R Code Overview for Master Thesis

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All **R** codes are made available on the following **GitHub** repository:
https://github.com/Gordon90s/R_codes_master_thesis

The content is:

1. Code **_RUN_FIRST_package_loader_directory_setting.R**
   - Loads and installs all the required **R** packages and implemented functions used throughout this thesis.
2. Code **univariate_functional_depths.R**
   - Implementation of the integrated depth with optional weight function w_3 and with optional extreme value theory modification.
   - Implementation of the extremal depth.
   - Implementation of the functional random projection depth with mean and minimum and optional extreme value theory modification for both.
   - Enables the use of the band depth, the modified band depth, the half-region depth and the modified half-region depth after installing the **R** package "ldfun" by Agostinelli.
3. Code **EVT_functions.R**
   - Implementation of the moment and Hill estimators for the extreme value index γ, including the generation of the necessary Hill-plots.
   - Implementation of the right tail probability estimator.
   - Implementation of several extreme value theory corrected cumulative empirical distribution functions (among other, one and two sided versions).
   - Implementation of the univariate Tukey depth and the univariate simplicial depth.
   - Implementation of the multivariate random Tukey depth and the multivariate random projection depth both with and without extreme value theory modification.
   - Implementation of simulation functions for various heavy tailed bivariate distribution functions.

4. Code **data_simulation.R**

   - Simulation and saving of the four main data sets used in this thesis.

5. Code **MT_MAIN_depth_function_for_analysis.R**

   - Enables to use several depth functions developed in **univariate_functional_depths.R** all at once and in a standardized way. This function is primary used to generate the figures present in this thesis.

6. Folder **Comparaison_data_simulations**

   - For comparisons purposes and because simulation of max-stable processes take a long time, several data sets have been simulated and stored.

7. Code **secondary_functions.R**

   - Various secondary functions to mostly facilitate plotting.

8. Folder **R_Data_choice_of_k_RTD**

   - Contains all **R** codes used to determine the optimal value k_0 of random projections for the random Tukey depth. (Note that simulations take several days on standard computers.)

9. Folder **R_Data_choice_of_k_FRPD**

   - Contains all **R** codes used to determine the optimal value k_0 of functional random projections for the functional random projection depth. (Here too simulations take several days on standard computers.)

10. Folder **MT_plots**

    - Contains most of the **R** codes used to generate the figures present in this thesis. (For the remaining plots, the corresponding **R** codes are integrated in the simulations codes in the other above mentioned folders.)