SEAS.M

seas is a simple program that demonstrates the use of the programs in the seas directory of the X-13 toolbox.

*** COMPONENTS OF THE seas SUBFOLDER **********************************

This folder contains a selection of programs that can be used to easily create a seasonal adjustment, based on filters, yourself.

These programs are:

trendfilter.m	Computes a trend (i.e. smoothed) version of the data. You can choose from many different methods to do that.
seasfilter.m	Splits data using splitperiods, smoothes them with trendfilter, and joins them together again with joinperiods.
normalize_seas.m	Computes the difference or the ratio of two series, depending on whether the decomposition is additive or multiplicative.
splitperiods.m	Splits the data into their periods. For instance, with monthly data, split periods makes twelve times series out of your data, one for each month of the year.
joinperiods.m	Reverse of splitperiods.
fillholes.m	Linear interpolation of missing values.
wmean.m	Computes the weighted mean. Similar to Matlab's conv command, but with smarter treatment of the edge of the data.
kernelweights.m	Computes the weights for a wide range of kernels. Used by trendfilter.m and seasfilter.m in conjunction with wmean.m
fixedseas.m	A rather elaborate program that produces a rather simple version of seasonal adjustment in which the seasonal factors are kept fixed over the years.
x11.m	An implementation of a much simplified version of the original X-11 method of the U.S. Census Bureau.
camplet.m	A form of seasonal adjustment that was recently developed and that does not produce revisions when data are added to the time series. It does that because the smoothing is completely backward looking (so no centered filters at all). camplet is separately implemented and does not use the other tools provided here.
seas.m	This file. You can experiment with the implementation in this file, and develop your own seasonal adjustment routine starting from seas.m.

*** AN EXAMPLE: SEAS.M **

Usage of seas.m
```
  s = seas(data,p)
  s = seas([dates,data],p)
  s = seas(...,[mode],[title])
```

data is either a column vector or an array with two columns. In that
case, the left column is a date vactor and the right column is the data
vector.

p is the period of the data that is to be filtered out. So, typically,
with monthly data, for instance, p should be set to 12.

mode is either 'add', 'logadd', or 'mult'. 'add' implies that the
seasonal factor will be zero on average and is subtracted from the
unadjusted data to get to the seasonally adjusted data. If type is
'logadd', an additive decomposition is performed on the logarithm of the
data, which are then converted back to their non-log versions afterwards.
With 'mult', the seasonal factor is one on average, and the data is
divided by the seasonal factor to get the seasonally adjusted data.
Quantitatively, 'mult' should be quite simkilar to 'logadd'.

title is a string containing the name of the series (if one is provided).

s contains the output neatly organized in a struct. To make an x13series
out of this, say the following,
```
  x = structtox13(s);
```
Alternatively, you can use the custom implementation with x13 as follows,
```
  x = x13(dates,data,spec,'prog','seas.m')
```
If you use it like this, the settings passed on are set in the spec in
the 'custom' section, for instance,
```
  spec = makespec('custom','save','(sa sf)','custom','mode','add')
```
This version has the advantage that you can also specify trading day and
Easter corrections, which are extracted via a regression of the irregular
component of a first pass of seas.m, correctingh the data from that, and
then running seas.m a second time.

*** MAKING YOUR OWN **

You can easily make your own implementation. It may be easiest to start
from seas.m and modify a copy of this file. Any custom m-file that
performs a seasonal adjustment has to return a struct, containing, at the
minimum, the following fields:
```
  'dates'      The column vector of dates.
  'dat'        The column vector of unadjusted data.
```
In addition, your output struct should contain the result of your
seasonal decomposition. Note that these fields must have names with at
most three letters (e.g., 'sa', 'rsd', etc). Fields with names longer
than three letters (except the ones listed below) will not be imported
into the x13series object.

```
Optional fields are:
    'keyv'      The content of this field is itself a struct with the
                following components: 'dat','tr','sa','sf','ir','si','rsd'.
                These fields contain the sames of key variables. This
                setting is stored not in the x13spec, but directly in the
                x13series object. If your output s does not contain a keyv
                field, the default is used,
                keyv = struct('dat','dat','tr','tr', 'sa','sa', ...
                                'sf','sf','ir','ir','si','si','rsd','rsd')
    'mode'      The mode of the adjustment (typically 'add', 'logadd',
                'mult', but others are possible, depending on what you
                implement). The setting is stored in custom-mode in the
                x13spec.
    'transform' A transformation of the data before processing (typically
                'none' or 'log', but again, more is possible. The setting
                is stored in transfer-function in the x13spec.
    'title'     The title of the variable (if one is provided).
    'name'      The name of the series. There is a subtle difference
                between title and name. title can be any string, name
                should be a valid filename (this has to do with x13as.exe,
                which is irrelevant in this context, but it is good
                practice to observe this restriction anyway).
    'options'   Some content, to be defined by you, that describes any
                information or settings you wish to use in your seasonal
                adjustment. The setting is stored in custom-options in the
                x13spec.
    'tbl'       This is itself a struct. The content of this struct will be
                imported as tables into the x13series object.

    **************************************************************************

    NOTE: This file is part of the X-13 toolbox, but it is completely
    independent of the Census X-13 program. It is part of the 'seas' addition
    to the toolbox which allows you to implement seasonal filters without
    using the Census Bureau programs.

    The toolbox consists of the following programs, guix, x13, makespec, x13spec,
    x13series, x13composite, x13series.plot,x13composite.plot, x13series.seasbreaks,
    x13composite.seasbreaks, fixedseas, camplet, spr, InstallMissingCensusProgram
    makedates, yqmd, TakeDayOff, EasterDate.
```

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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