Steps in life table processing for building time series for all empirical countries

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Steps:

1. Set country (id, name or iso\_code).
2. Read InputFiles sheets for getting analyst decision: “MORT\_PARAMS”, “MORT\_INPUTS”, “mx1\_crises”.
3. Get country data (download from server). Filter for abridged if “Age\_Specific\_Mortality\_Input\_Data”=”Abridged” (not complete), or Complete (Complete or Abridged, prioritizing the first one).
4. Include or exclude Estimates and VR data following InputFiles TRUE/FALSE by time.
5. Add WPP19 data in case left gap (starting from 1950) is greater than 15 years and no data point could be used there.
6. Validation data process: each life table can be labelled as complete or abridged without non possible recovering errors (checking mainly the ages).
7. Special cases:
   1. Remove zero rates or non-decremental survival function for smoothing purposes. If the life tables are:
      1. lt: spline interpolation (“monoH.FC”) imputation for those ages with no deaths.
      2. nMx: add half of the minimum rate experienced in all years for those age with zero.
   2. Split in 0 and 1-4 abridged LT with grouped 0-4 ages or 0:4 ages. re-labeling as no error.
8. Filter error LTs.
9. Select data following these criteria, in this order:
   1. Disable lonely points when these are before/after an extended series.
   2. Index hierarchy: "HMD","EuroStat","VR(WPP)","WHO DB","HLD 2020","DYB","GBD 2016","WPP19”.
   3. Ranking quality data: nrank3 & DataTypeSort (this take in care distinct HLD data for the same TimeMid and the possible inclusion of other sources not in the previous list).
   4. First Complete data. If it was not included, only abridged will be selected.
   5. First rates, then survival function.
   6. First not averaging years in TimeLabel.
   7. Des-overlap with 2% rule on e(0) deviation from linear tendency.
10. Detect and classify gaps. Take in care if each sex has different data ranges selected by the analyst in InputFiles.
11. Depending on input data:
    1. Complete input data
       1. Graduate into complete age with DemoTools package:
          1. Single age with OANew = 100.
          2. Old Age extrapolation arguments from InputFiles if it is activated. If not DemoTools default.
       2. Interpolate/Extrapolate LT. Parameters options for window observed data, jump-off bias and prevent sex divergence comes from InputFiles.
          1. Left gap. If any data point is there: Lim-LC. If no data point is there: LC.
          2. Middle gap: Lim-LC.
          3. Right gap: LC.
    2. Abridged input data
       1. Infant adjustments: “adjust\_LT\_under\_five” replace in LT.
       2. Death coverage adjustments: nMx/VR\_completeness for Age>=5.
       3. Homogenize on abridged groups with DemoTools/ungroup:
          1. Keep abridged now with OANew = 100.
          2. OldAge extrapolation arguments from InputFiles if it is activated. If not DemoTools default.
       4. Smooth or not ("input" stage) over time (n-year moving average window).
       5. Interpolate/Extrapolate LT. Parameters options for window observed data, jump-off bias and prevent sex divergence.
          1. Left gap. If any data point is there: Lim-LC. If no data point is there: LC
          2. Middle gap: Lim-LC
          3. Right gap: LC
       6. Graduate into complete age with DemoTools/ungroup.
12. Smooth pattern by single age for each sex with AP or APC models. If some of them not converge, give a 3-years average on time.
13. Add mortality crises on rates at the top. Recompute LT.
14. Write in InputFile: sheets “life\_table\_age\_sex”, “lt\_abridged”, “dd\_selected\_series” and “update\_status”.
15. Make static plots.
16. Save Rdata as background.
17. End.