LAG PLOT

PURPOSE

Generates a lag plot.

DESCRIPTION

For a single time series, a lag plot is a graphical data analysis technique for determining if an autocorrelation structure exists within the time series. For two time series, a lag plot is a graphical technique for determining if cross-correlation structure exists between the two time series. Ideally (for a white noise time series or for 2 uncorrelated time series), the lag plot should have the appearance of a random shotgun pattern. Any kind of a structured pattern in a lag plot indicates an underlying auto/cross-correlation model, the nature of which may be inferred from the type of lag plot structure.

In time series analysis, a lag is a fixed time displacement. For example, y(2) and y(7) would be said to have a lag of 5 (= 7-2). For a lag plot, the lag is fixed at some value specified by the analyst. The default value is a lag of 1.

For a lag plot on a single time series, the lag plot consists of:

Vertical axis = x(i)
Horizontal axis = x(i+lag)

For a lag plot for 2 time series, the lag plot consists of:

Vertical axis = y(i)
Horizontal axis = x(i+lag)

SYNTAX 1

LAG <n> PLOT <x> <SUBSET/EXCEPT/FOR qualification>
where <n> is an integer number or parameter between 1 and n-1 (n is the number of observations) that specifies the lag;
<x> is the variable of raw data values which is being analyzed for autocorrelation structure;
and where the <SUBSET/EXCEPT/FOR qualification> is optional.

This syntax is used for a single time series.

SYNTAX 2

LAG <n> PLOT <y1> <y2> <SUBSET/EXCEPT/FOR qualification>
where <n> is an integer number or parameter between 1 and n-1 (n is the number of observations) that specifies the lag;
<y1> is the first variable of raw data values which is being analyzed for cross-correlation structure;
<y2> is the second variable of raw data values which is being analyzed for cross-correlation structure;
and where the <SUBSET/EXCEPT/FOR qualification> is optional.

This syntax is used for two time series.

EXAMPLES

LAG 3 PLOT X
LAG PLOT X
LAG -12 PLOT Y X
LAG PLOT Y X

DEFAULT

If <n> is omitted, the default lag is 1.

SYNONYMS

None

RELATED COMMANDS

CHARACTERS = Sets the types for plot characters.
LINES = Sets the types for plot lines.
PLOT = Generates a data or function plot.
4- PLOT = Generates a 4-plot for univariate analysis.
CORRELATION PLOT = Generates an auto or cross-correlation plot.
SPECTRUM = Generates a spectral plot.
SUMMARY = Generates a table of summary statistics.
LET = Computes various statistics (and many other capabilities).
FIT = Carries out a least squares fit.

APPLICATIONS
Time Series Analysis, Regression

IMPLEMENTATION DATE
Pre-1987

PROGRAM 1
.T HIS SAMPLE PROGRAM READS THE FILE LEW.DAT IN THE DATAPLOT
. REFERENCE DIRECTORY. THE DATA IS BEAM DELECTION DATA.
SKIP 25
READ LEW.DAT Y
.
LEGEND 1 AUTOCORRELATION ANALYSIS
LEGEND 2 LAG PLOT
TITLE AUTOMATIC
Y1LABEL X(LC(i))
CHAR X
LINES
YMAX 500
XMAX 500
MULTIPL OT 2 2; MULTIPL OT CORNER COORDINATES 0 0 100 100
LOOP FOR K = 1 1 4
  X1LABEL X(LC(i)+^K)
  LAG ^K PLOT Y
END OF LOOP
END OF MULTIPL OT

```plaintext

LAG 1 PLOT Y

LAG 2 PLOT Y

LAG 3 PLOT Y

LAG 4 PLOT Y

```

-1000 -500 0 500
-1000
-500
0
500

-1000 -500 0 500
-1000
-500
0
500

-1000 -500 0 500
-1000
-500
0
500

-1000 -500 0 500
-1000
-500
0
500

X(i+1)
X(i)
X(i+2)
X(i)
X(i+3)
X(i)
X(i+4)
X(i)
PROGRAM 2

. THIS SAMPLE PROGRAM READS THE FILE HAYES1.DAT IN THE DATAPLOT
. REFERENCE DIRECTORY. THIS IS FIRE RESEARCH SMOKE OBSCURATION DATA.

. SKIP 25
READ HAYES1.DAT JUNK Y1 Y2

. TITLE AUTOMATIC
LEGEND 1 CROSS-CORRELATION ANALYSIS
LEGEND 2 LAG PLOT
Y1LABEL X(LC(i))
TIC OFFSET 0.2 0.2

. CHAR X
LINES
YLIMITS 0 3
XLIMITS 0 3
MULTIPLAN 2 2
MULTIPLOT CORNER COORDINATES 0 0 100 100
LOOP FOR K = 1 1 4
   X1LABEL Y(LC(i+K))
   LAG ^K PLOT Y1 Y2
END OF LOOP
END OF MULTIPLAN

LAG 1 PLOT Y1 Y2
LAG 2 PLOT Y1 Y2
LAG 3 PLOT Y1 Y2
LAG 4 PLOT Y1 Y2