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sexy-rgtk: a package for programming RGtk2 GUI in a user-friendly manner

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There are many different ways to program Graphical User Interfaces (GUI) in R. [1] provides an overview of the available methods, describing ways to program R GUI with **RGtk2**, **qtbase** and **tcltk**. More recently, the package **shiny**, for building interactive web applications, was also released (the first version has been published on December, 2012).

The package **RGtk2** [2] is probably one of the most complete packages to program complex and highly customizable GUI. It is based on GTK2 (the GIMP Toolkit, <http://www.gtk.org/>), which is a multi-platform toolkit for creating Graphical User Interfaces. GTK2 offers a complete set of widgets and can be used to develop complete application suites working on Linux, Windows and Mac OS X. Although very flexible, each **RGtk2** interface results in a long script that has a counterintuitive syntax for most R users. For instance, the simple window of Figure 1¹ is obtained with the command lines provided in Figure 2 (left).



Figure 1: A simple GUI interface made with **RGtk2**.

One attempt to overcome the difficulty of the **RGtk2** syntax is the package **gWidgets** but, quoting its reference manual

*“The excellent **RGtk2** package opens up the full power of the GTK2 toolkit, only a fraction of which is available through **gWidgetsRGtk2**.”*

¹obtained on Kubuntu 12.04, Satanic Edition. The window’s appearance differs depending on the OS and on the system’s color configuration.

By automatically indexing all objects and methods available in **RGtk2**, we² developed a method for creating GTK2-based GUI, in a friendlier and more compact manner. Widgets are accessible with simple functions and options, as is more natural for a R language programmer. The window of Figure 1 is thus generated by the script provided in Figure 2 (right).

```

window <- gtkWindow()
window["title"] <- "wnaetw GUI"
vbox <- gtkVBoxNew(FALSE, 8)
vbox$setBorderWidth(24)
window$add(vbox)
hbox <- gtkHBoxNew(FALSE, 8)
vbox$packStart(hbox, FALSE, FALSE, 0)
label <- gtkLabelNew("Welcome Lazy Student!
  Which file do you want to analyze?")
hbox$packStart(label, FALSE, FALSE, 0)
vbox$packStart(gtkHSeparatorNew(), FALSE, FALSE, 0)
hbox <- gtkHBoxNew(FALSE, 8)
vbox$packStart(hbox, FALSE, FALSE, 0)
label <- gtkLabelNewWithMnemonic("_File name")
hbox$packStart(label, FALSE, FALSE, 0)
filename <- gtkEntryNew()
filename$setWidthChars(50)
label$setMnemonicWidget(filename)
hbox$packStart(filename, FALSE, FALSE, 0)
buttonOpen <- gtkButtonNewFromStock("gtk-open")
gSignalConnect(buttonOpen, "clicked", openFile)
hbox$packStart(buttonOpen, FALSE, FALSE, 0)
# ... (script is cut at 1/3 of its length)

```

```

main <- Window(title="wnaetw GUI",
  contents=Rows(
    Label("Welcome Lazy Student! Which file do you want
      to analyze?"),
    br, HSeparator(), br,
    LabeledWidget("_File location ",
      Entry(use.name='filename', width.chars=50),
      mnemonic=T),
    Button(from.stock="gtk-open", on('clicked', run=
      chooseFile()), fill=F), br,
    # ... (script is cut at 1/3 of its length))

```

Figure 2: **RGtk2** (left) vs **sexy-rgtk2** (right).

This method has been used for recoding in a very short and simple manner the basic GUI of the (toy) package **wnaetw**³. Also a function has been developed to ease the use of the function **rGtkDataFrame**. A **data.frame** object **res** can thus be displayed in a window with the single command **DataFrame(res)** instead of having to define individually each column renderer. This feature is illustrated in Figure 3. The method should be released as a package next summer but the first scripts, without documentation, as well as the demo code, are available upon request.

	year	age	zip	siblings	height	feetSize	dotCode	averageMathGrade	bacMathGrade	averageSportGrade	gini
mean	2007.94	19.09	4200489	1.8	172.76	41.32	46.48	7.96	6.6	5.89	
median	2007	19	33500	2	174	41.5	34	6	7	6	
min	2007	17	11000	0	158	37	9	2	1	1	
max	2010	26	97200	4	190	47	97	15	15	14	
range	3	9	86200	4	32	10	88	13	14	10	
sd	1	2	27836	1	8	2	22	4	4	3	
kurtosis	-1.36	5.37	-0.99	-0.17	-0.58	-0.67	-0.47	-1.34	-0.91	-0.77	
skewness	0.3	2.09	0.53	0.69	0.02	0.35	0.65	0.38	0.32	0.24	
variation	0	0.09	0.66	0.6	0.05	0.06	0.47	0.57	0.6	0.47	
Q1	2007	18	16477.5	1	167.25	39	31	4	3	4	
Q3	2010	20	66000	2	179	42.75	66	12	9.5	8	
gini	0	0.04	0.36	0.31	0.03	0.03	0.24	0.32	0.33	0.26	

```

performWmtw(main$filename$text, main$headers$active,
  main$sep$text, main$dec$text, main$quote$active,
  main$saveres$active, main$savename$text)
# ...
performWmtw <- function(fn, headers, sep, dec, quote,
  save, sn) {
  # ... reading file
  res <- applyWmtw(my.data)
  ## GUI part
  resGUI <- Dialog(title="Here we are, lazy student.
    Please find below the main statistics:")
  DialogRows(resGUI, DataFrame(res, row.names=TRUE), br,
    pack(Button(from.stock='Cancel', on('clicked', run=
      resGUI$destroy()), expand=F, fill=T, padding=20,
      whence="end")))

```

Figure 3: Use case example for the function **DataFrame**.

References

- [1] M. Lawrence and J. Verzani. *Programming Graphical User Interfaces in R*. CRC The R Series. Chapman & Hall, June 2012.
- [2] L. Michael and T.L. Duncan. RGtk2: A graphical user interface toolkit for R. *Journal of Statistical Software*, 37(8):1–52, 2010.

²The authors did not contribute equally to the work: Damien developped the method to extract and interface **RGtk2** objects and methods, whereas Nathalie was the friendly useR and beta tester.

³“What Nicolas’s Teacher Wants”, described at <http://tuxette.nathalievilla.org/?p=885&lang=en>.