DEX ... PARETO EFFECTS PLOT

PURPOSE

Generates a dex Pareto effects plot for a given statistic.

DESCRIPTION

A dex Pareto effects plot is a graphical method for representing a design of experiment problem. The first variable is a response variable while the remaining variables (must be at least one) represent levels of factors. The user specified statistic is computed for each level of each factor. This plot consists of:

Vertical	axis =	if there are exactly 2 levels, the effect is the value of the statistic for the lower level subtracted from the value of the statistic for the higher level (this can be positive or negative). If there are more than 2 levels, the lowest value of the statistic is subtracted from the highest value of the statistic (this value is always positive). The values are then sorted from highest to lowest.
Horizontal	axis =	the factor id (i.e., 1 for the factor with the highest value, 2 for the factor with the second highest value, and so on).

This plot graphically shows the following:

1. The magnitude of the maximum differences for a given statistic between levels of a factor;

2. How these maximum differences vary between factors.

SYNTAX 1

DEX <stat> PARETO EFFECTS PLOT <y> <x1> ... <xn> <SUBSET/EXCEPT/FOR qualification>

where <y> is the response variable;

<x1> ... <xn> are a sequence of variables representing factors in a designed experiment;

<stat> is one of the following statistics:

MEAN (or AVERAGE), MIDMEAN, MEDIAN, TRIMMED MEAN, WINDSORIZED MEAN,
SUM, PRODUCT, SIZE (or NUMBER or COUNT), MINIMUM, MAXIMUM,
STANDARD DEVIATION (or SD), VARIANCE,
STANDARD DEVIATION OF MEAN (or SDM), VARIANCE OF MEAN (or VM),
RELATIVE STANDARD DEVIATION (or RELSD),
RELATIVE VARIANCE (or RELV or COEFFICIENT OF VARIATION),
RANGE, MIDRANGE, LOWER HINGE, UPPER HINGE, LOWER QUARTILE, UPPER QUARTILE,
<FIRST/SECOND/THIRD/FOURTH/FIFTH/SIXTH/SEVENTH/EIGTH/NINTH> DECILE (or 1DEC, 2DEC,
  3DEC,4DEC,5DEC,6DEC,7DEC, 8DEC, 9DEC),
SKEWNESS, KURTOSIS, PROPORTION,
AUTOCORRELATION, AUTOCOVARIANCE,
SINE FREQUENCY, SINE AMPLITUDE,
CP, CPK, EXPECTED LOSS, PERCENT DEFECTIVE,
SINE FREQUENCY, SINE AMPLITUDE,
TAGUCHI SN, TAGUCHI SN+, TAGUCHI SN-, TAGUCHI SN00;

and where the <SUBSET/EXCEPT/FOR qualification> is optional.

This syntax is used for statistics that only require a single variable to compute.

SYNTAX 2

DEX <stat> PARETO EFFECTS PLOT <y> <x> <x1> ... < xn> <SUBSET/EXCEPT/FOR qualification>

where <y> is the response variable;

<x> is a second variable used in calculating the statistic (e.g., a linear fit is computed between <y1> and <x>);

<x1> ... <xn> are a sequence of variables representing factors in a designed experiment;

<stat> is one of the following statistics:

LINEAR INTERCEPT, LINEAR SLOPE, LINEAR RESSD, LINEAR CORRELATION,

and where the <SUBSET/EXCEPT/FOR qualification> is optional.

This syntax is used for statistics that require two variables to compute.

EXAMPLES

DEX MEAN PARETO EFFECTS PLOT Y X1 X2
DEX SD PARETO EFFECTS PLOT Y X1 X2 X3

DEX RANGE PARETO EFFECTS PLOT Y X1 X2 X3 X4
DEX RANGE PARETO EFFECTS PLOT Y X1 TO X4

NOTE 1

This plot is similar to the DEX ... EFFECTS PLOT. The distinction is that the Pareto effects plot orders the effects from high to low while the standard effects plot orders them in the order they are given in the plot. The advantage to the standard plot is that you can trace a value to a specific factor while the Pareto plot loses this. However, the ordering of the Pareto plot can make it easier to read by first generating a standard effects plot and then generating the Pareto version. The TIC LABEL CONTENT can be used to label the factors on the Pareto version (the proper order is manually determined from the standard effects plot). This was done for the example program below.

NOTE 2

This plot is normally done for a location parameter (typically the mean or median) or a spread parameter (typically the standard deviation or range). The other statistics are less often used.

NOTE 3

The TO syntax is allowed for the list of factor variables (see the EXAMPLES above).

NOTE 4

The CHARACTER, BAR, SPIKE, and LINE settings can be used to control the appearance of the plot. The trace is typically drawn with a blank line and some type of character set (the choice of character is a matter of user preference) or with no character and a bar. In any event, the user must explicitly set character and line settings (they default to all lines solid and all characters blank).

DEFAULT

None

SYNONYMS

DEX ... EFFECTS PARETO PLOT

RELATED COMMANDS

LINES	=	Sets the type for plot lines.
CHARACTER	=	Sets the type for plot characters
PLOT	=	Generates a data or function plot.
DEX SCATTER PLOT	=	Generates a dex scatter plot.
DEX SIGN PLOT	=	Generates a dex sign plot.
DEX ... PLOT	=	Generates a dex plot for a statistic.
DEX ... PARETO PLOT	=	Generates a Pareto dex plot for a statistic.
DEX ... YOUDEN PLOT	=	Generates a Youden dex plot for a statistic.
DEX ... EFFECTS PLOT	=	Generates an effects dex plot for a statistic.
DEX ... PARE ABSO EFFECTS PLOT	=	Generates a Pareto absolute effects dex plot for a statistic.
DEX WIDTH	=	Specifies the width of levels in a dex plot.

REFERENCE

"Statistics for Experimenters," Box, Hunter, and Hunter, Wiley and Sons, 1978.

APPLICATIONS

Design of Experiments

IMPLEMENTATION DATE

89/12

PROGRAM

        SKIP 25
        READ SHEESLE2.DAT Y PROC PLANT SPEED SHIFT PROC
        .
        BAR ON
        BAR WIDTH 0.5
        LINE BLANK
        TITLE DEX PARETO EFFECTS PLOT
        LET NUMFAC = 4
        XLIMITS 1 NUMFAC
        MAJOR XTIC MARK NUMBER NUMFAC
        MINOR XTIC MARK NUMBER 0
        XTIC OFFSET 1 1
        XTIC LABEL FORMAT ALPHA
        .
        MULTIPLOT 2 2
        MULTIPLOT CORNER COORDINATES 0 0 100 100
        Y1LABEL MEAN
        XTIC LABEL CONTENT SHIFT SPEED PLANT PROCESS
        DEX MEAN PARETO EFFECTS PLOT Y PROC PLANT SPEED SHIFT
        Y1LABEL MEDIAN
        XTIC LABEL CONTENT SHIFT SPEED PLANT PROCESS
        DEX MEDIAN PARETO EFFECTS PLOT Y PROC PLANT SPEED SHIFT
        Y1LABEL STANDARD DEVIATION
        XTIC LABEL CONTENT SHIFT PLANT SPEED PROCESS
        DEX SD PARETO EFFECTS PLOT Y PROC PLANT SPEED SHIFT
        Y1LABEL RANGE
        XTIC LABEL CONTENT SHIFT PLANT SPEED PROCESS
        DEX RANGE PARETO EFFECTS PLOT Y PROC PLANT SPEED SHIFT
        END OF MULTIPLOT