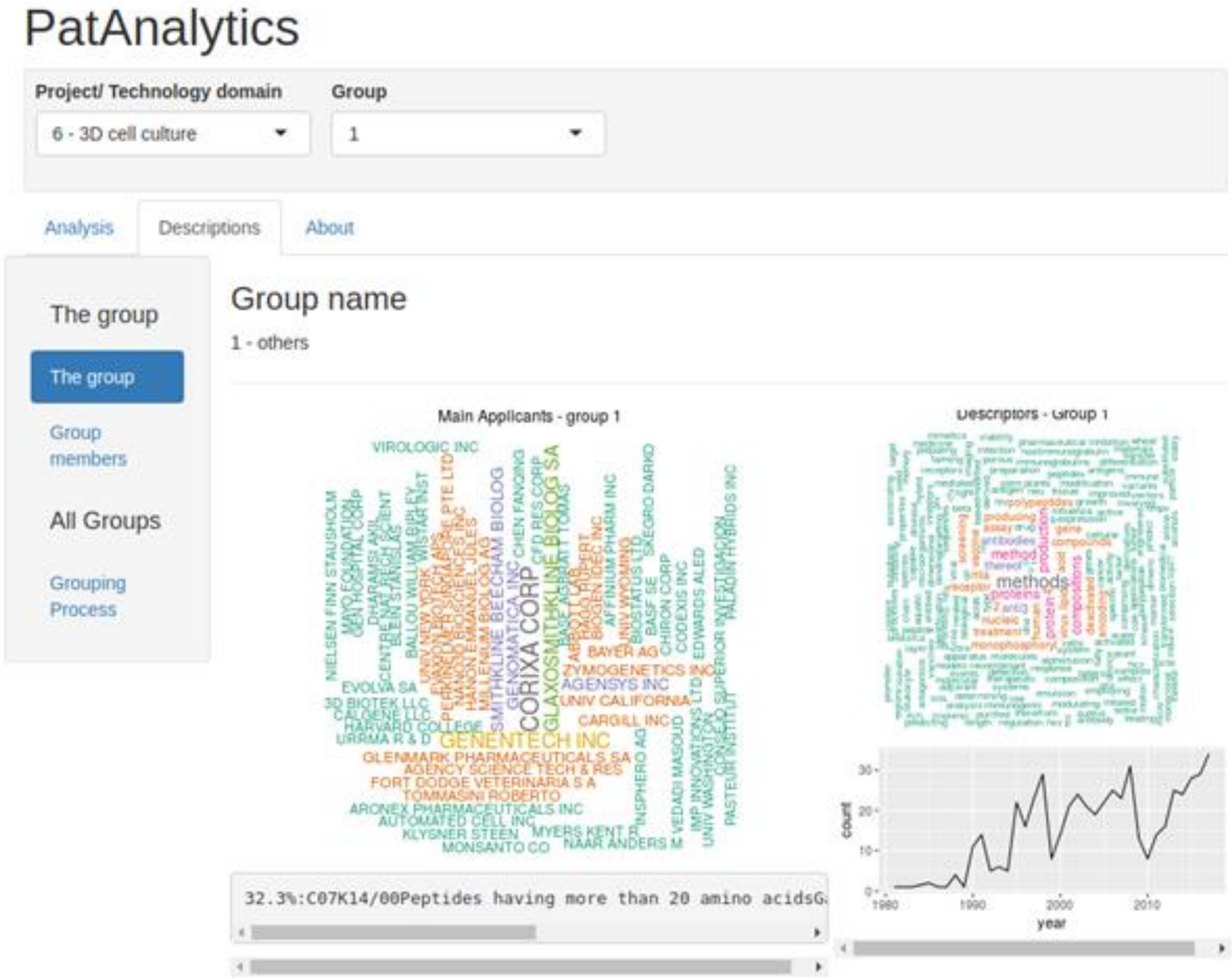
https://jjames.shinyapps.io/shinyHome/

Examples



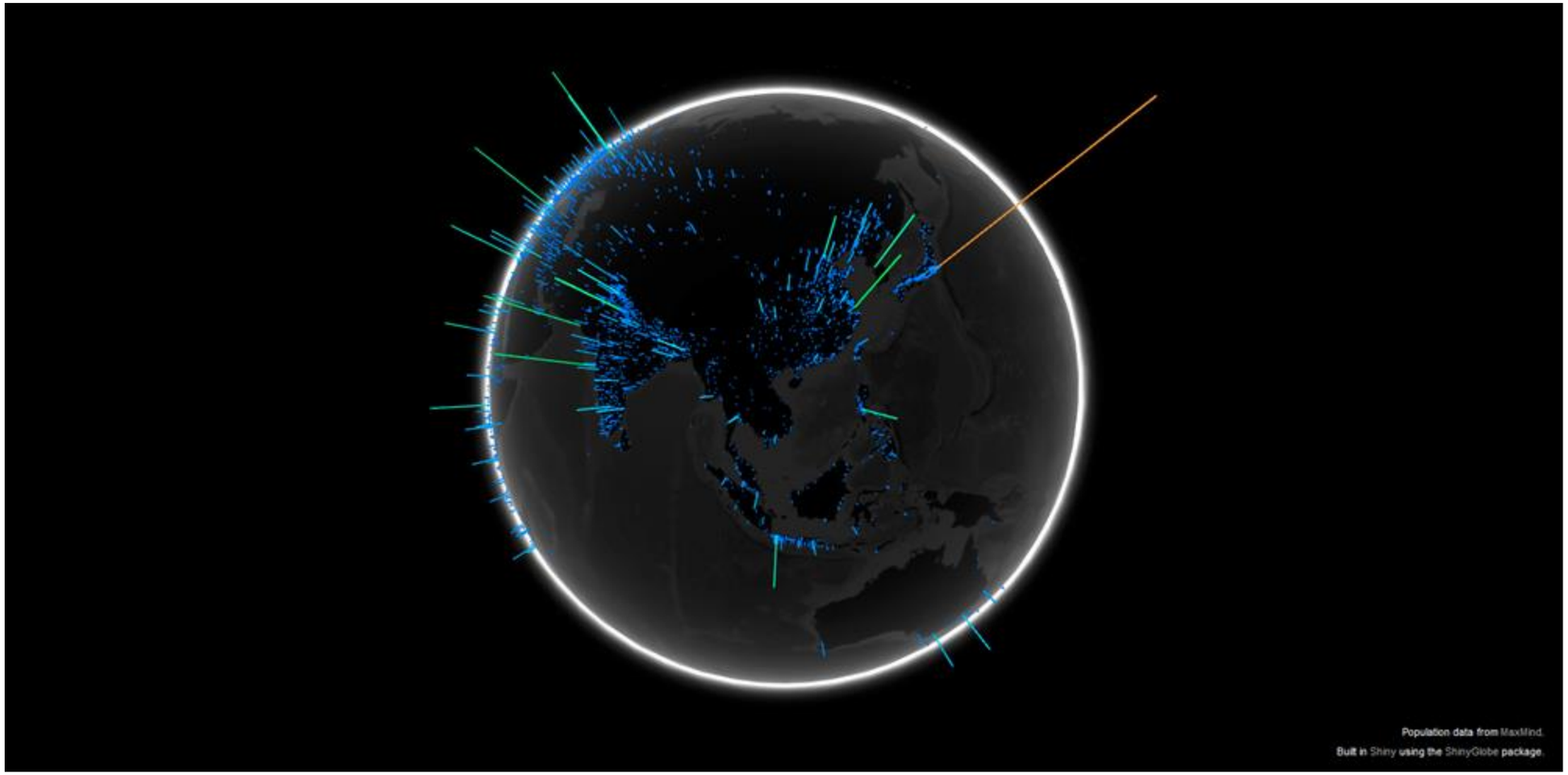
https://karthiaru.com/shiny/epl-fantasy/

Examples



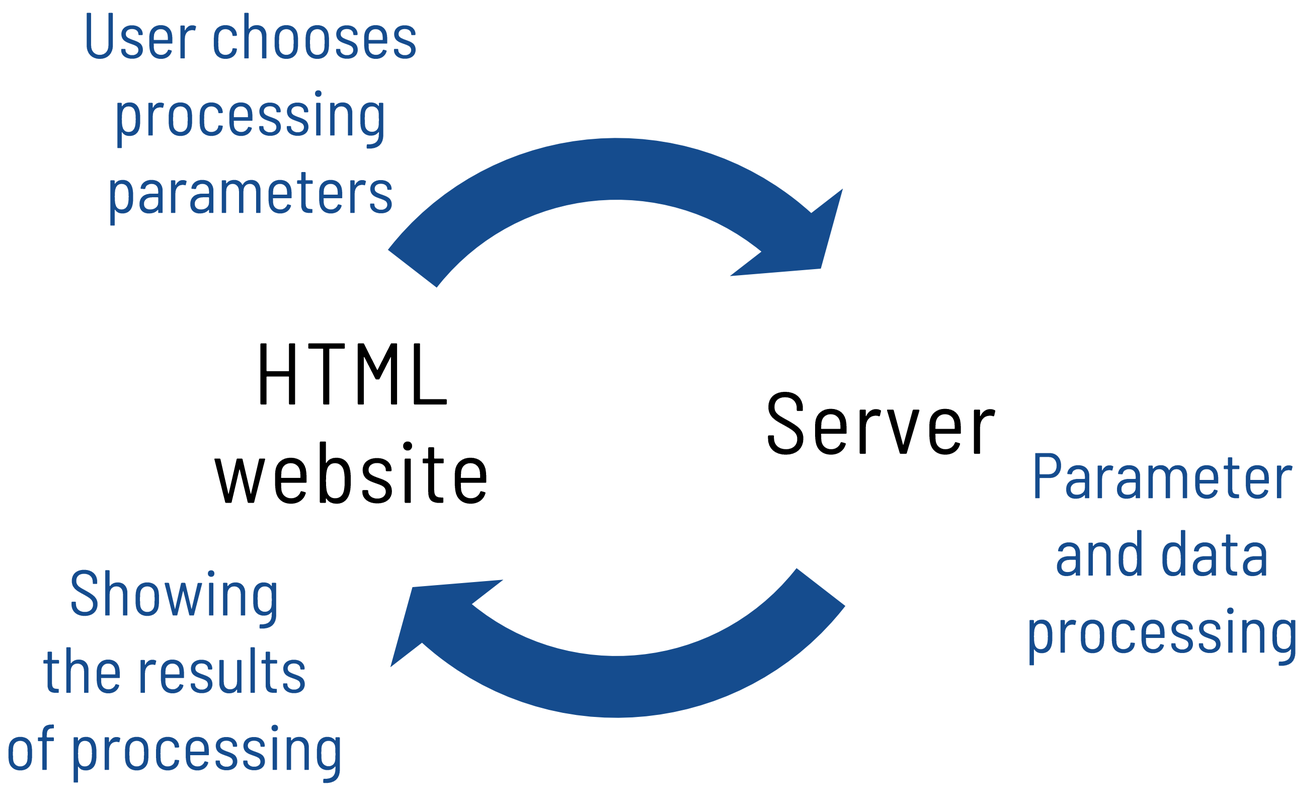
https://hamagust.shinyapps.io/patAnalyticsM5_V/

Examples



http://spark.rstudio.com/trestletech/globePopulation

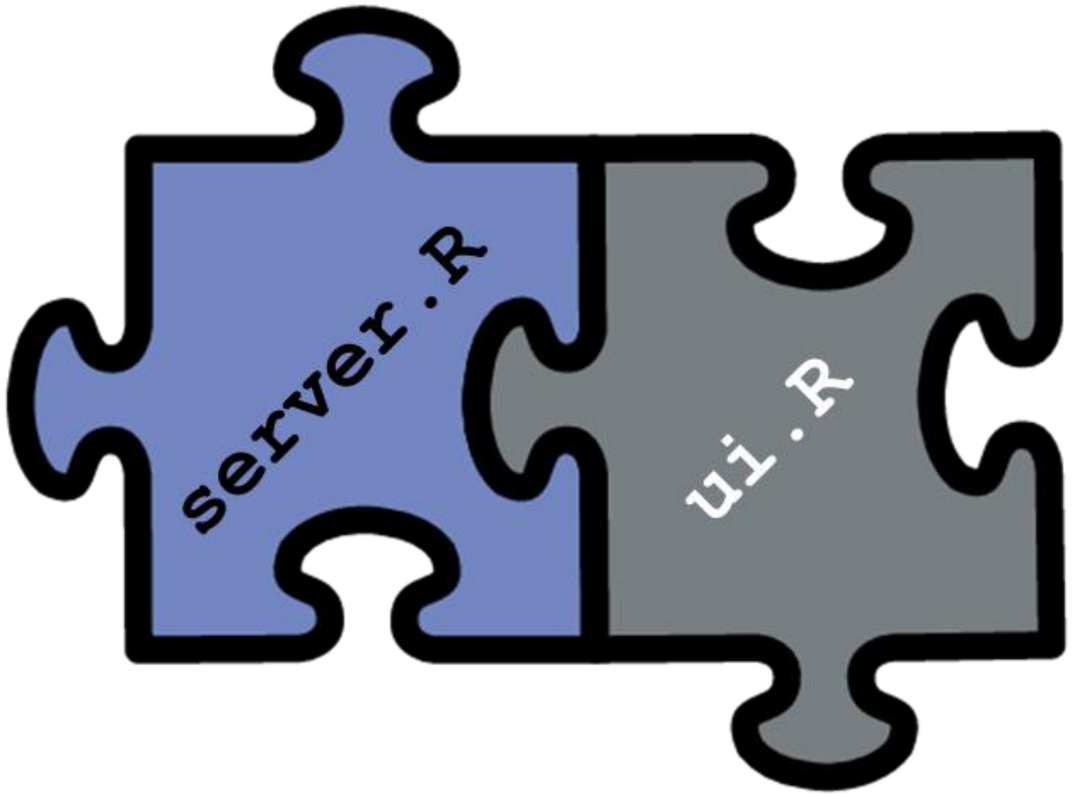
Shiny applications



Two pieces of a Shiny application

Two R files:

- Way of data processing description



- User interface description
- Layout of graphical elements

Let’s move on to coding...

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