EWMA / Time Series Plot Overlay

Use of the Layout Command

A detailed response to a question posed on the Minitab forum on LinkedIn

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Hello- Is there a way to overlay graphs in Minitab? For example - create a time series plot above the EWMA chart to understand which points contribute to one data point in the EWMA chart? PP

This detailed response uses many of the techniques outlined in the previous “How To” topic – “Layout – 2 plots overlaid”. Refer to it for the basics.

Note: in this example I show the code using my favourite text editor EditPadPro – hence the coloured text on the screen shots.
The End Result

This example uses Viscosity data as the process property being control charted.
EWMA Plot Overlay

• Steps (in this example):
  – Create an EWMA chart. I used 45 as the historical average and 1.0 as the historical standard deviation.
    • Edit the X, Y axis spans to the range of the raw data + a little
    • Move the Y axis label upwards and change its colour to Blue
    • Change the title; Add a subtitle & change font size, colour
    • Add Y Gridlines
    • Slightly adjust the location or size of the data region (so it will be included in the session commands when you “capture” the code).
    • “Capture” the commands
    • Paste the commands into a text editor (Notepad or in my case EditPadPro).
Graph & Captured Code

EWMA Viscosity 1;
  Scale 1;
    Min -1.55;
    Max 87.55;
  Scale 2;
    Tick 42 43 44 45 46 47 48;
    Min 41.5;
    Max 48.5;
  AxLabel 2;
    TColor 64;
    Offset -0.00323275862068966 &
      0.207692307692308;
  Data 0.097 0.8534 0.1246 0.8492;
  Mu 45;
  Sigma 1;
  Session;
  Weight 0.25;
  Data 0.097 0.8534 0.1246 0.8492;
  Connect;
  Symbol;
  Grid 2;
  OutLabels;
    Title &
      "Viscosity Data (Green) and EWMA Chart of Viscosity (Blue)";
  SubTitle "k1";
    PSize 10;
    TColor 4;
    Center;
    Footnote;
    FPanel;
    NoDTitle.
• Steps (in this example):
  – Create a Time Series graph.
    • Edit the X, Y axis spans to the range of the raw data + a little
    • Move the Y axis label downwards and change its colour to Green
    • Remove the title
    • Change the connect line and symbol colour to green
    • Remove the X axis Ticks, Tick Labels and Axis Label
    • “Capture” the commands
    • Paste the commands into a text editor (Notepad or in my case EditPadPro) below the previous code.
Graph & Captured Code

TsploT viscosity;
Scale 1;
   LDisplay 1 0 0 0;
   Min -1.1;
   Max 87.1;
AxLabel 1;
   ADisplay 0;
AxLabel 2;
   TColor 9;
   Offset -0.00431034482758621 &
   -0.223076923076923;
Index;
Connect;
   Type 1;
   Color 9;
   Size 1;
Symbol;
   Type 6;
   Color 9;
   Size 0.7;
Footnote;
   FPanel;
   NoDTitle.
Next Steps... making a macro

• To make this graph into a full fledged macro I took these steps:
  – Added the GMacro and EndMacro lines
  – Added some code to create a sub-title text string that includes the date/time
  – Created constants for the span of the X axis so that we could be sure that the 2 axes would be the same when overlaid and would adjust to the number of data points present
  – Added the Layout, EndLayout commands including commands to save the graph to a JPEG file.
  – See screen captures for more comments
We need to have the same X axis range for both graphs. We define constants based on how many data points we have that will let us define an X axis range that starts slightly before 1 and goes slightly past the last data point.
Layout command with code to save the graph to a JPEG image file.

We change the Scale 1 subcommands to use the min and max values we previously defined.

We change the sub-title command to use the constant we previously defined.
We change the Scale 1 sub-commands to use the min and max values we previously defined.

We copy the Data line from the EWMA code so that the Time Series Plot data region will be in exactly the same location as the EWMA chart. The Type 0; command makes the data region background transparent so we can see the underlying EWMA graph.

EndLayout tells Minitab to output the graph now.

EndMacro is the last command of a macro.