readme.pdf

This file (readme.pdf) lists contents of GitHub folder
https://github.com/ltrr-arizona-edu/TRISH-R/releases

The list include main R-script (ReconAnalog) and all user-written R functions used by web-based tool TRISH (Prusevich et al., submitted) to generate reconstruction of a hydrologic time series (predictand) from a network of tree-ring chronologies. Files of sample data included enable you to duplicate the illustration (Katun River runoff reconstruction) in section 4 of that paper outside of TRISH on your own laptop using R and RStudio, as has been done elsewhere for the Truckee River Basin (Meko et al., 2024). The GitHub folder also includes "odt" or "docx" versions of the "pdf" files. These "odt" files can be ignored. They are there just to help Meko in updating files.

1. **ReconAnalog.R** -- Main recoconstruction script, which calls many of the functions listed below as items 2-45 below.
2. **c13toc3.R** -- utility function for conversion of 13-column climate data to 3-column (year-month-value)
3. **CrossValid1.R** -- Leave-m-out cross-validation of a previously estimated stepwise regression model
4. **CrossValid2.R** -- Leave-m-out cross-validation of a regression model
5. **EffectSS.R** -- Effective sample size -- effective number of "independent" observations
6. **emssgUNH.R** -- Write an error message to a specified output directory
7. **ForwStep1.R** -- Forward stepwise regression. entry is done until all variables are in. The final model is selected optionally as the model for step at which adjusted R-square is maximum or the cross-validation RE is a maximum
8. **ForwStep2.R** -- The forward stepwise entry is done until all variables are in. The final model is selected as the model for step at which adjusted R-square is maximum
9. **ForwStep3.R** -- Forward stepwise regression with validation/calibration stopping rules. Initial forward stepwise entry is done until all variables are in. The final model is selected optionally as the model for step at which adjusted R-square is "approximately" maximum, or at a lower step at which cross-validation RE is maximum
10. **ForwStep.R** -- Forward stepwise regression for maximum-adjusted-Rsquared model. The forward stepwise entry is done until all variables are in. The final model is selected as the model for step at which adjusted R-square is maximum (similar approach to ForwStep2).
11. **Fpvalue.R** -- p-value of overall-F of regression
12. **KnnAnalog.R** -- Analog reconstruction from Euclidean distance of PCs from key year
13. **LagkAcc.R** -- Lag-k autocorrelation coefficient(s) of a time series matrix or vector
14. **LagModel2Char.R** -- Utility to build string represntation of a lagged stepwise regression model
15. **LagModel2Sign.R** -- Build string representation of signs of regression coefficient in lagged stepwise regression model
16. **LagReOrder.R** -- Reorder columnms of lagged tree-ring index
17. **LagYear.R** -- Create a lagged verson of a time series matrix
18. **LeaveOut.R** -- Build pointer matrix for use in leave-m-out cross-validation
19. **mannken1.R** -- Mann-Kendall trend test for a time series
20. **NashSutt.R** -- Nash-Suttcliffe efficiency
21. **PeriodCommon.R** -- Common period of a time series with time series matrix

22. **PrewhitenChrons.R** -- Convert time series matrix of chronologies to prewhitened matrix using autoregressive model of order p
23. **RecMLR1.R** -- Multi-site reconstruction (MSR) by multiple linear regression on SSRs or their PCs
24. **reconsw4.R** -- single-site reconstruction (SSR) by stepwise forward distributed-lag regression
25. **RecPCR1.R** -- Multi-site reconstruction (MSR) by regression on PCs of single-site reconstructions (SSRs)
26. **RecSLR1.R** -- Multi-site reconstruction (MSR) by simple linear regression on mean of single-site reconstructions
27. **SeasClim.R** -- Seasonalize monthly climate data in a 3-column (year-month-value) input format
28. **SignalDrop1.R** -- Drop in maximum climate signal in recent years as chronologies drop out
29. **ssValid.R** -- Split-sample calibration-validation of regression model
30. **stem1.R** -- Stem plot for ACF, ala Matlab (obsolete)
31. **stemACF.R** -- Stem plot for ACF, ala Matlab
32. **Table1Column.R** -- Utility to write table with just 1 column of data after column of variable names
33. **TablePCA1.R** -- Utility to write PCA summary table, including list of loadings
34. **TableWrite1.R** -- Utility to write table with any number of columns and rows
35. **TabSepTsm1.R** -- Write tab-separated file of reconstruction with confidence interval, plus observed predictand
36. **TabSepTsm2.R** -- Utility to write tab-separated file of a time series matrix, with heading line
37. **TabSepTsm3.R** -- Write general tab-separated file of a time series matrix, with heading line
38. **ties1.R** -- Identify ties in a time series
39. **TranFlow.R** -- Transformation of flows or some other single time series
40. **trimnan.R** -- Untility to get row indices of 1-col matrix after trimming of leading and trailing NA
41. **trimRowNA.R** -- Utility to get row index for trimming trailing and leading all-NA rows from a matrix
42. **TrimTsm1.R** -- Trim a time series matrix with constraints for single-site reconstruction (SSR)
43. **Tsm2Scores1.R** -- Time series matrix to PC scores
44. **tsmExtend.R** -- Extend time series matrix on recent end by quantile method
45. **xyCI.R** -- Utility to convert upper and lower confidence interval into x,y for a confidence interval polygon
46. **AbbreviationsTRISH.pdf** -- List of abbreviations frequently used in TRISH and ReconAnalog
47. **siteData_Katun.txt** -- Tab-separated time series matrix of tree-ring chronologies needed by ReconAnalog to duplicate offline the TRISH sample reconstruction in section 4 of Prusevich et al. (submitted)
48. **siteMeta_Katun.txt** -- Tab-separated metadata tree-ring chronologies needed by ReconAnalog to duplicate offline the TRISH sample reconstruction in section 4 of Prusevich et al. (submitted)
49. **hydroData_Katun.txt** -- Tab-separated time series matrix (2 column) of hydrologic predictand needed by ReconAnalog to duplicate offline the TRISH sample reconstruction in section 4 of Prusevich et al. (submitted)

50. **Recon.init** -- Java Script Object Notation (json) file of input specifications for running ReconAnalog to duplicate offline the sample reconstruction in section 4 of Prusevich et al. (submitted)
51. **Recon_Katun.init** -- identical to Recon.init. This is the archived permanent storage version of Recon.init. ReconAnalog specifically reads "Recon.init." You may have different dedicated json files for various analyses, such as Recon_Katun.init, Recon_Yenisei.init,.... Before running ReconAnalog for a different analysis copy the desired dedicated json file as Recon.init, writing over the existing Recon.init.
52. **PackagesNeeded.txt** -- List of R packages and versions that must be installed on user's laptop for ReconAnalog to work.
53. **TrishOutputDescribeAnalog.pdf** -- Detailed description of simple analog method, one of the options for reconstruction in ReconAnalog
54. **TrishOutputDescribeMLR1-noPCA.pdf** -- Detailed description of reconstruction by multiple linear regression of predictand on the time series of screen single-site reconstructions (SSRs), one of the options for reconstruction in ReconAnalog. The "noPCA" indicates that that this method does not involve principal component analysis (PCA)
55. **TrishOutputDescribeMLR1-PCA.pdf** -- Detailed description of reconstruction by multiple linear regression of predictand on principal components of screen single-site reconstructions (SSRs), one of the options for reconstruction in ReconAnalog.
56. **TrishOutputDescribeSLR1.pdf** -- Detailed description of simple linear regression (SLR) method, one of the options for reconstruction in ReconAnalog
57. **Running_Instructions_ReconAnalog.pdf** -- brief instructions for R user to duplicate the TRISH sample reconstruction described in section 4 of Prusevich et al. (submitted) standalone in RStudio on user's laptop.
58. **Recon_init_explanation.pdf** -- line-by-line explanation of the json input settings in files Recon.int and its identical twin Recon_Katun.init.
59. **readme.txt** -- this readme file
60. **ListFilesTRISH01.txt** -- List of files, including their folders on Meko's laptop, used to populate the GitHub repository that you obtainted these file from. You can ignore this file.

References

Prusevich, A. A., Meko, D. M., Panyushkina, I. P., Shiklomanov, A. I., Lammers, R. B., Glidden, S., & Thaxton, R. D. (submitted). TRISH: Tree-Ring Integrated System for Hydrology, a web-based tool for reconstruction. Environ. Model. Softw.. (Submitted 29 October 2024)

Meko, D. M., Biondi, F., Taylor, A. H., Panyushkina, I. P., Thaxton, R. D., Prusevich, A. A., . . . Glidden, S. (2024). Runoff variability in the Truckee-Carson River Basin from tree rings and a water balance model. Earth Interact.. (Early online version, 5 June 2024) doi: 10.1175/EI-D-23-0018.1