Notes: COSvis

Daniel Klotz, Johannes Wesemann, Mathew Herrnegger

Introduction

COSvis is an R based visualisation tool for **COSEROreg**. It is still in its infancy and currently maintained by Daniel Klotz. We hope that it will soon grow into a nice and usefull tool.

The purpose of this document is to collect notes regarding its usage and future developements. It is structured as following: Firstly, in *1. Overview* the program requirements and structure is presented. In *2. Setup* a short help for the program-usage is given. Section *3. Control Options* gives a list of the options for manipulation the program output.

1. Overview

COSvis makes extenstive use of R-packages. To date, the following packages are in use: *dplyr*, *ggplot2*, *gridExtra*, *hydroGOF*, *shiny* & *xts* (see: 2. Setup). The "program" comprises the following files:

```
* folder::"APP"
    + file::"calculations.R"
    + file::"server.R"
    + file::"ui.R"
    + folder::"www"
          - file::"bootstrap.CSS"
          - ...
* file::"COSvis_notes.pdf"
* file::"COSvis_notes.Rmd"
* file::"start.R"
* file::"readme.md"
```

Furthermore, the code is currently not DRY (but aspires to be so, asap!). In this case DRY is an acronym DRY and stands for "Don't Repeat Yourself"; which is a programming paradigm that tries to minimize the amount of repeated code, while pertaining legibility. Currently the entire calculations are done before the App/Visualsiation itself runs. In future versions this will be done more smartely. Nevertheless, parts of the code have allready been optimised with regards to calculation-speed, e.g.: Most "big" loops have been transformed in [a-z]pply statements or vectorized directly.

2. Setup

1. Download & install the R programming language from from https://www.r-project.org/ (It might also be usefull to get and IDE, such as Rstudio).
2. Open R & install the needed packages:

```
install.packages("data.table")
install.packages("shiny")
install.packages("hydroGOF")
install.packages("ggplot2")
install.packages("xts")
install.packages("dplyr")
```

```
install.packages("grid")
install.packages("gridExtra")
install.packages("dygraphs")
```

3. Open start.R in your COSvis folder and set up the options according to your will (see: ctrl-Cheatsheet).
4. Now you can either
   - copy the start.R and paste it into your R command window, or
   - execute start.R from the IDE of your choice

3. Control Options

3.1. The `ctrl` Variable

The `ctrl` variable is the main or basic control mechanism. It is basically a list in which the options can be defined. These definitions can be set in the start.R file. The `ctrl` variable is structured in the following way

Variable	Description	Format
`ctrl$pathtoCosero`	Path to the **COSEROreg** folder	string::path
`ctrl$pathtoApp`	Path to App folder in **COSvis**	string::path
`ctrl$ofoldername`	Path to output folder in **COSEROreg**	string::folder
`ctrl$ctrl_span`	timespan for the header year	{integer::year1,integer::year2}
`ctrl$colors`	colors for the pltos	{string::col1,. . . ,string::col4}
`ctrl$clr_NSEmid`	midpoint of the color scale for the NSE	real::value
`ctrl$yearName`	string for the x-axis title of the hydrological years	string::Name

3.2. The `plt_ctrl` Variable

The `plt_ctrl` variable is a list, which containts the control options for the different plot functions (see: chapter 4). Care: Not all plotting functions make use of all options! The options can be set in the calculations.R file. Currently the list is structured as following:

Variable	Description	Format
`plt_ctrl$gtitle`	title	string::name
`plt_ctrl$ylab`	label of the y-Axis	string::name
`plt_ctrl$xlab`	label of the y-Axis	string::name
`plt_ctrl$clr1`	color for the lowest value	string::name
`plt_ctrl$clr2`	color for the midpoint	string::name
`plt_ctrl$clr3`	color for the highest value	string::name
`plt_ctrl$clr4`	extra color	string::name
`plt_ctrl$midpoint`	midpoint of the color ramp	real::value
`plt_ctrl$limits`	lower and upper y-limit of the plotted data	{real::value,real::value}
`plt_ctrl$lb_cut`	lower boundary (min)	real::value

3.3. The `s_ctrl` Variable

COSvis will export additional files into the `'~/App/out/'` and `/App/www/` folder. The different save options are controlled with the 's_ctrl' variable. The control is realised via a list witch can be given to the save functions. Currently (v.0.2) only few additional files are produced:

- (a) The summary table of the NSE is written into the `'~/App/out/'` folder
- (b) html files & jpegs are written into the `/App/www/` folder. The former are blank files which show the later.

Thus, the `s_ctrl` options are rather limited. Currently the following funcitionality is implemented for the function `save_expnd_barplts`

Variable	Description	Format	Function
`s_ctrl$hmtlfilename`	file name of the html file	string::name	`save_expnd_barplts`
`s_ctrl$jpgfilename`	basic file name of the jpegs	string::name	`save_expnd_barplts`

4. Functions

Follows soon