medplot : Installation and usage

Contents

Package `medplot` installation instructions 2

Prerequisites: 2

RAndFriends installation 2

Installation of `medplot` package 2

Package `medplot` usage instructions 6

General usage instructions 7

“Stop R Server” button 8

“Update medplot R package” button 8

Protected cells and sheets 8

Closing the Excel file 9

PlotSymptoms.xlsm spreadsheet usage instructions 10

“SETTINGS” sheet 10

“PATIENTS” sheet 10

“DATA” sheet 11

“ERRORS” sheet 11

Running the plotting function 11

PlotTests.xlsm spreadsheet usage instructions 13

“SETTINGS sheet 13

“PARAMETERS” sheet 14

“DATA” sheet 14

“ERRORS” sheet 15

Running the plotting function 15

Bibliography 17

Package `medplot` installation instructions

We will describe a typical installation of the *medplot* package. We hope it will work for you, as there seem to be some differences depending on which version of Excel you are using (2003, 2007, 2010).

Prerequisites:

- MS Excel, 32 bit version, (versions 2003, 2007, 2010 should be supported; 64 bit versions are NOT supported)
- a working internet connection

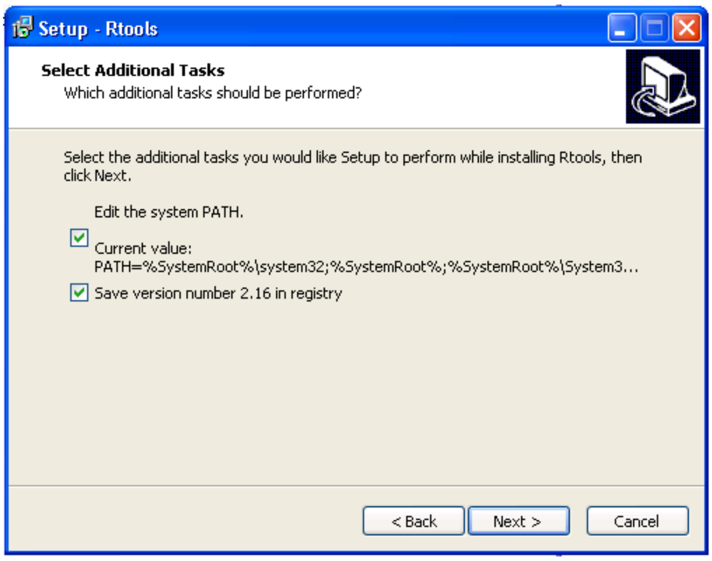
RAndFriends installation

Navigate to http://rcom.univie.ac.at/download.html and follow the instructions to download and run the RAndFriends installation package (several hundred megabytes in size, in case you have a slow connection, this will take a while). When following on screen instructions you can stick to the default options, in case of doubt. (*SWord* is actually not needed for medplot, but will be installed by default.)

Installation of `medplot` package

Next you will install the medplot package, also via the R console. For the moment, only installation via GitHub is supported (CRAN installations are planned). Open your R console and proceed.

1. run:
   ```
   install.packages("devtools")
   ```
2. You will need to download and install the Rtools package (not done via the R console). Use your web browser to navigate to the address: http://cran.r-project.org/bin/windows/Rtools/
1. Download the latest available version of Rtools package (at time of writing `Rtools216.exe`). Remember where you saved it and then run it, to install Rtools. You can stick to the defaults, but not when asked about additional tasks - select both options when prompted:



Setup - Rtools

Select Additional Tasks

Which additional tasks should be performed?

Select the additional tasks you would like Setup to perform while installing Rtools, then click Next.

Edit the system PATH.

☑ Current value:
PATH=%SystemRoot%\system32;%SystemRoot%;%SystemRoot%\System3...

☑ Save version number 2.16 in registry

   The option to edit the system PATH should be checked.
2. Restart windows after installing Rtools (because the system PATH needs to be reloaded at boot time).

3. From your R console, load devtools into library:
   ```
   library(devtools)
   ```
4. Install the medplot package from GitHub:
   ```
   install_github("medplot", username="crtahlin")
   ```
   Note: If installation fails with an error mentioning the SVGAnnotation package, please check the note under step 6.
5. To check where your medplot package is installed, you can run the library() command from your R console, which will open a window with a list of library locations and names:
   ```
   library()
   ```
   These packages should be installed:

   Cairo,

   gplots,

   RColorBrewer,

   XML,

   SVGAnnotation,

   shiny,

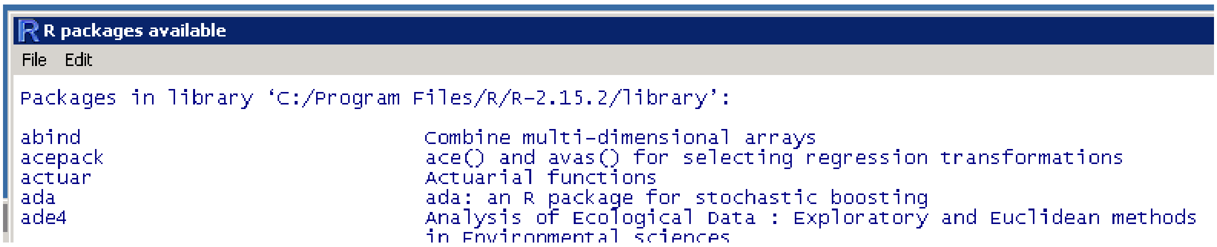
   scales,

   reshape2,

   ggplot2,

   seriation,

   medplot (This is our package; the others are needed for it to function. **Take note of the directory where this package is installed in** – it is listed in a line above the list of packages in it. You will need it a few steps later. See example screenshot below, showing path to the library.)



```
Packages in library ‘C:/Program Files/R/R-2.15.2/library’:

abind                              Combine multi-dimensional arrays
acepack                            ace() and avas() for selecting regression transformations
actuar                             Actuarial functions
ada                                ada: an R package for stochastic boosting
ade4                               Analysis of Ecological Data : Exploratory and Euclidean methods
                                   in Environmental Sciences
```

6. If it turns out some package is missing, try to install it manually by running:
   ```
   install.packages("NAME_OF_PACKAGE")
   ```
   For copy-paste ease of use, these are listed below:
   ```
   install.packages("Cairo")
   install.packages("RColorBrewer")
   install.packages("shiny")
   install.packages("scales")
   install.packages("reshape2")
   install.packages("gplots")
   ```

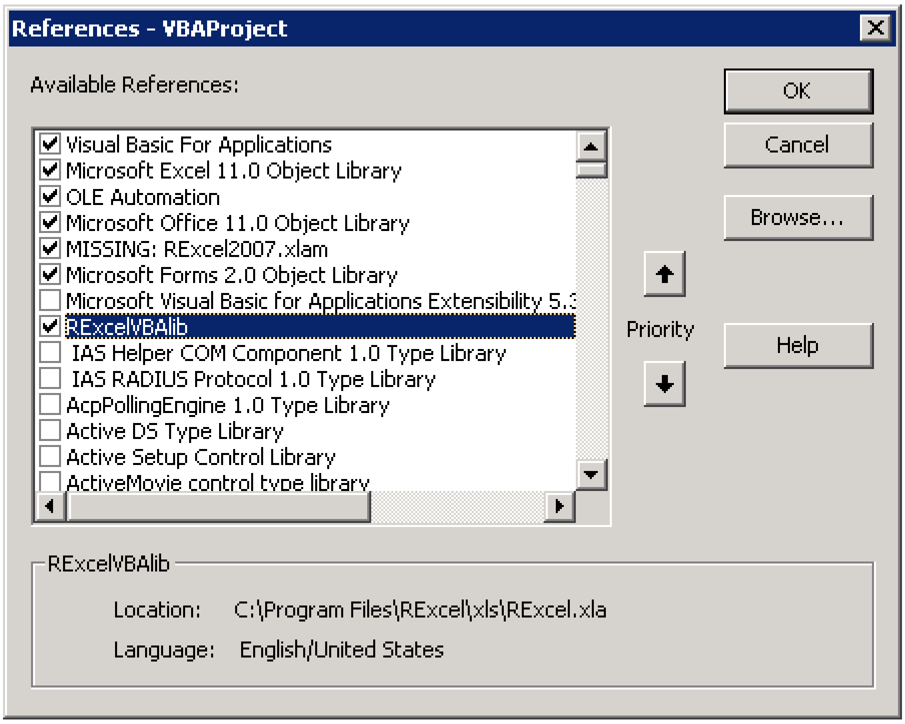
```
install.packages("ggplot2")
install.packages("seriation")
install.packages("XML")
```

Note: At the time of writing the SVGAnnotation package did not have an appropriate binary version on CRAN. For this package to install, run the installation from source:

```
install.packages("SVGAnnotation", repos="http://www.omegahat.org/R", type="source")
```

This package might be the reason that the installation of medplot package fails in the first place – you might try running this line first and then repeating step 4.

7. Load medplot package into library:
   `library(medplot)`
   This command will return something like *"... there is no package called 'medplot"'* if the installation of medplot failed for some reason. In that case you need to repeat medplot installation steps.
8. Look into the library (folder) on your computer, where the medplot package is installed (e.g.: `C:\Program Files\R\R-2.15.2\library\medplot`).
   In this folder, you should find the Excel files which you will use in your work:
   `PlotTests.xlsm` - plotting of test results
   `PlotSymptoms.xlsm` - plotting of symptoms found
9. Copy the appropriate Excel file to the folder where you keep your work and open it. You have to click "Enable content" to enable macros and code that is used for functionality to work. If all is well, you will get a message that a "medplot toolbar" was created. You can find it under "Add-Ins" menu (under Excel 2010).
   Different versions of Excel have different settings. Under Excel 2003, for example, it seems you have to set macro security lower than “high” for macros to work at all.
10. If you do not see the RExcel tab, you might try manually running the “Activate RExcel Add-in” program, probably found under Start->Programs->statconn->RExcel. And then run the “RExcel with RCommander” icon that is placed on your desktop and answer affirmatively to the questions if you want to install RExcel add-in permanently. This seems to be necessary on some systems running Excel 2003.
11. Finally, right click any tab in Excel and choose “View Code”. This opens the Visual Basic for Applications window. In it, navigate to Tools->References and make sure that the “RExcelVBAlib” option is checked. (as in screenshot below)



Available References:

- ☑ Visual Basic For Applications
- ☑ Microsoft Excel 11.0 Object Library
- ☑ OLE Automation
- ☑ Microsoft Office 11.0 Object Library
- ☑ MISSING: RExcel2007.xlam
- ☑ Microsoft Forms 2.0 Object Library
- □ Microsoft Visual Basic for Applications Extensibility 5.3
- ☑ RExcelVBAlib
- □ IAS Helper COM Component 1.0 Type Library
- □ IAS RADIUS Protocol 1.0 Type Library
- □ AcpPollingEngine 1.0 Type Library
- □ Active DS Type Library
- □ Active Setup Control Library
- □ ActiveMovie control type library

RExcelVBAlib

Location: C:\Program Files\RExcel\xls\RExcel.xla

Language: English/United States

Note: If your situation is as in screenshot above, make sure to uncheck the "MISSING:RExcel2007.xlam" option.

You should now have your medplot package ready for work.

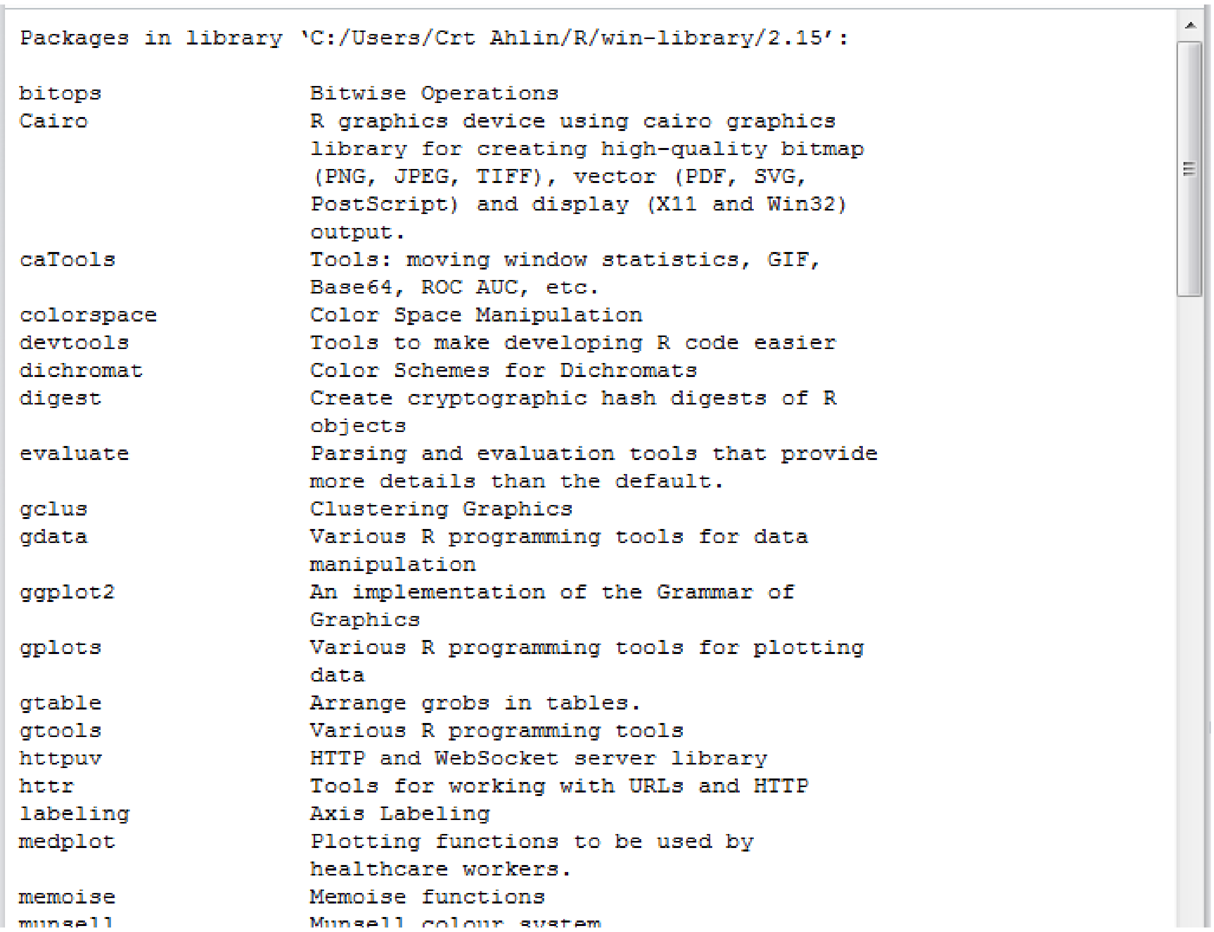
Package `medplot` usage instructions

The medplot package contains several MS Excel (http://office.microsoft.com/en-us/excel/) files which you can fill with your own data (let us call them template files). You can generate graphs from this data by clicking an appropriate button in Excel toolbar. A Visual Basic for Applications (VBA) script starts, using RExcel (http://rcom.univie.ac.at/) (Baier & Neuwirth, 2007) connector to connect MS Excel to the R statistical environment (R Core Team, 2013), which handles the plotting.

We will assume you have successfully installed the *medplot* package for the R language and all the other required packages (installation is described in another document). Note that only 32 bit versions of MS Excel are supported and that the package might not work on Excel 2013 (not tested) and Excel versions for Mac computers (not tested)

You can find the Excel template files in one of the subfolders of the medplot package folder. To see where your medplot package is installed, issue the following command at the R prompt:

```
> library()
```

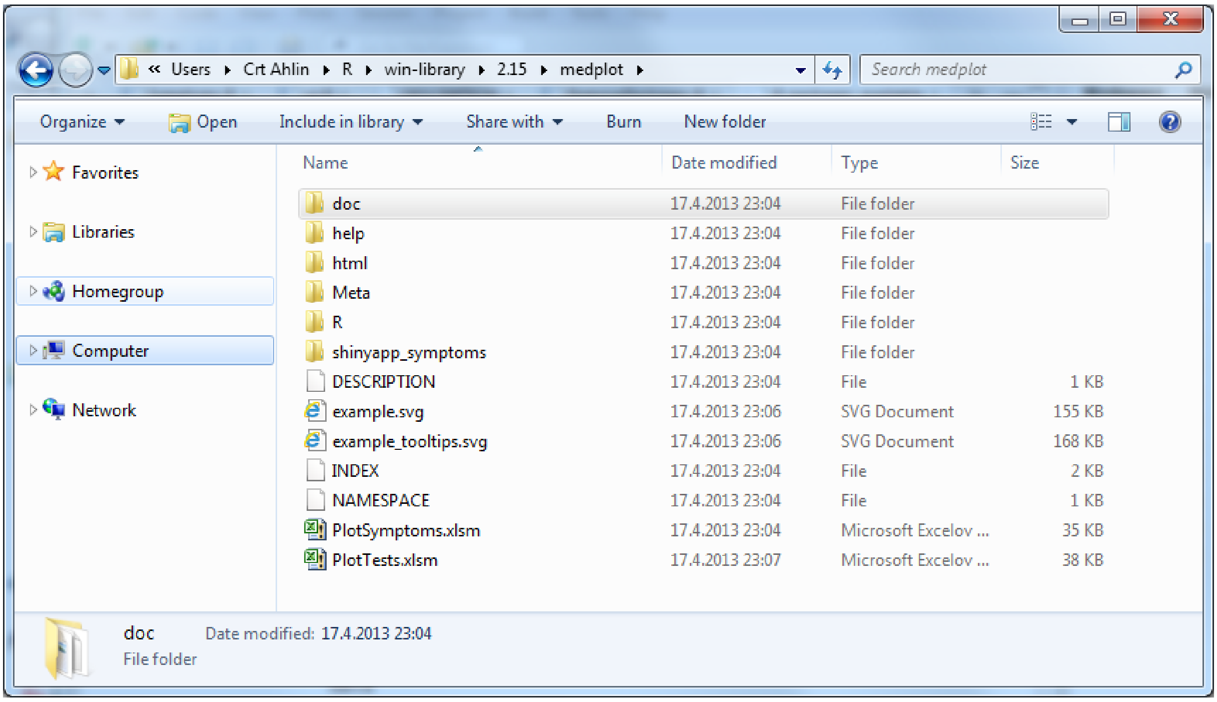


```
Packages in library 'C:/Users/Crt Ahlin/R/win-library/2.15':

bitops                  Bitwise Operations
Cairo                   R graphics device using cairo graphics
                        library for creating high-quality bitmap
                        (PNG, JPEG, TIFF), vector (PDF, SVG,
                        PostScript) and display (X11 and Win32)
                        output.
caTools                 Tools: moving window statistics, GIF,
                        Base64, ROC AUC, etc.
colorspace              Color Space Manipulation
devtools                Tools to make developing R code easier
dichromat               Color Schemes for Dichromats
digest                  Create cryptographic hash digests of R
                        objects
evaluate                Parsing and evaluation tools that provide
                        more details than the default.
gclus                   Clustering Graphics
gdata                   Various R programming tools for data
                        manipulation
ggplot2                 An implementation of the Grammar of
                        Graphics
gplots                  Various R programming tools for plotting
                        data
gtable                  Arrange grobs in tables.
gtools                  Various R programming tools
httpuv                  HTTP and WebSocket server library
httr                    Tools for working with URLs and HTTP
labeling                Axis Labeling
medplot                 Plotting functions to be used by
                        healthcare workers.
memoise                 Memoise functions
munsell                 Munsell colour system
```

E.g.: the screenshot reveals the medplot package is inside the folder C:/Users/Crt Ahlin/R/win-library/2.15.

Navigate to the folder where medplot is installed, and enter the medplot subfolder.



Name	Date modified	Type	Size
doc	17.4.2013 23:04	File folder	
help	17.4.2013 23:04	File folder	
html	17.4.2013 23:04	File folder	
Meta	17.4.2013 23:04	File folder	
R	17.4.2013 23:04	File folder	
shinyapp_symptoms	17.4.2013 23:04	File folder	
DESCRIPTION	17.4.2013 23:04	File	1 KB
example.svg	17.4.2013 23:06	SVG Document	155 KB
example_tooltips.svg	17.4.2013 23:06	SVG Document	168 KB
INDEX	17.4.2013 23:04	File	2 KB
NAMESPACE	17.4.2013 23:04	File	1 KB
PlotSymptoms.xlsm	17.4.2013 23:04	Microsoft Excelov ...	35 KB
PlotTests.xlsm	17.4.2013 23:07	Microsoft Excelov ...	38 KB

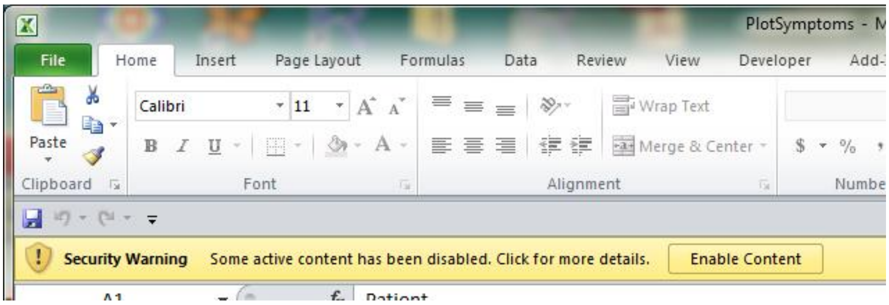
doc Date modified: 17.4.2013 23:04
File folder

E.g.: the contents of the medplot subfolder.

The Excel template files have the .xslm suffix, indicating they contain macros. Copy these files to your favorite working folder. You can also rename them, if you wish. **Always work on these copies to avoid losing data when updating the medplot package.**

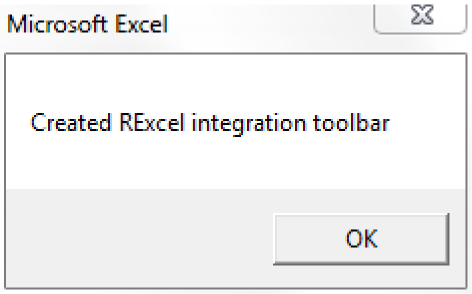
General usage instructions

When you open one of the files for the first time, you will probably get a security warning that some active features of the files are disabled.



Security Warning Some active content has been disabled. Click for more details. Enable Content

You should allow these to enable macros in these files to run; otherwise the medplot functionalities will not be available. If you get a warning like in above case, simply click the button on the right side of the warning to enable them. If the required permissions are granted, you should get a message that the RExcel integration toolbar was generated.

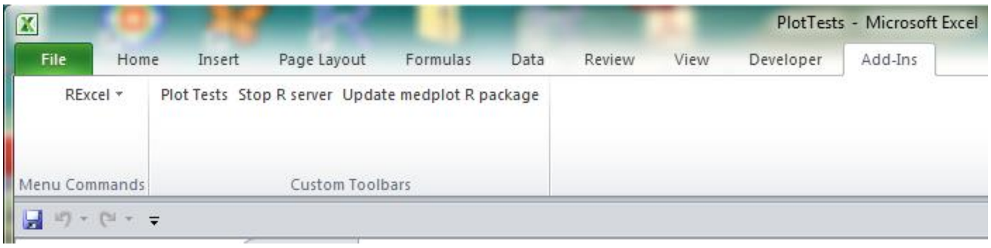


Microsoft Excel

Created RExcel integration toolbar

E.g.: the RExcel integration toolbar was created.

You can find the generated toolbar under the Addins tab. A general RExcel toolbar is on the left side of the tab and the toolbar specific to medplot is on the right (assuming you have no other custom toolbars, of course; see screenshot below).



E.g.: The RExcel general toolbar and the medplot toolbar with buttons.

Clicking one of the buttons causes VBA (Visual Basic for Applications) code to be called. Some buttons are common to all the Excel template files and will be described in the following subchapters.

"Stop R Server" button

Clicking the Stop R Server button will stop the R process, if one is running. This is only meant to be used if R misbehaves in some way, to stop it. It will start again automatically when another function requiring R is called.

"Update medplot R package" button

Clicking the Update medplot R package button will start the R process (via RExcel add-in) and attempt to update the medplot package with the version in the GitHub repository (https://github.com/crtahlin/medplot). You should have a working internet connection. The whole medplot subfolder in the R library gets updated if the update is successful. This includes both the R code and the Excel template files that contain the VBA code. This is meant to be used for on-the-fly code updates (hot fixes).

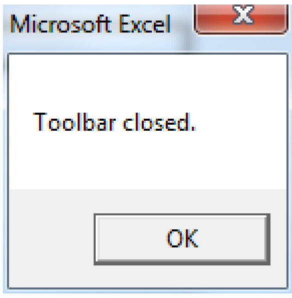
Note that you can probably still continue to use the Excel file that you have open at the moment of update; unless the update was also to the VBA code in the Excel file and the update is such, that the old VBA code is no longer compatible with the new functionality. In that case, you should use the new Excel template files, transferring your data to them.

Protected cells and sheets

The sheets and cells in the Excel template files are protected in a sense, that the user cannot edit cells that he is not supposed to edit. The protection can be removed by users (no password is used), but this is discouraged as more mistakes are possible without protection enabled.

Closing the Excel file

You should get a message that the RExcel toolbar was closed when closing the Excel file.



Toolbar closed.

E.g.: The RExcel integration toolbar was closed.

If you do not get the message, Excel was probably not closed correctly and the toolbar will persist in your following Excel sessions, even if they are not using the medplot package. If you wish to resolve this, open and close the Excel medplot file again.

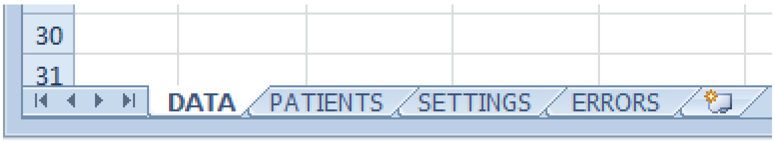
In the next chapters, each of the Excel template file specifics will be described separately.

PlotSymptoms.xlsm spreadsheet usage instructions

PlotSymptoms.xlsm relies on the R `shiny` package (RStudio & Inc., 2013), which runs a simple web server on the local machine and renders a plot the user can manipulate via a web browser.

The PlotSymptoms.xlsm contains the following sheets:

- DATA
- PATIENTS
- SETTINGS
- ERRORS



E.g.: Sheets in PlotSymptoms.xlsm.

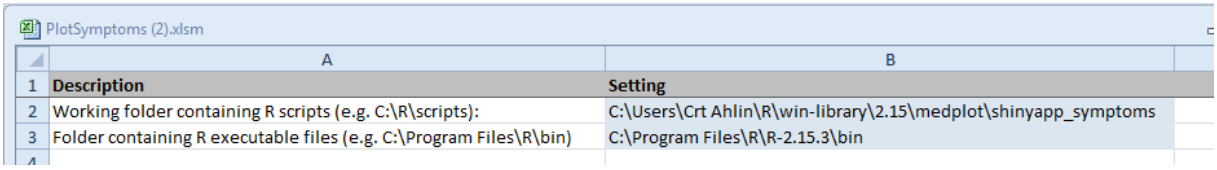
The sheets will be described in the order the user should refer to them in the following subparagraphs.

"SETTINGS" sheet

The SETTINGS sheet contains the parameters the user must set before running the plotting function. The user should set the correct values in the light blue fields (the rest of the fields are write protected and read-only).

Working folder containing R scripts (e.g. C:\R\scripts): set path to the folder containing the R code for the shiny application, e.g. the Symptoms.R file. The code is installed together with the medplot package and should be a subfolder of the medplot folder, named "shinyapp_symptoms" (see screenshot for example).

Folder containing R executable files (e.g. C:\Program Files\R\bin): set path to the folder containing the R executable files, e.g. Rscript.exe. This depends on your operating system and R version. (see screenshot for example)

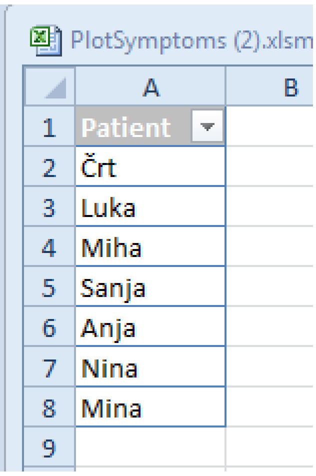


	A	B
1	Description	Setting
2	Working folder containing R scripts (e.g. C:\R\scripts):	C:\Users\Crt Ahlin\R\win-library\2.15\medplot\shinyapp_symptoms
3	Folder containing R executable files (e.g. C:\Program Files\R\bin)	C:\Program Files\R\R-2.15.3\bin

E.g.: Screenshot of the SETTINGS sheet.

"PATIENTS" sheet

The PATIENTS sheet contains names of the patients. For data integrity purposes only patients listed on this sheet can be entered on the DATA sheet.


PlotSymptoms (2).xlsm

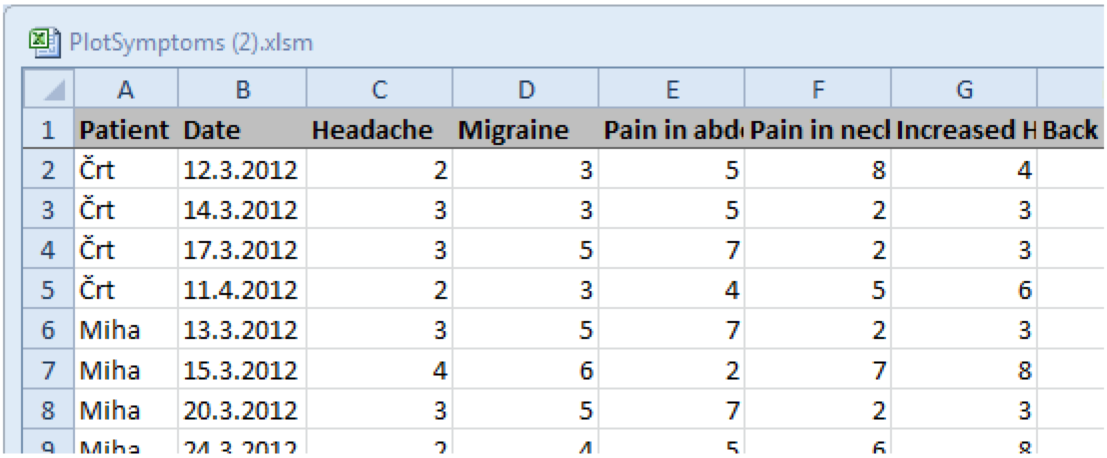
	A	B
1	Patient	
2	Črt	
3	Luka	
4	Miha	
5	Sanja	
6	Anja	
7	Nina	
8	Mina	
9		

E.g.: Sample patients on the PATIENTS sheet.

“DATA” sheet

The DATA sheet contains the patients, the dates of checkups and the severity of reported symptoms. Each line of data represents one date of one patient checkup.

The user can edit the column names after the Date column, which represent the symptom names. Names in the Patient column should be entered as they are listed on the PATIENTS sheet. Names not listed on this sheet are not valid. Dates in the Date column should be entered in DD.MM.YYYY format. Severity of symptoms should be entered as an integer value between and including 0 and 10.


PlotSymptoms (2).xlsm

	A	B	C	D	E	F	G	
1	Patient	Date	Headache	Migraine	Pain in abd	Pain in necl	Increased H	Back
2	Črt	12.3.2012	2	3	5	8	4	
3	Črt	14.3.2012	3	3	5	2	3	
4	Črt	17.3.2012	3	5	7	2	3	
5	Črt	11.4.2012	2	3	4	5	6	
6	Miha	13.3.2012	3	5	7	2	3	
7	Miha	15.3.2012	4	6	2	7	8	
8	Miha	20.3.2012	3	5	7	2	3	
9	Miha	24.3.2012	2	4	5	6	8	

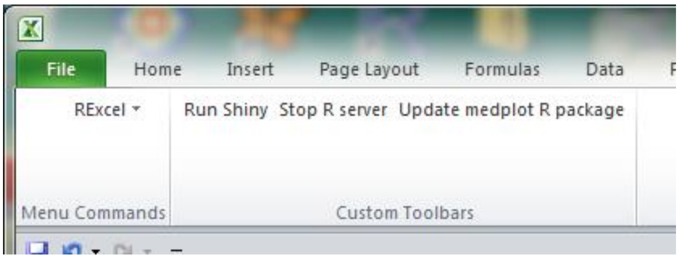
E.g.: Sample data on the DATA sheet.

“ERRORS” sheet

Potential errors get listed on the ERRORS sheet. The user should check the sheet after running the plotting function.

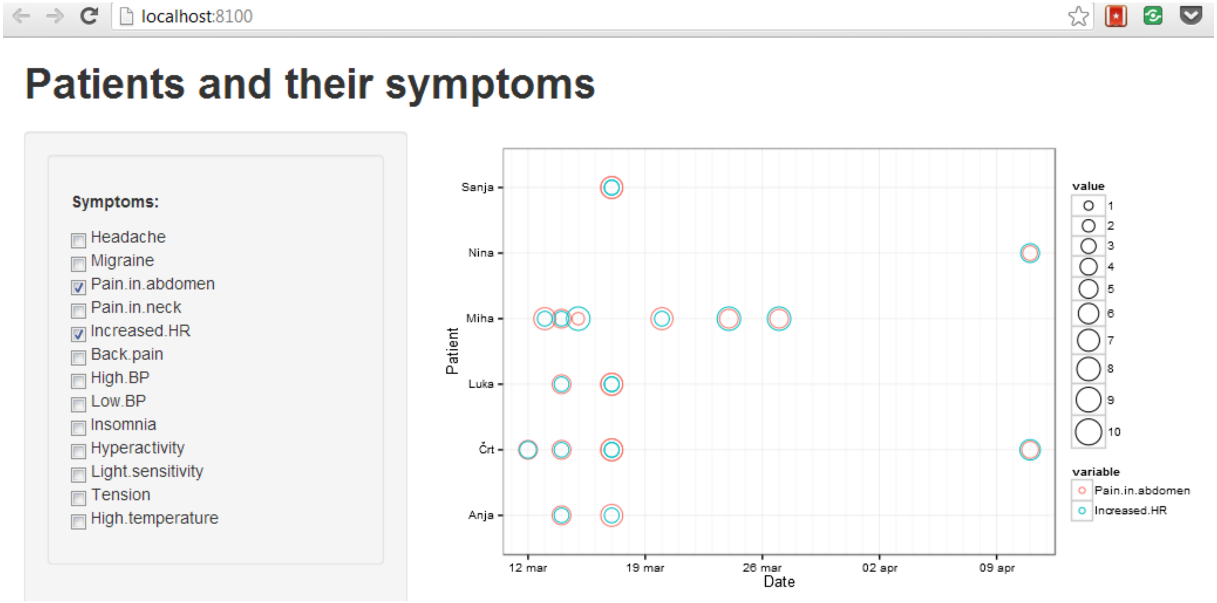
Running the plotting function

The user can start the plotting function by clicking the button Run Shiny on the medplot toolbar.



E.g.: Example of the Run Shiny button.

A web browser window should open with options to select which symptoms the user wishes to plot. The plot updates every time after the user changes the selection.



Patients and their symptoms

Symptoms:

- □ Headache
- □ Migraine
- ☑ Pain.in.abdomen
- □ Pain.in.neck
- ☑ Increased.HR
- □ Back.pain
- □ High.BP
- □ Low.BP
- □ Insomnia
- □ Hyperactivity
- □ Light.sensitivity
- □ Tension
- □ High.temperature

E.g.: Example of the generated plot.

The size of the circles on the plot represents symptom severity while the color of the circle represents a particular symptom.

Note that the shiny web server runs on the local host – the firewall on the user's computer has to allow connections to the server in order for the web browser to be able to connect to it.

PlotTests.xlsm spreadsheet usage instructions

PlotTest.xlsm relies on the R `SVGAnnotation` package (Nolan & Lang, 2012) to generate a scalable vector graphics (SVG) file containing the plots.

The PlotTests.xlsm contains the following sheets:

- DATA
- PARAMETERS
- SETTINGS
- ERRORS

The sheets will be described in the order the user should refer to them in the following subparagraphs.

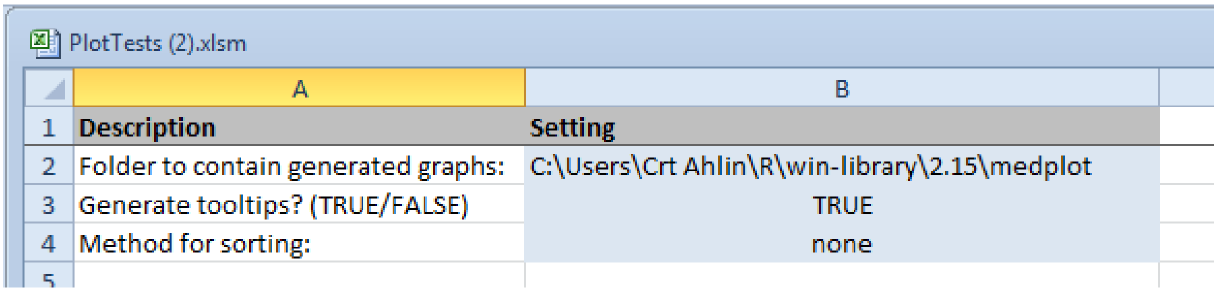
“SETTINGS sheet

The SETTINGS sheet contains the parameters the user must set before running the plotting function. The user should set the correct values in the light blue fields (the rest of the fields are write protected and read-only).

Folder to contain generated graphs: set path to a folder that will contain the files containing the graphs. **Note that existing files containing graphs in this path will be overwritten.**

Generate tooltips? (TRUE/FALSE): set to TRUE if you wish the generated SVG file to contain the functionality of generating pop-up windows with extra information about the data point when the user moves the mouse cursor over a point in the graph (tooltips). This is slower than generating a graph without tooltips.

Method for sorting: select an option how to sort the units in the generated graph. None – does not sort the units in the graph and uses the order in which they are listed in the Excel sheet. DateIn – will sort according to the DateIn column, which contains dates of arrivals. The rest of the options use the R package `seriation` (Hahsler, Hornik, & Buchta, 2007) for sorting, using the values of test results entered on a particular date. BEA – will sort via the bond energy algorithm; BEA_TSP – uses the travelling salesperson algorithm; PCA – uses the first principal component for sorting. The idea behind sorting is that patterns of test results might emerge visually if the units are sorted on the graph.



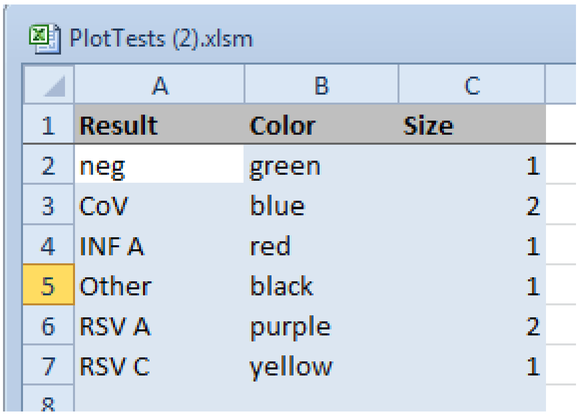
PlotTests (2).xlsm

	A	B
1	**Description**	**Setting**
2	Folder to contain generated graphs:	C:\Users\Crt Ahlin\R\win-library\2.15\medplot
3	Generate tooltips? (TRUE/FALSE)	TRUE
4	Method for sorting:	none
5		

E.g.: The SETTINGS sheet example.

“PARAMETERS” sheet

The PARAMETERS sheet contains the names of valid test results under the Result column, the color for a particular test result under the Color column and the size of the dot on the graph in the Size column. The light blue colored fields are editable by the user.



	A	B	C
1	**Result**	**Color**	**Size**
2	neg	green	1
3	CoV	blue	2
4	INF A	red	1
5	Other	black	1
6	RSV A	purple	2
7	RSV C	yellow	1
8			

E.g.: The PARAMETERS sheet example.

“DATA” sheet

The DATA sheet contains data about subjects (e.g. patients or medical staff) and their test results on different test days.

The columns used in the sheet are:

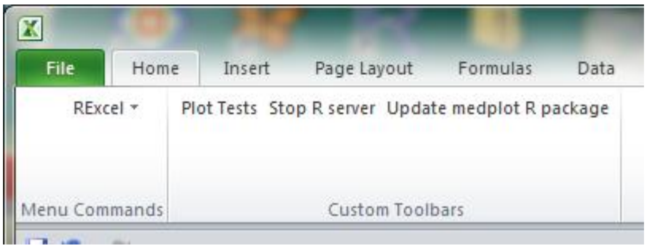
- ID: identity code of the subject; alphanumeric
- Name: name of the subject; alphanumeric
- Age: age of the subject; numeric
- Sex: sex of the subject; string
- Type: type of subject; alphanumeric
  The label used in this field determines the 1st level group under which the subject will be placed on the graph. Examples are: Patient, Staff. Can be any label the user chooses. Can be left blank.
- Diagnosis: the diagnosis the patient started treatment for; alphanumeric
  The label used in this field determines the 2nd level group under which the subject will be placed on the graph. Can be any label the user chooses. Can be left blank.
- Outcome: the final outcome of the treatment; alphanumeric
  Can be any label the user chooses. The label “died” plots a special character on the graph at the date under DateOut column. Examples are: improved, died.
- DateIn: the date the treatment started; expected format: DD.MM.YYYY
- DateOut: the date the treatment ended; expected format: DD.MM.YYYY
- The date columns: they contain the dates of tests taken as the column header (expected format: DD.MM.YYYY) and the labels of positive test results on that particular day for a particular subject in the cells. Multiple positive test results should be separated by a comma (e.g.: “CoV,Other”). The user can edit (add) the dates column header labels.

“ERRORS” sheet

Potential errors and warnings get listed on the ERRORS sheet. The user should check the sheet after running the plotting function. For example, errors might occur if invalid test result labels are used on the DATA sheet. Compared to errors, warnings usually do not stop the plotting, but are caused situations the user should be aware of.

Running the plotting function

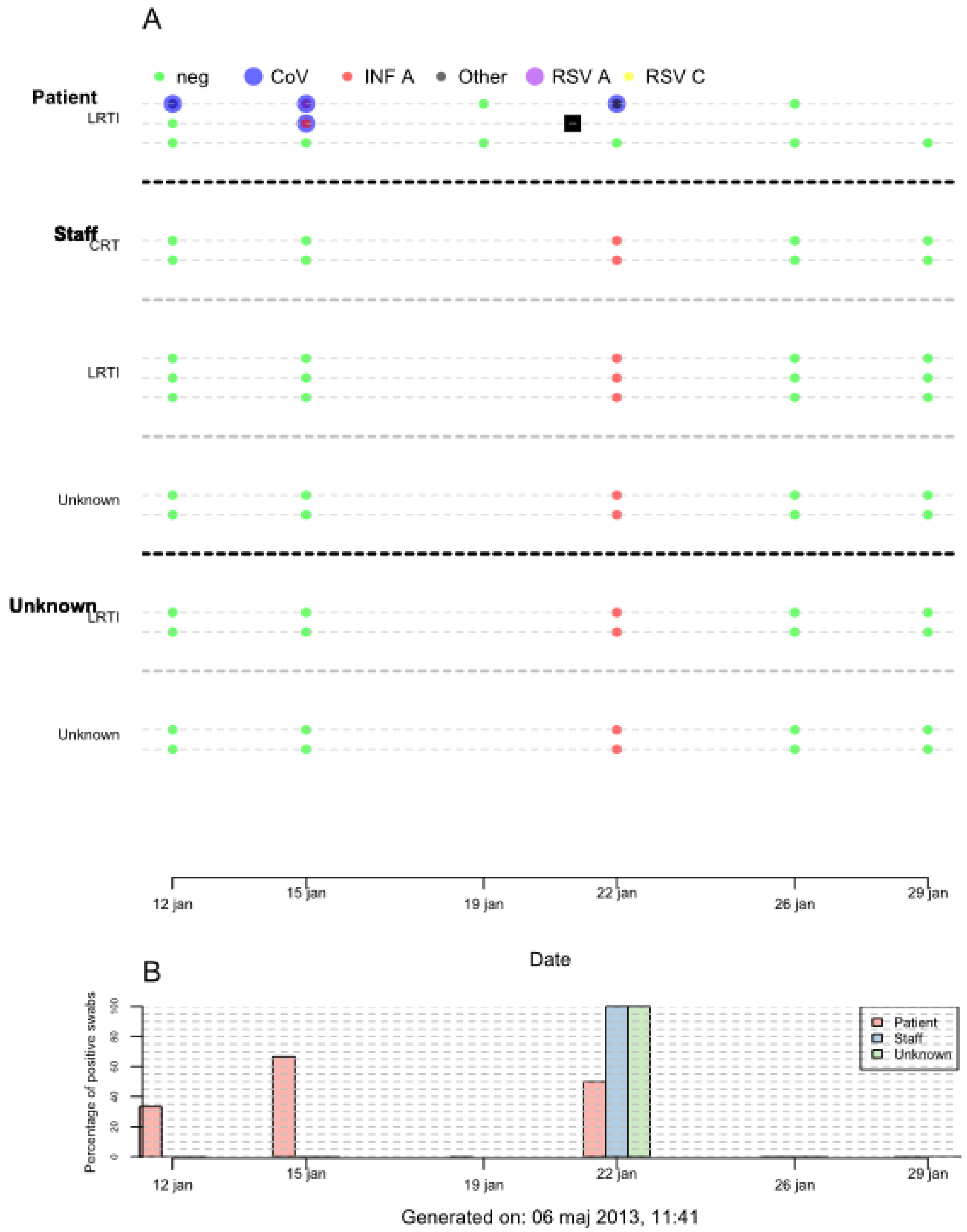
The user can start the plotting function by clicking the button Plot Tests on the medplot toolbar.



E.g.: The Plot Test button on the medplot toolbar.

Depending on the amount of data, the plot generation can take a while. Potential errors are reported on the ERRORS sheet. The user should look for the generated graphs inside the folder specified on the SETTINGS sheet. Depending on the other settings used, the folder should contain one or two image files with .svg suffix. They can be opened with SVG viewer applications or most modern browsers (e.g. Chrome version 26+, Internet Explorer 10).

The plots should look similar to the plot bellow, depending on the version of medplot used.



E.g.: Example of Plot Tests plot.

The graph under the label A shows test results for subjects on different days of testing. Moving the mouse over a plotted dot will raise a window with additional details about the subject (on the plot with tooltips, not on the "normal" SVG plot). The graph under the label B shows the percentage of positive swabs for different 1st level groups of subjects on different dates via a bar chart. All test results that are not "neg" or NULL are considered positive.

Bibliography

Baier, T., & Neuwirth, E. (2007). Excel :: COM :: R. *Computational Statistics*, *22*(1, April 2007), 91–108. doi:10.1007/s00180-007-0023-6

Hahsler, M., Hornik, K., & Buchta, C. (2007). Getting Things in Order: An introduction to the R package seriation, (2001). Retrieved from http://epub.wu.ac.at/852/

Nolan, D., & Lang, D. T. (2012). Interactive and Animated Scalable Vector Graphics. *Journal of Statistical Software*, *46*(1).

R Core Team. (2013). R: A Language and Environment for Statistical Computing. Vienna, Austria. Retrieved from http://www.r-project.org/

RStudio, & Inc. (2013). shiny: Web Application Framework for R. Retrieved from http://cran.r-project.org/package=shiny