Lab 1
Continuous Wavelet Transform – Visualization

Aim of this Lab:
- Plot of continuous wavelet transforms for different functions and interpretation.
- Introduction to the toolbox WaveLab, and first use of some functions in the directory
« Continuous », in particular the maxima lines (see the course).
- Send me the figures in one single pdf file, at the end of the session (no later than the end of the day !).

 -I- Connection to Matlab
Matlab is available on the machine "pcserveur.ensimag.fr" (and also on other machines)

Open a terminal, and run Matlab. Do not use the drop-down menu !

-II- Continuous Wavelet Transform (my own programs)

Plot and interpretation of continuous wavelet decompositions.
Examples of available programs: signal.m, ondelette.m
(run *signal*, and then *ondelette* on Matlab command window)

NB: To construct a signal called « y » you can use the (WaveLab) command :
 y = MakeSignal(Name,n)

-III - Toolbox Wavelab
          Wavelab is a (free) toolbox developed by the Standford university:
https://statweb.stanford.edu/~wavelab/

The command :

>> help Wavelab850

list the Waveab directories, with the Wavelab functions. For example:

>> help Continuous
list the Matlab functions in this directory "Continuous", related to the continuous wavelet transform.

Or

>> help Orthogonal
list the matlab functions in this directory, related to the orthogonal wavelet transform.

<u>- IV – Continuous Wavelet Transform using the directory "Continuous" of Wavelab</u>

Exercise (**to do and to send me at the end of the Lab**)

1 – List all the Matlab functions available in the directory « Continuous » and explain what are the main ones and what they do.

2- Try to apply the functions for detecting the maxima lines, and for plotting them.
- What are the name of such functions ?
- Write a Matlab program computing the continuous wavelet transform of a given function, compute its maxima lines. (if you use the AWT or RWT function, set the parameter "nvoice" equal to 4).
- Plot on the same figure: the function, its continuous wavelet transform, and its maxima lines.
- Execute the program for different functions of different local regularities.
- Are you able to compute the local Lipchitz-regularity (see the course) ?

At the end of the session, write an email to <u>Valerie.Perrier@grenoble-inp.fr</u> with an attached pdf file with:

- the answer to question 1, and the matlab commands of your program
- the figures you obtain at question 2.

Have a nice Lab !