Tools installation for seasonnal adjustment

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2023-01-17

Context

For seasonal adjustment we recommend using JDemetra+ algorithms

Thus, it is helpful to install the following tools:

- JDemetra+ Graphical User Interface (X13-Arima and Tramo-Seats)
- **R** and Rstudio (which allow to access even more JDemetra+ algorithms)

⚠ No assistance in **SAS** language will be given. ⚠

Preliminary

On the computers without administrator rights (*professional computer, for example*), it is recommended to create a folder **Software** under C:\Users\...\Software or directly under C:\Users\Software where all software will be installed.

⚠ Warning: when we specify an **absolute** path for a software (JDemetra+, Java, **R**, …) in a program, a shortcut, a variable, …, it must be modified each time any root repository is moved.

1 Installation of JDemetra+

JDemetra+ is a collection of Java programs used for time series analysis and more specifically for seasonal adjustment. JDemetra+ is delivered in the form of an GUI (Graphical User Interface) but there are **R** packages developed to be used with **R** as well as a cruncher (executable).

1.1 Version of JDemetra+ and dependencies

JDemetra+ is downloadable from the github link of the application: https://github.com/jdemetra/jdemetra-app/releases.

The last release (v2.2.4) dates from january 31, 2023. It is the last **stable** version of JDemetra+. **This version should be downloaded and must be used in production.**

There is one more version of JDemetra+ which are only at a **test** stage:

- v3.0.0: the new JDemetra+ version with new features and a new GUI

JDemetra+ v2.2.4 require Java version ≥ 8 while v3.0.0 requires Java version ≥ 17:

JDemetra+ version	Java version
v2.2.4	≥ 8
v3.0.0 (RC1)	≥ 17

RC: Release candidate

In the following procedure, the installation processes of this 3 versions are the same. You just have to repeat them for each version you want to install.

1.2 Installation process

There are two possibilities for installing:

- **Download and execute** the `.exe` file which requires administrator rights
- **Download** and **unzip** the compressed folder `.zip` that allows to get a portable version of the software

⚠ Warning: for the second option, you need to **download** the compressed folder `jdemetra+-2.2.4-bin.zip` (for the version 2.2.4 for example) and **not** the folder `Source code (zip)`.

The Software is in the folder \nbdemetra\bin\, these are the file `nbdemetra.exe` (version 32-bit) and `nbdemetra64.exe` (version 64-bit).

ℹ Advice: If you want to use several versions of JDemetra+ (v2.2.4, v3.0.0, …), you can rename the unzipped folder in \nbdemetra-2.2.4\ and \nbdemetra-3.0.0\.

ℹ Remark:You can create shortcuts to the executable files if you want to launch them from another folder (Desktop, project folder…).

1.3 Installation of the cruncher

The cruncher (**JWSACruncher**) is a tool to update a workspace of JDemetra+ from the console, without opening JDemetra+ Graphical User Interface. The update of a workspace can then be done from another Software (**R** or **SAS** for example).

To use the cruncher, you have to:

- **Download** and **unzip** the file from the **latest stable** version v2.2.4 here https://github.com/jdemetra/jwsacruncher/releases

If you want to install and use a portable Java version (See section Java installation), you have to modify some parameters to use the cruncher:

- In the unzipped folder, **open** (for example with Notepad++) the file `jwsacruncher.bat` present in the subfolder \bin\ (that is under jdemetra-cli-2.2.4\bin\ in the version 2.2.3 of the cruncher)
- **Modify** the value of the variable `JAVACMD` at the line **71** (currently `JAVACMD=java`) by the address towards the file `java.exe` of the portable version. Then, if JPortable is installed under C:\Users\Software, the new line is `if "%JAVACMD%"=="" set JAVACMD="C:\\Users\\Software\\Java64\\bin\\java"` (for Java 8).

2 Installation of Java

ℹ On Insee computers, Java is already installed in version 8. Then, there is no need to install a portable version to use JDemetra+ in version 2.2.4.

2.1 Java 8

To install Java 8, use the link https://portableapps.com/apps/utilities/java_portable. If you use the version 64-bit of JDemetra+, you should install the version jPortable 64-bit (at the bottom of the page).

2.2 Java 17

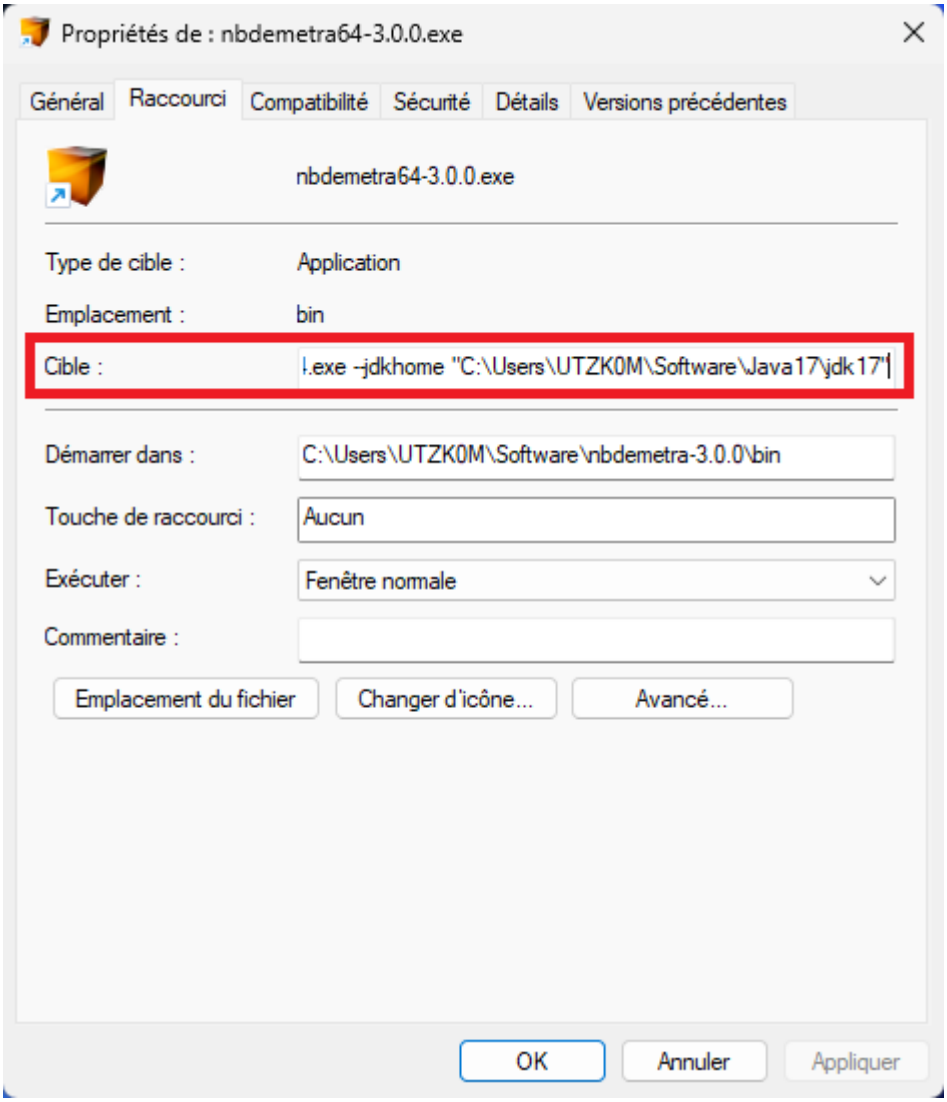
To install Java 17, you need to head over to https://www.oracle.com/java/technologies/javase/jdk17-archive-downloads.html.

- **Download** the version `Compressed Archive` of Windows (https://download.oracle.com/java/17/archive/jdk-17.0.4.1_windows-x64_bin.zip)
- **Unzip** the folder jdk-17.0.6 under C:\Users\Software (for example)

After a Java installation (in version 8, 17 or other), you need to:

- **Modify** the environment variable `PATH` of Rstudio and of Windows (See section Environment variables)
- **Modify** the targets of JDemetra+ to set the localisation of the new Java versions.

For example, if you installed Java version 17 in order to use the JDemetra+ version 3.0.0. You should add the localisation of Java 17 to the shortcut of the executable using the option `--jdkhome`. The target of the shortcut becomes `C:\Users\Software\nbdemetra-3.0.0\bin\nbdemetra64.exe --jdkhome "C:\Users\Software\Java17\jdk17"`



3 Installation of R and Rstudio

The JDemetra+ features are available on **R** via **R** packages. To use **R**, it is better to use an IDE like Rstudio. All the executable files to download are under https://posit.co/download/rstudio-desktop/#download.

3.1 Installation of R

To install **R**, you should:

- **Download** the binary file `R-4.2.2-win.exe` under https://cran.rstudio.com/bin/windows/base/
- **Execute** the executable to parameter and install **R**.

3.2 Installation of Rstudio

Download the last Rstudio version (under https://posit.co/download/rstudio-desktop/#download) and the **installer**.

If the installation via the file `.exe` fails (because it requires higher rights (administrator, elevation, ...), we will get a portable version of the Software. To do this:

- **Download** and **unzip** the compressed folder `.zip` in a folder named "Rstudio" (under C:\Users\Software)
- **Create a shortcut** of the file `rstudio.exe` on the Desktop.

3.3 Installation of R packages

To install a **R** package, there are several methods:

- Either it is on CRAN and you can install it directly with the function `install.packages()`
- Or it is on Github and you can install it directly with the function `install_github()` from the package **remotes**
- Or you have to retrieve the package from a folder (binary format) (`.zip`) and then install it with the function `install.packages()` with the arguments `repos = NULL, type = "binary"`.

3.3.1 In version 2

The packages in version 2 are:

Name	Available on CRAN	Github link
RJDemetra	✅	https://github.com/jdemetra/rjdemetra
rjdworkspace	❌	https://github.com/InseeFrLab/rjdworkspace
JDCruncheR	❌	https://github.com/InseeFr/JDCruncheR
rjwsacruncher	✅	https://github.com/AQLT/rjwsacruncher
rjdmarkdown	✅	https://github.com/AQLT/rjdmarkdown

The packages installation code is below:

```
# If remotes is not installed
# install.packages("remotes")

install.packages("RJDemetra")
remotes::install_github("InseeFrLab/rjdworkspace")
remotes::install_github("InseeFr/JDCruncheR")
install.packages("rjwsacruncher")
install.packages("rjdmarkdown")
```

3.3.2 In version 3

Currently version 3 packages are NOT on CRAN. To install them, you need to go through Github:

```
# If remotes is not installed
# install.packages("remotes")
remotes::install_github("rjdemetra/rjd3toolkit")

remotes::install_github("rjdemetra/rjd3tramoseats")
remotes::install_github("rjdemetra/rjd3x13")
```

```
remotes::install_github("rjdemetra/rjdemetra3")
remotes::install_github("rjdemetra/rjd3revisions")

remotes::install_github("rjdemetra/rjd3sts")
remotes::install_github("rjdemetra/rjd3highfreq")
remotes::install_github("rjdemetra/rjd3stl")
remotes::install_github("rjdemetra/rjd3bench")
# options : INSTALL_opts = "--no-multiarch"

remotes::install_github("AQLT/ggdemetra3")
```

3.3.3 AUS (Insee server) case

To install a package on AUS, you can't use the function `install_github()`. Therefore, if the package is not on CRAN, it must be downloaded at the binary format (`.zip`). For this you have to look for the compressed folder `.zip` under GitHub.

For the package **JDCruncheR**, you need to search under https://github.com/InseeFr/JDCruncheR (*release* Section) then launch the installation code:

```
install.packages("path/.../JDCruncheR_0.2.4.tar.gz",
                 repos = NULL, type = "binary")
```

4 Environment variables

4.1 In Rstudio

4.1.1 Proxy

ℹ On Insee computers, you need to **configure** the proxy and parameters of Software localisation under Rstudio. You should:

- **Launch** the code `file.edit("~/.Renviron")`
- **Add** the parameters (news lines):

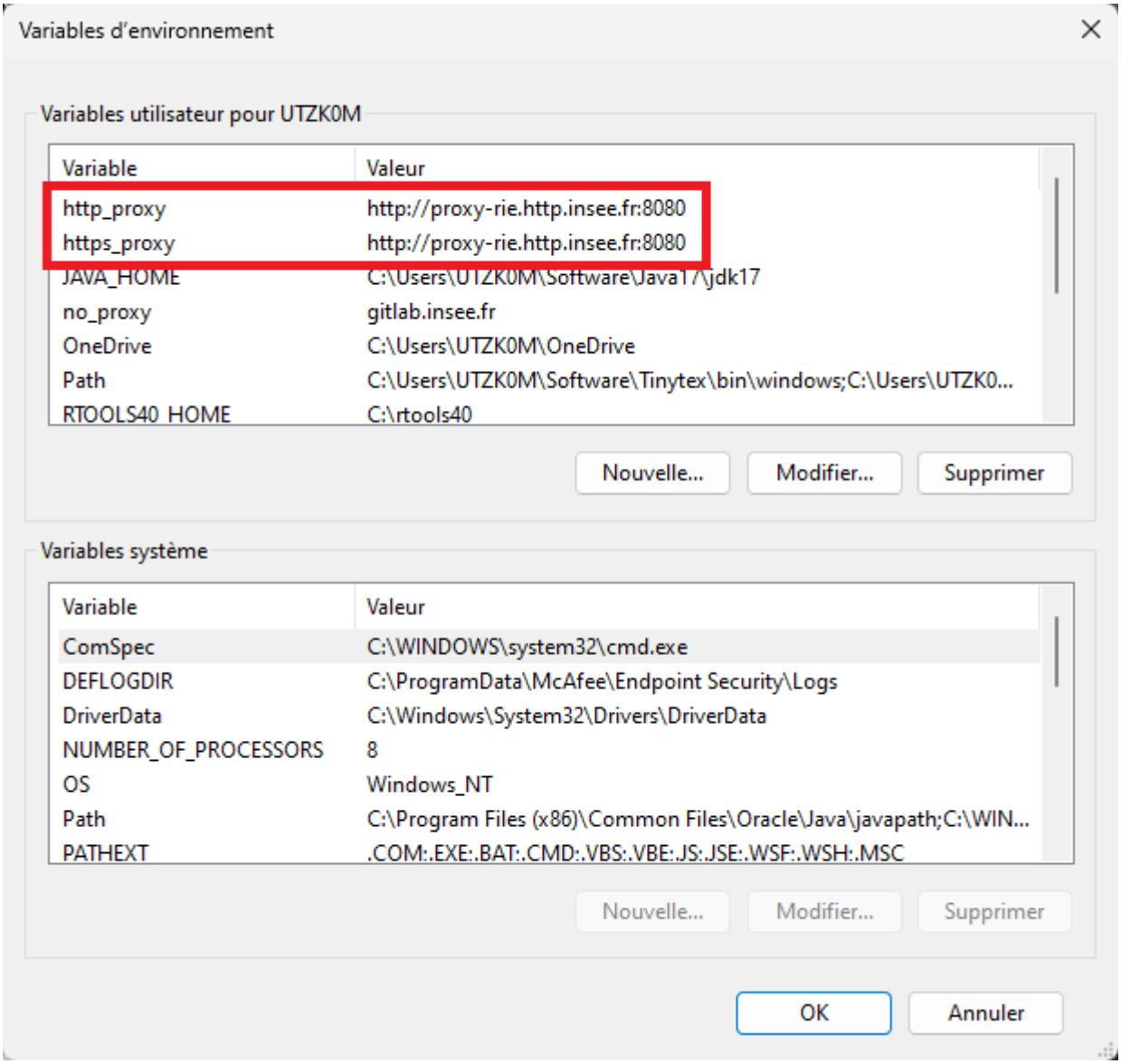
```
http_proxy = http://proxy-rie.http.insee.fr:8080/
https_proxy = http://proxy-rie.http.insee.fr:8080/
```

- **Save** and **close** the file

Also, you can set the environment variables `http_proxy` and `https_proxy` for Windows.

To do this, follow these steps:

- Search for "Environment variables"
- Click on the application that appears.
- Add the variables `http_proxy` and `https_proxy` if they don't exist, and modify them if they already do:



4.1.2 JAVA_HOME

If a new Java version has been installed, you should inform Rstudio of the Java installation localisation. For this, as to parameter the proxy:

- **Launch** the code `file.edit("~/.Renviron")` to edit the environment variables
- **Add** the parameters:

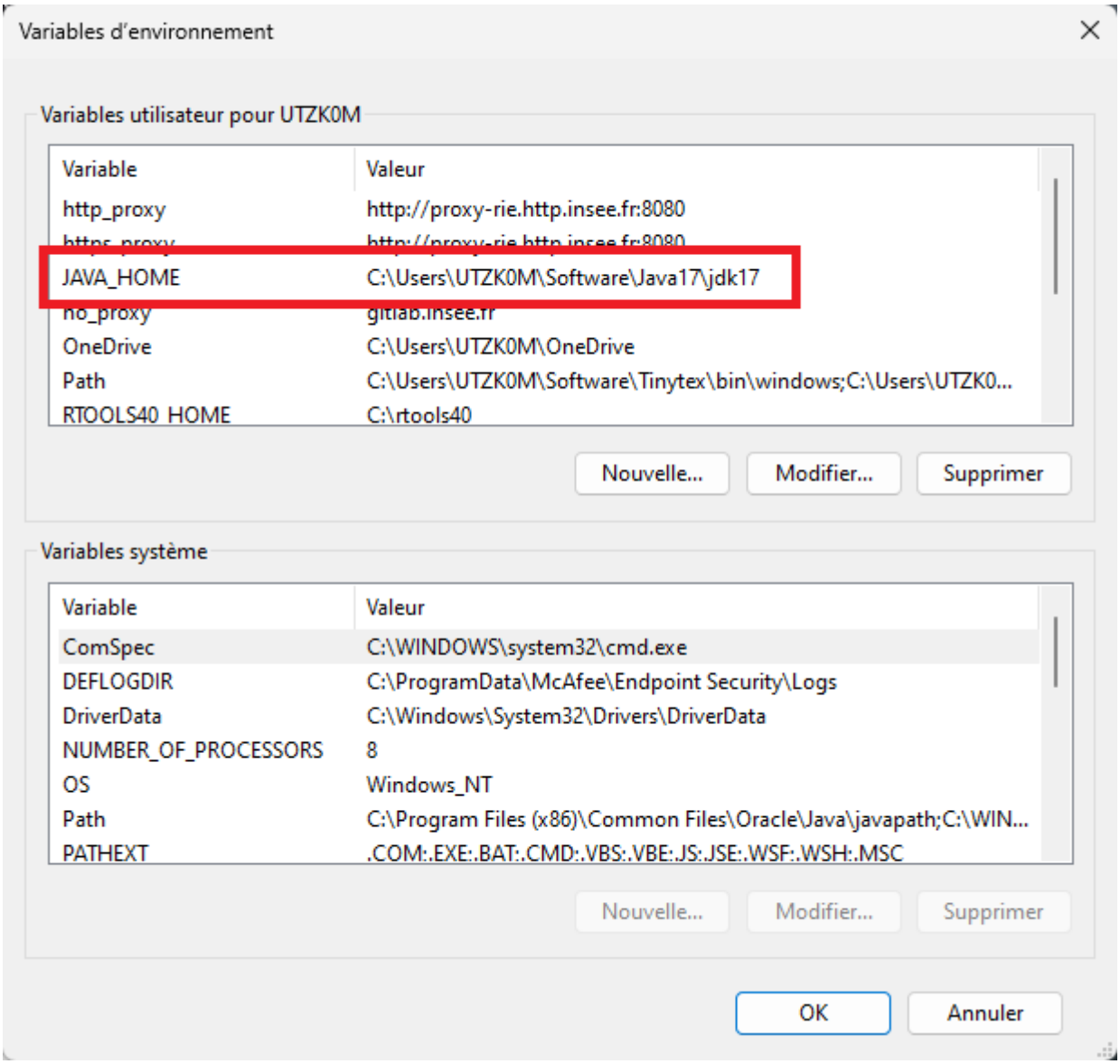
```
JAVA_HOME = "C:/Users/Software/Java17/jdk17"
```

- **Save** and **close** the file

Also, you can set the environment variable `JAVA_HOME` for Windows.

To do this (as for the proxy set up), follow these steps:

- Search for “Environment variables”
- Click on the application that appears.
- Add the variable `JAVA_HOME` if it doesn't exist, and modify is if it already does:



4.1.3 PATH

The environment variable `PATH` in **R** is used to indicate to **R** where to find the executable files.

When you install a new software (for example JDemetra+, Rtools, Java…) that Rstudio uses, you have to modify this environment variable:

- **Get** the actual value of the variable `PATH` via the **R** command `Sys.getenv("PATH")` (Rstudio returns a succession of adresses as `C:/WINDOWS/system32;C:/WINDOWS`)
- **Copy paste** this value after `PATH =` and add the paths towards the folder \bin\ (binary) of the software newly installed, by separating them with semicolon (without space before or after).

For the Rtools installation, the path is C:\rtools42\mingw64\bin (depending on where Rtools was installed). You have to add `C:\\rtools42\\mingw64\\bin` or `C:/rtools42/mingw64/bin` (In **R**, \ is a special character, so you have to replace the \ by / or by \\). The path become `C:/WINDOWS/system32;C:/WINDOWS;C:/rtools42/mingw64/bin`.

- **Modify** the variable with the function `Sys.setenv()`. For Rtools, the command to launch is:

```
Sys.setenv(PATH = "C:/WINDOWS/system32;C:/WINDOWS;C:/rtools42/mingw64/bin")
```

ℹ NB: Generally a 32 bits version and a 64 bits version are available for downloading and installing a software. You need to check your processor type of your operating system to choose the right folder to download.

For this, you can launch the command:

```
Sys.getenv("R_ARCH")
Sys.info()[["machine"]]
```

According to the result, the version is 32 bits or 64 bits :

Version	Output
64 bits	/x64 x86-64
32 bits	/i386 x86_32

More information on the variable `PATH` via the page https://java.com/fr/download/help/path.xml.

5 Verifications

To ensure that everything works fine, you can launch some example of **R** code and check that there is no error:

```
library("RJDemetra")

myseries <- ipi_c_eu[, "FR"]
x13_model <- x13(myseries) # X-13ARIMA method
ts_model <- tramoseats(myseries) # TRAMO-SEATS method

# Basic plot with the original series, the trend and the SA series
plot(x13_model, type_chart = "sa-trend")
```

To check the Java version we are using on **R**, you can try to install and use the package **rJava** and launch the command below:

```
# If rJava is not installed
install.packages("rJava")
```

If the installation of **rJava** returns an error, it means that Java was incorrectly installed or incorrectly configured on **R**. You need to get back to the section Environment variables.

This block of code tests the Java version with which **R** works:

```
library("rJava")
.jinit()
.jcall("java/lang/System", "S", "getProperty", "java.runtime.version")
```

Finally, you can consult the Java version installed with which Windows works (it doesn't matter to us):

```
system("java -version")
```

6 Optionnal installations

Some supplementary installations are optionnal (that is they are no mandatory but bring external features):

- Miktek to produce PDF document with Latex
- Rtools to develop **R** packages and compile the code

7 Problems you may encounter

7.1 Problems installing R packages

If you get the following error while installing **R** packages:

```
install.packages("RJDemetra")
```

```
## Error in eval(expr, envir, enclos): Erreur: the chargement a échoué
## Exécution arrêtée
## *** arch - x64
```

The problem doesn't come from Java but from the **R** package. By default, the package is installed from a "source" file, it means that the package is recompiled. For some computing reasons, when compiling by default, **R** uses the system (Windows) parameters (which doesn't have necessarily have the correct Java version).

There are two solutions:

- Compile the package by installing from the binary file:

  ```
  install.packages("RJDemetra", type = "binary")
  ```

- Specify that we want to use the local parameters:

  ```
  install.packages("RJDemetra", type = "source", INSTALL_opts = "--no-multiarch")
  ```

ℹ️ More information: https://github.com/jdemetra/rjdemetra/wiki/Installation-manual

7.2 The command `library("RJDemetra")` returns an error message

The package **RJDemetra** requires Java version 8 or higher to work. If another package has been loaded before **RJDemetra** via the function `library()` and which doesn't requires an updated Java version, then an old Java version will be used during all the session (**R** is refractory to in-session version change). In case of using **RJDemetra** in a program, you have to specify at the very beginning of the program that **R** must use Java version 8, via the command:

```
# Where Java is installed
Sys.setenv(JAVA_HOME = "C:/Users/Software/Java17/jdk17")
```

or load **RJDemetra** first

```
# At the beginning of program
library("RJDemetra")
```

Else you have to restart a new **R** session.

7.3 `Error array index = -1`

The message of the type `Error array index = -1` tells that an auxiliary variable is not found. It can be calendar regressor or other user defined variables (Easter effect, PSO = pure seasonal outlier…).

7.4 The function `cruncher_and_param(...)` of the JDCruncheR package returns an error

When you use the function `cruncher_and_param(...)` of the **JDCruncheR** package, you can get the following error:

```
## Error in eval(expr, envir, enclos): Error in cruncher(workspace = workspace, cruncher_bin_directory =
##   There is an error in the path to the cruncher bin folder
```

That means that the path to the cruncher is incorrectly configured. To solve this, you need to specify to R the path to the cruncher at the start of the program withe the function `options(...)` :

```
options(cruncher_bin_directory = "C:/Users/Software/jwsacruncher-2.2.4-bin/bin")
```

To check that the path is valid, you could use the function `getOption(...)` :

```
getOption("cruncher_bin_directory")
```