CAMPLET.M

camplet computes the Camplet seasonal adjustment.

Source: Barend Abeln and Jan P.A.M. Jacobs, "Seasonal adjustment with and without revisions: A comparison of X-13ARIMA-SEATS and camplet," CAMA Working Paper 25/2015, Australian National University, July 2015.

Note: The initialization algorithm is different from the one proposed by the authors. As a result, the adjustment of the first few years of data is different then when using the authors' original algorithm. Moreover, on very volatile time series, these differences remain throughout the sample because the automatic parameter adjustments are not identical. In practice, the differences should be rather small.

Usage:

```
  s = camplet(data,period);
  s = camplet([dates,data],period);
  s = camplet(... ,'log');
  s = camplet(... ,'verbose');
  s = camplet(... , name,value, [name,value], ...);
```

data must be a vector. camplet is NaN tolerant, meaning data can contain NaNs.

period is a positive number which indicates the length of the seasonal cycle (i.e. period = 12 for monthly data, period = 7 for daily data having a weekly cycle, or period = 5 if the data is weekdaily).

Some arguments are added as single keywords:

'add' or 'none'	Implies that the analysis is performed on the data as presented.
'mult' or 'log'	The log of the data is first taken. After the application of the algorithm, the exponential of the result is returned. This amounts to a multiplicative seasonal adjustment.
'verbose'	During execution the program outputs detailed information to the console whenever something unusual happens (detection of an outlier or pattern shift, for instance).

Other optional arguments are entered as name-value pairs. Possible names and their meaning are:

'INITYEARS'	The number of years used to initialize the alorithm. Default is 3. (initT = INITYEARS * period is the number of observattions used for the initialization.)
'INITMETHOD'	The argument following this must be one of the following:
...,'mean'	Takes the average daviation of the data from its mean over the interval 1:initT. The initial estimate of the seasonal factors is then the average of these deviations for each month/quarter.
...,'ma'	Computes the deviation of the data (1:initT) from a centered

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                moving average over period observations, instead.
     ...,'ls'   ls stands for least squares. This option estimates a linear
                regression of the data (1:initT) on a constant and a linear
                trend. The average residuals per month/quarter are the starting
                values for the seasonal factor. The slope of this regression is
                the initial estimat of g. This method is the default.
'CA'            Initial CA parameter (Common Adjustment).
'M'             Initial M parameter (Multiplier).
'P'             Reset value for CA when pattern shift is detected.
'LE'            Initial LE parameter (Limit to Error).
'T'             Initial T parameter (Number of repetition before pattern shift
                is detected).
'LEshare'       Limit of outliers that invokes the 'volatile series' adjustment.
'CAadd'         Increment to CA parameter for volatile series.
'LEadd'         Increment to LE parameter for volatile series.
'LEmax'         Maximum limit to error.
'TIadd'         Increment of T parameter for volatile series when LE exceed
                LEmax.
'MUsub'         Reduction of MU parameter for volatile series when LE exceed
                LEmax.
'SIM'           Strictly between 0 and 1. The parameter determines the required
                similarity between consecutive errors to trigger a pattern
                shift.

s is a struct with the following fields:
  .dat          The original data.
  .dates        The original dates. If none were provided, this is just a vecor
                counting from 1 to the number of data points.
  .period       Period that has been filtered.
  .transform    Either 'none' or 'log'.
  .keyv         A struct containing the sames of some key variables.
  .opt          Structure containing the selected parameters.
  .sa           Seasonally adjusted series.
  .sf           Seasonal factors.
  .fcst         Running forecast.
  .fer          Running forecast error.
  .g            Running estimate of trend.
  .nol          Number of consecutive outliers in a particular month/quarter.
  .pshift       Boolean indicating detection of a pattern shift.
  .currca       Changing value of CA.
  .ca           Changing value of CA.
  .m            Changing value of M.
  .le           Changing value of LE.
  .t            Changing value of T.

s.opt is a struct with the the parameters chosen by the user (or the default
parameters if nothing was selected): .INITMETHOD .INITYERAS .CA .M .P .LE .T
.LEshare .CAadd .LEadd .LEmax .TIadd .MUsub .SIM

Examples:
We assume that data is a column vector of data (the original time series)
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```
  with a quarterly frequency, and dates is an equally long vector containing
  Matlab date codes.
    c = camplet(data,4);
    figure('Position',[440 160 560 700]);
    ah = subplot(2,1,1); plot(ah,[data,c.sa]); grid on;
    ah = subplot(2,1,2); plot(ah,c.sf,'k');    grid on;
  If data is monthly, replace the 4 above by 12. Any other frequency is fine,
  too, actually (for instance, with weekdaily data, searching for a weekday
  pattern, use 5).
  You can choose to perform a multiplicative filtering instead, and add detailed
  feedback to the console on what is happening:
    c = camplet([dates,data],4,'verb','mult');
    figure('Position',[440 160 560 700]);
    ah = subplot(2,1,1); plot(ah,dates,[data,c.sa]); dateaxis('x'); grid on;
    ah = subplot(2,1,2); plot(ah,dates,c.sf,'k');    dateaxis('x'); grid on;
  You can tweak the parameters. Here, we change the initial period and the
  method of the initialization phase:
    c  = camplet([dates,data],4);
    c2 = camplet([dates,data],4,'INITMETHOD','ma','INITYEARS',5);
    plot(dates,[c.sf,c2.sf]); dateaxis('x'); grid on;

  NOTE: This program is part of the X-13 toolbox, but it is completely
  independent of the Census X-13 program. It uses a simpler strategy to filter
  seasonal cycles than X-13ARIMA-SEATS. The main advantage of camplet is that
  this argorithm does not produce revisions of older seasonal adjustements when
  new data comes in. Also, camplet accomodates arbitrary frequencies, not only
  monthly and quarterly. Moreover, the residual seasonality is often much
  smaller than when using fixedseas.m, but unlike with this algorithm, the
  seasonal factors are not constant, but adapt over time. This program is just
  a small addition to the toolbox that makes it more complete.

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Version : 1.50

If you use this software for your publications, please reference it as:
Yvan Lengwiler, 'X-13 Toolbox for Matlab, Version 1.50', Mathworks File
Exchange, 2014-2021.
url: https://ch.mathworks.com/matlabcentral/fileexchange/49120-x-13-toolbox-for-
seasonal-filtering
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