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12.8

Linear & Polynomial Trend Lines in Webi

Former Member

2014 Feb 14 9:27 PM

SAP Managed Tags: SAP BusinessObjects Business Intelligence platform, SAP BusinessObjects - Web Intelligence (WebI)

Currently, there is no option to draw a linear or polynomial trend line in a webi chart. However, we can use mathematical calculations to overcome the challenge.

In this post, I utilize eFashion Universe for demonstration purposes. I am assuming that you are somewhat familiar with regression analysis and Webi 4.0 – Rich Internet Application Viewing Mode.

Warm-up reminders:

A linear trend line is defined by this equation: Y= a0 + b*X1 , in which we are assuming that

- variable X is a timing factor (day, month, year etc..) and can be used to explain the fluctuation of the output Y;
- a0 & b are the best estimators of the model and can be calculated using the ordinary least squares (OLS) method.

We define: x1=X1-Average[X1] and y=Y-Average[Y] then

- b = Sum[x1*y]/Sum[x1*x1]
- a0 = Average[Y] - b*Average[X1]

Similarly, a polynomial trend line can be defined by this equation: Y=a + b1*X1 + b2*X2, in which:

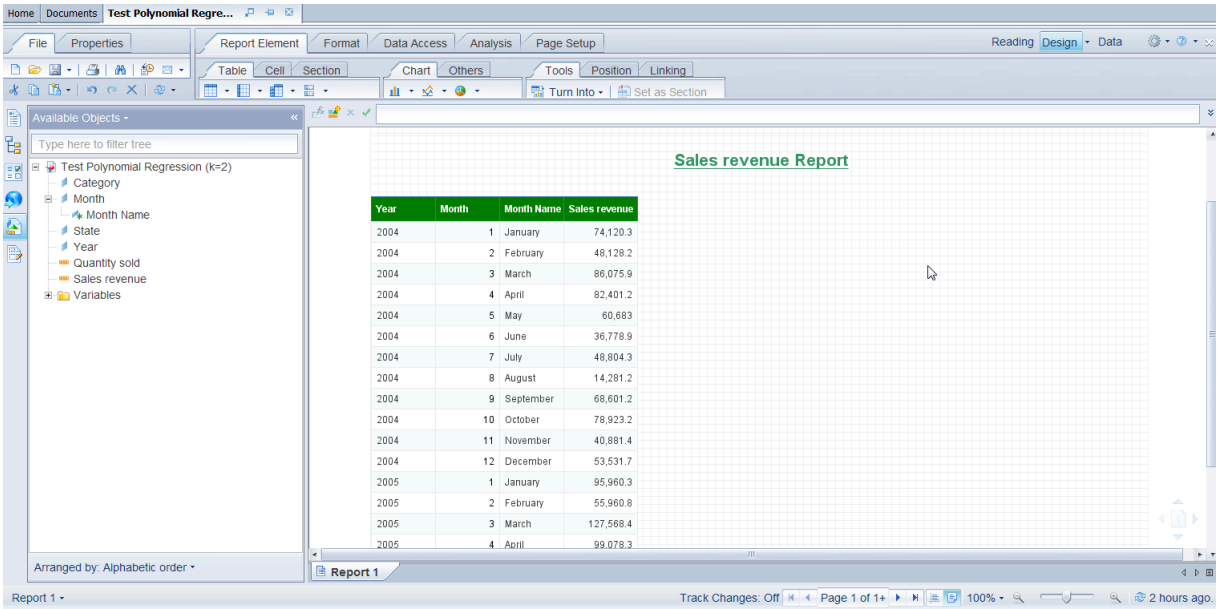
- variable X1, X2 are timing factors (day, month, year etc..) and can be used to explain the fluctuation of the output Y;
- X2 = X1 * X1
- a, b1 & b2 are the best estimators of the model and can be calculated using the ordinary least squares (OLS) method.

We also define x2=X2-Average[X2] then

- b1 = {Sum[x2*x2] * Sum[x1*y] – Sum[x1*x2] * Sum[x2*y]}/ {Sum[x1*x1] * Sum[x2*x2] – Sum[x1*x2] * Sum[x1*x2]}
- b2 = {Sum[x1*x1] * Sum[x2*y] – Sum[x1*x2] * Sum[x1*y]}/ {Sum[x1*x1] * Sum[x2*x2] – Sum[x1*x2] * Sum[x1*x2]}
- a = Average[Y] – b1*Average[X1] – b2*Average[X2]

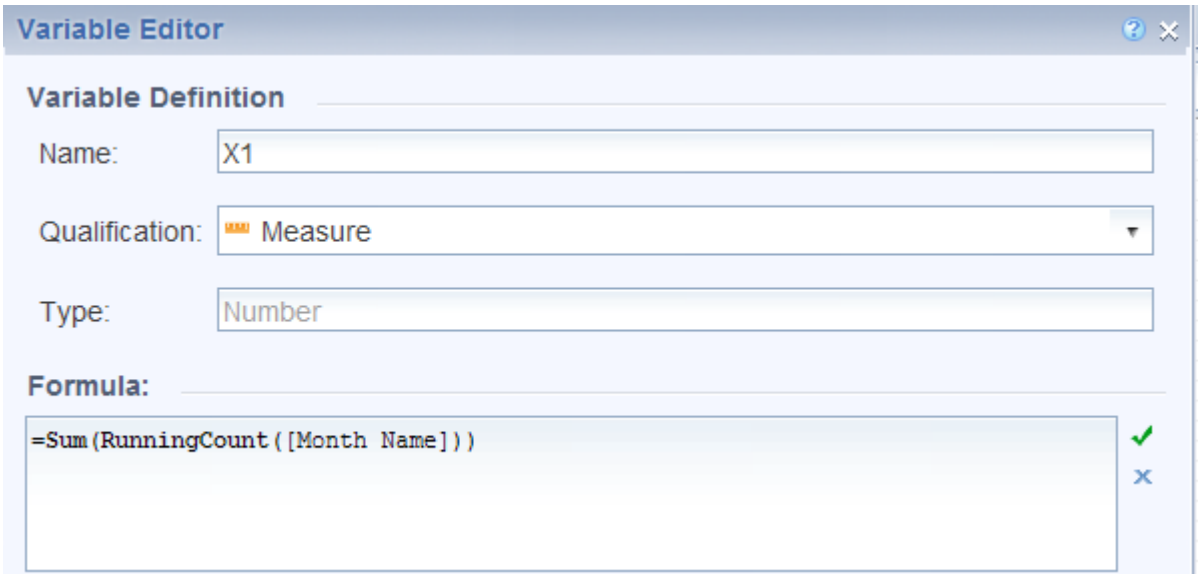
Create a linear trend line in Webi 4.0

Step 1: Build a Webi report using eFashion Universe.



Step 2: Create new variables for those in the warm-up reminders Section. Note that we don't have to create a new variable for each of them.

Create X1 (assuming we are showing trend lines by month)



Similarly, create x1y

=([X1]-(Average([X1]) In Block))*([Sales revenue]-(Average([Sales revenue]) In Block))

Create x1x1

=([X1]-(Average([X1]) In Block))*([X1]-(Average([X1]) In Block))

Create b

=(Sum([x1y]) In Block)/(Sum([x1x1]) In Block)

Create a0

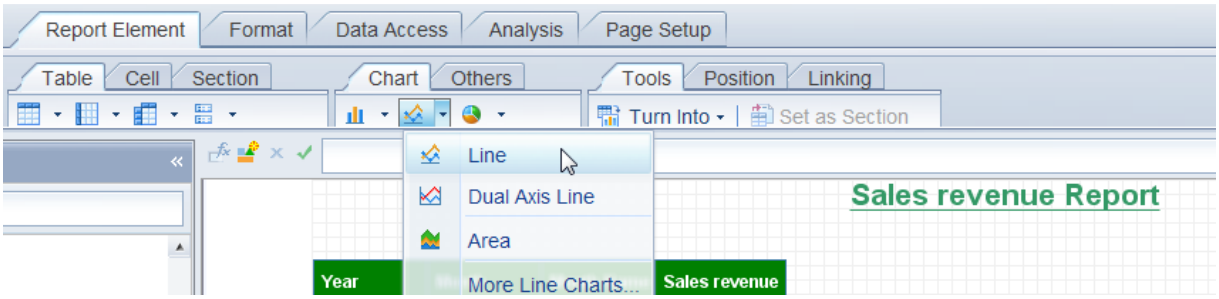
=Average([Sales revenue]) In Block - [b]*(Average([X1]) In Block)

Create Linear Trend

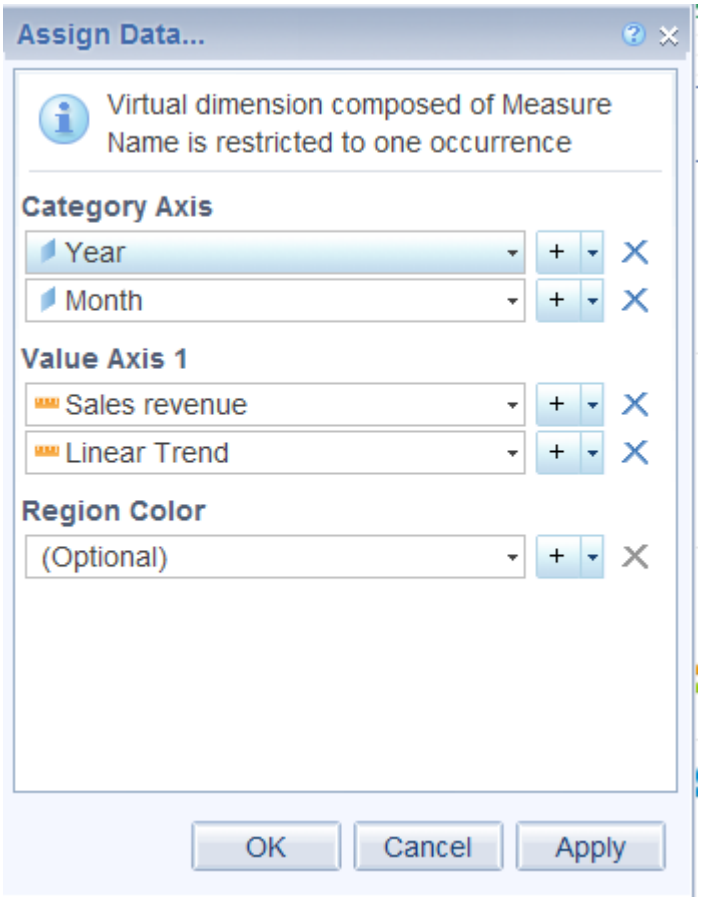
=[a0]+[b]*[X1]

Step 3: Insert a webi chart with the linear trend line we have created:

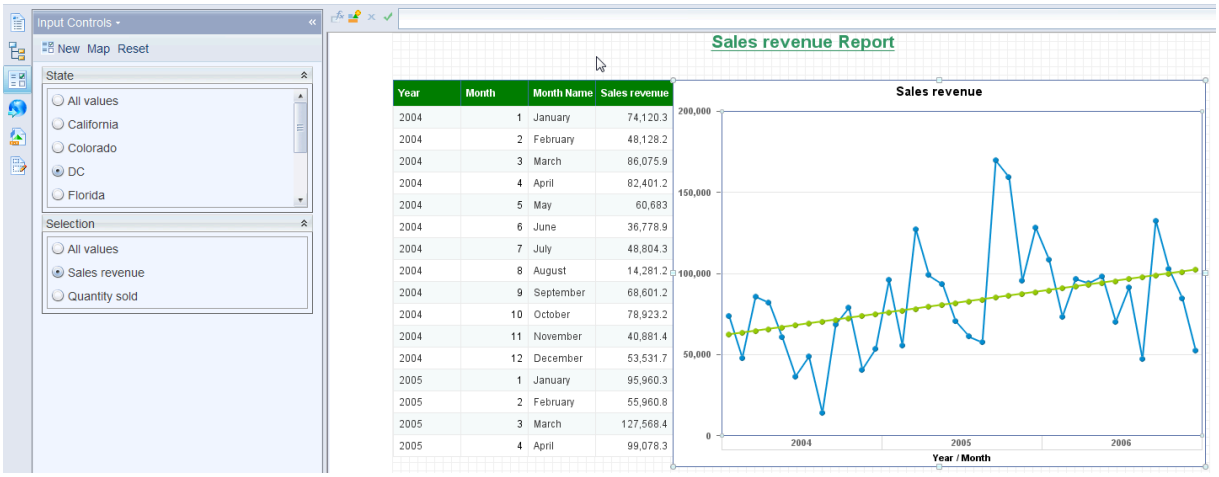
Go to Report Element \ Chart \ Line



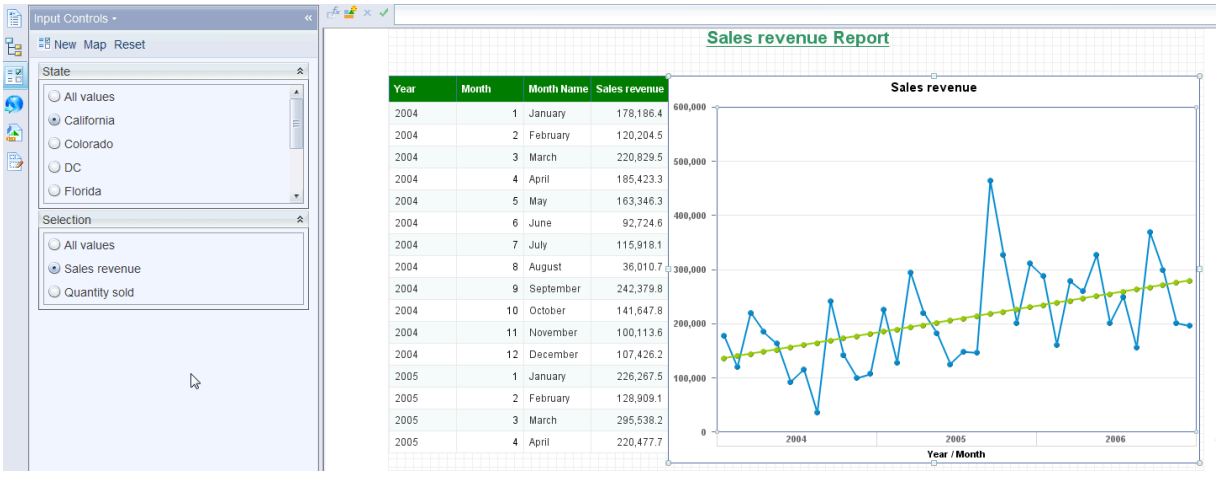
Assign data to the new chart



Enjoy the result. The image below shows linear trend line and Sales revenue in DC only



Below is the Sales revenue Report for California



Create a polynomial trend line in Webi 4.0

Assuming we continue to use some of the work we have done in the Linear Trend Line section.

Step 4: Create additional variables for the polynomial trend line

Create X2

=[X1]*[X1]

Create x2x2

=([X2]-(Average([X2]) In Block))*([X2]-(Average([X2]) In Block))

Create x2y

=([X2]-(Average([X2]) In Block))*([Sales revenue]-(Average([Sales revenue]) In Block))

Create x1x2

=([X1]-(Average([X1]) In Block))*([X2]-(Average([X2]) In Block))

Create b1

=((Sum([x2x2]) In Block)*(Sum([x1y]) In Block)-(Sum([x1x2]) In Block)*(Sum([x2y]) In Block))/((Sum([x2x2]) In Block)*(Sum([x1x1]) In Block)-(Sum([x1x2]) In Block)*(Sum([x1x2]) In Block))

Create b2

=((Sum([x1x1]) In Block)*(Sum([x2y]) In Block)-(Sum([x1x2]) In Block)*(Sum([x1y]) In Block))/((Sum([x2x2]) In Block)*(Sum([x1x1]) In Block)-(Sum([x1x2]) In Block)*(Sum([x1x2]) In Block))

Create a

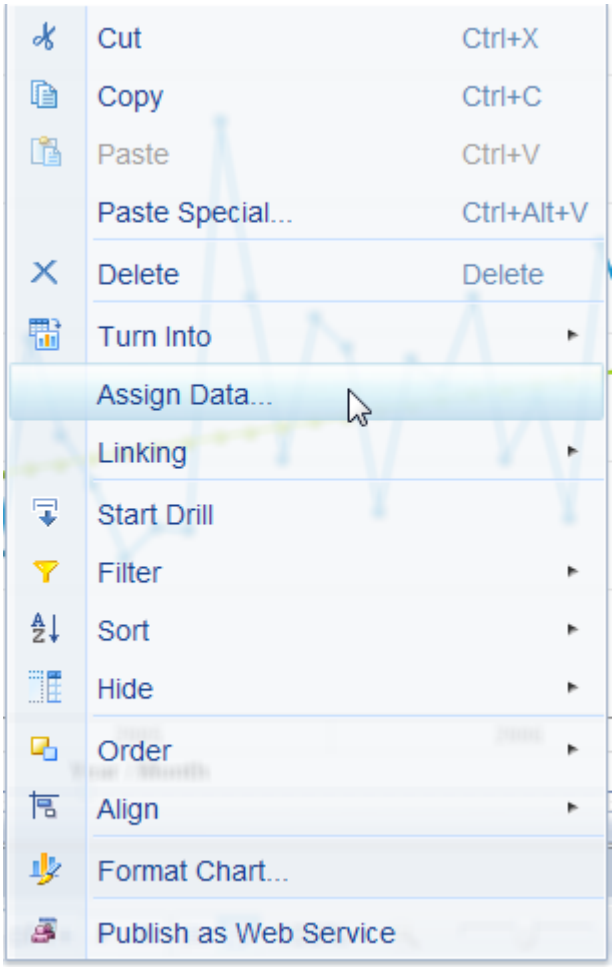
=(Average([Sales revenue]) In Block)-[b1]*(Average([X1]) In Block)-[b2]*(Average([X2]) In Block)

Create Poly Trend

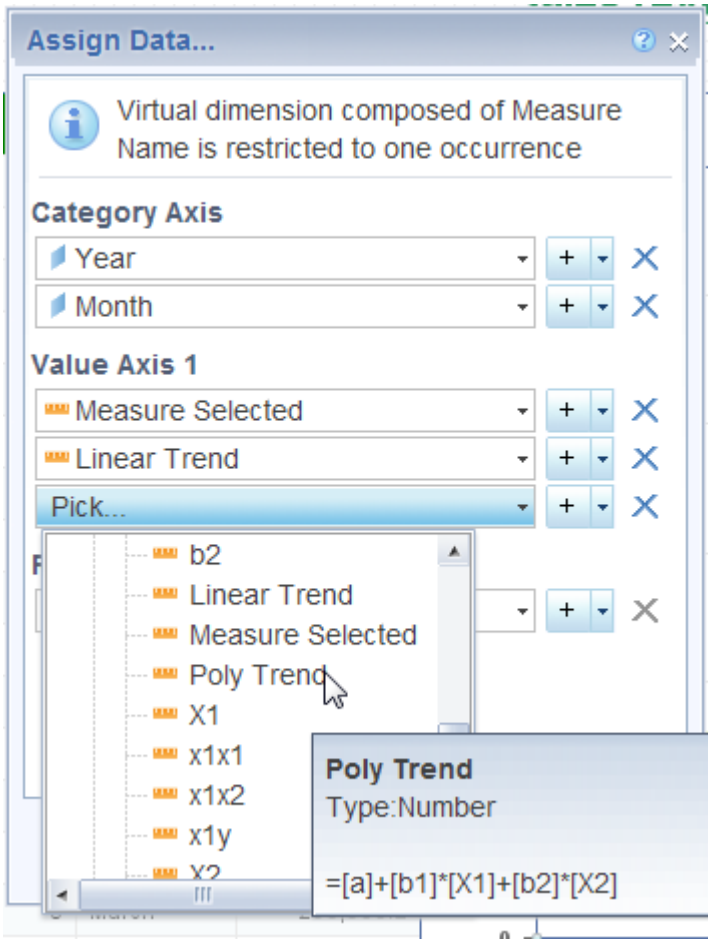
=[a]+[b1]*[X1]+[b2]*[X2]

Step 5: Add the polynomial trend line in the current chart

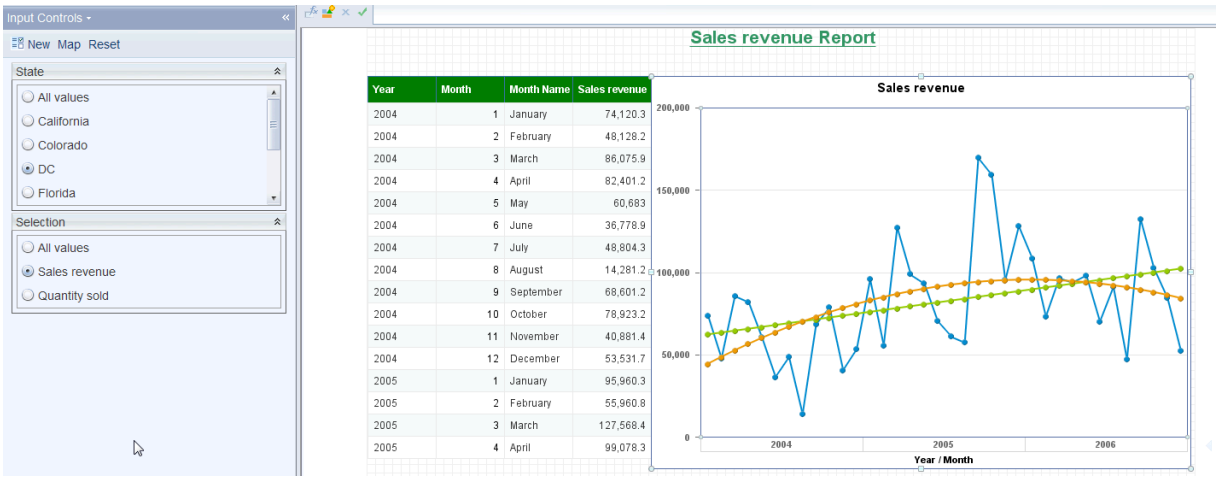
Right-click on the chart then choose Assign Data…



Click on the plus ➕ sign in the Value Axis 1 Section, then choose Poly Trend.



Enjoy the result.



If you have any questions, please leave a comment below and I will try to answer them as soon as I can.

Happy Valentine!

BONUS: R-squared calculations

As josh.crawford's suggested, I have included here a bonus section for R-squared calculation. If you need to refresh your mind about what it is, here is the link Coefficient of determination - Wikipedia, the free encyclopedia

Create SStotal

=([Sales revenue]-(Average([Sales revenue]) In Block))*([Sales revenue]-(Average([Sales revenue]) In Block))

Create SSres.Linear

=([Linear Trend]-[Sales revenue])*([Linear Trend]-[Sales revenue])

Create SSres.Poly

=([Poly Trend]-[Sales revenue])*([Poly Trend]-[Sales revenue])

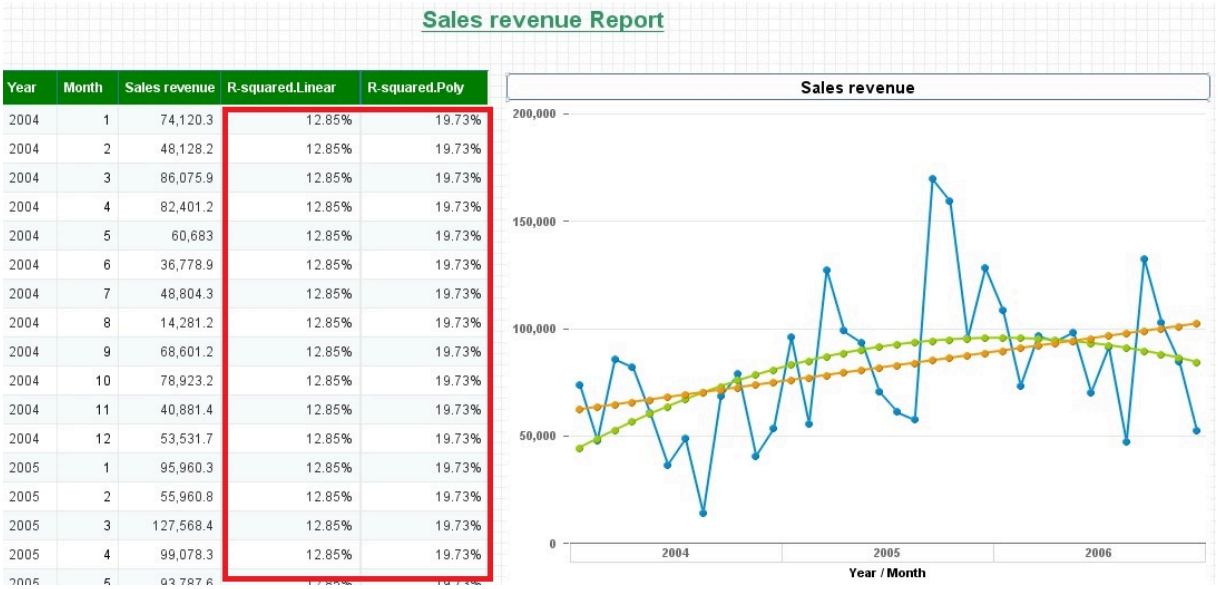
Create R-squared.Linear

=1-(Sum([SSres.Linear]) In Block)/(Sum([SStotal]) In Block)

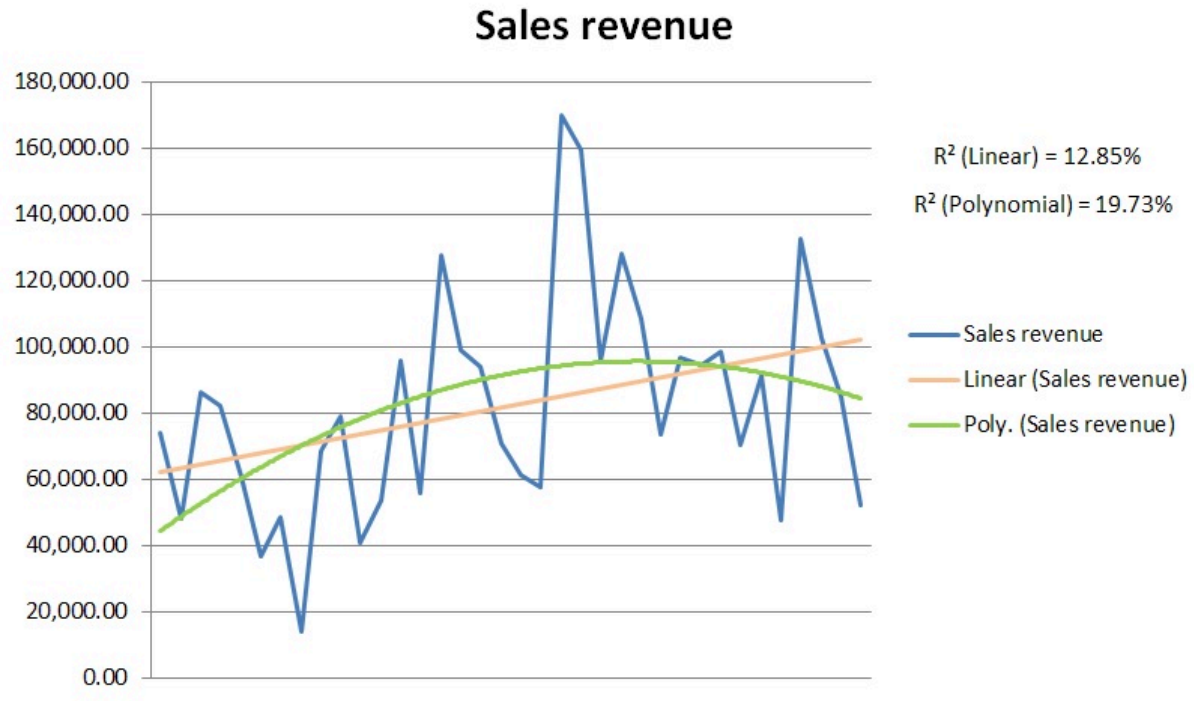
Create R-squared.Poly

=1-(Sum([SSres.Poly]) In Block)/(Sum([SStotal]) In Block)

If you place R-squared.Linear and R-squared.Poly next to each other in the table, you will see the values as shown here



Here is the chart with both Linear and Polynomial Trend Lines using Excel:



Thanks,

Huu Nguyen

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18 Comments

Former Member

2014 Apr 12 12:11 AM

0 Kudos

Beautiful... works like a charm. How about for calculating R-squared values? :wink:

Prabhith
Active Contributor

2014 Apr 12 4:58 AM

0 Kudos

Great Document,

Surely this is going to save a lot of time for our SDN colleagues who have similar requirement.

Former Member

2014 Apr 15 6:08 PM

0 Kudos

Thanks for your feedback. I will update this thread with R-squared calcultion soon.

Former Member

2014 Apr 15 6:09 PM

0 Kudos

Thanks Prabhith! It would be nice if this becomes a new feature in BO.

W

wmarcy

Contributor

2014 May 12 2:03 PM

0 Kudos

Great Webi trick !

You've been added to Webi 4.x tricks : summary for a better visibility. Keep posting !

William

Former Member

2014 Jul 10 3:24 PM

0 Kudos

great work. thanks

Former Member

2014 Aug 19 5:31 PM

0 Kudos

Excellent work Huu! Now if only there was an easy way to do this in Design Studio...

Former Member

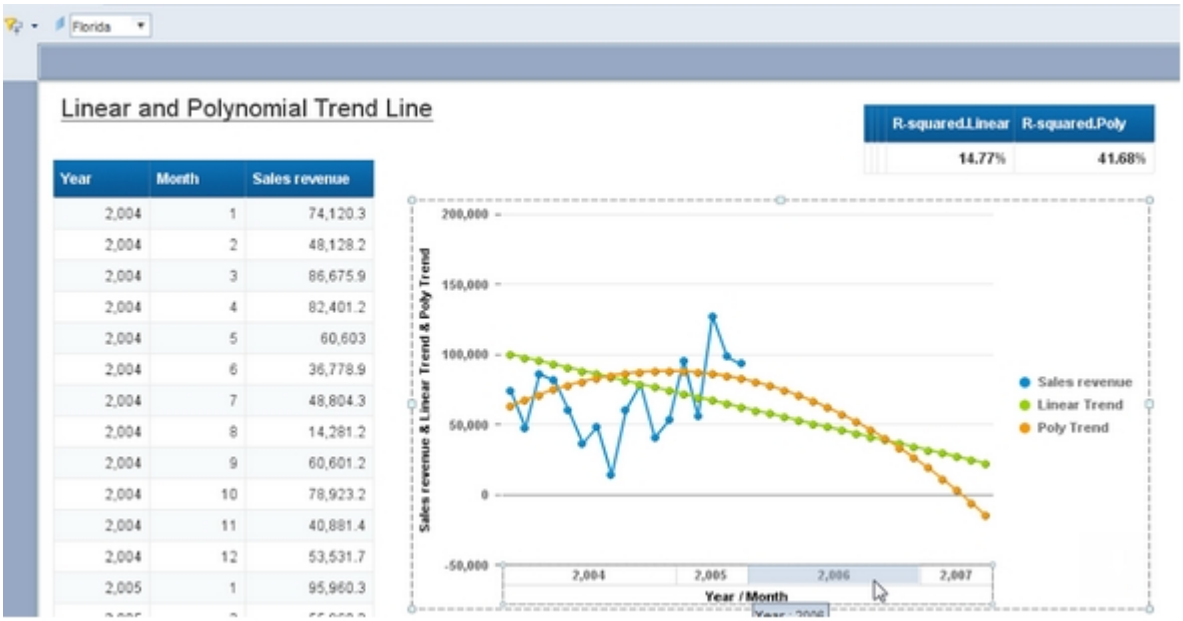
2015 Feb 11 6:57 PM

0 Kudos

Not working for me. Please could you attach your webi report to this article?

[Edit]

Wait! Now It works, however since I only have real data up to 2005, how do I make it generate the possible values for 2006, 2007. Would it be more like a forecasting? Is it posible to achieve that on Webintelligence?



Former Member

2015 Apr 23 5:29 PM

0 Kudos

We have a requirement to chart forecasted trend line based on the Linear Trend line.

1) How to add n # of months to the report date range and

2) Include in chart the projected value i.e. in this example that would be the forecasted sales revenue for say the next 3 months.

Has anyone been able to do this or can someone provide steps for doing this?

Former Member

2015 Apr 24 2:57 PM

0 Kudos

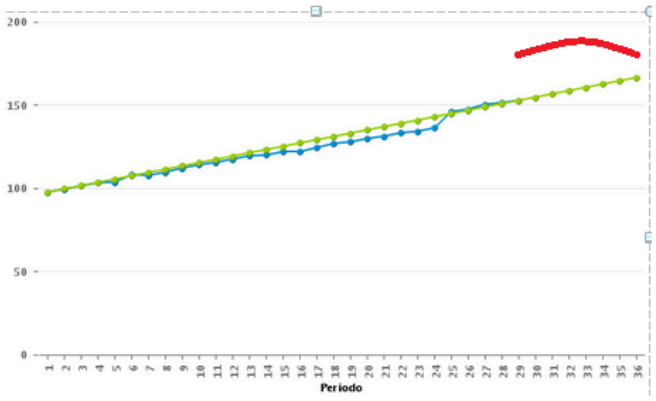
I was able to generate trending values for periods I didn't have values. What I did was that I included in my Excel sheet those periods. In Webi it looks like this:

Period	Value
26	147.54
27	150.48
28	151.46
29	152.8
30	
31	
32	
33	
34	
35	
36	

Then I applied linear trend formula

25	146.08	144.93	1.97	95.77
26	147.54	146.9	1.97	95.77
27	150.48	148.87	1.97	95.77
28	151.46	150.83	1.97	95.77
29	152.8	152.8	1.97	95.77
30		154.77	1.97	95.77
31		156.73	1.97	95.77
32		158.7	1.97	95.77
33		160.67	1.97	95.77
34		162.63	1.97	95.77
35		164.6	1.97	95.77
36		166.57	1.97	95.77

Linear Trend Formula



Former Member

2015 Apr 24 3:43 PM

0 Kudos

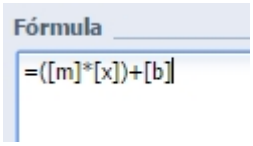
Thank you Erika! Can you show me what your calculation for the forecast column looks like? And the calculation for the 1.97 as well?

Former Member

2015 Apr 24 5:21 PM

0 Kudos

Trend



where m (slope 1.97) is:

=(Sum([g2]-[g1]))/(Sum([p2]-[p1]))

x is:

=[Period]

g2, g1 are my measures

g2 is:

=([measure] Where ([Period]=[p2])) In Block

g1 is

=([measure] Where ([Period]=1)) In Break

p2, p1 are my periods

p2 is:

=Max([Period] Where (Not(IsNull([measure])))) In Block

p1 is:

=Min([Period]) In Break

b is

=[g1]-([m]*[p1])

Former Member

2015 Jun 30 6:16 PM

0 Kudos

Excellent post! Thank you for sharing.

Former Member

2015 Aug 11 9:26 AM

0 Kudos

Interpolation can also be used where there are null values in the measure.

My method is somewhat different to yours Huu but works in a similar way. But I use interpolation to resolve the issue with null value.

That is a post in istself though! :smile:

Former Member

2015 Oct 02 5:05 PM

0 Kudos

How do you get the period to extend beyond line 29? Mine ends with the last month I have data for. So there are no rows for the forecast values

Former Member

2015 Oct 17 5:42 PM

0 Kudos

You should have additional rows for additional periods in your query. It doesn't matter if they don't have data. It doesn't matter if you add them with a view or a union.

For example, in my test, I added manually those rows (in table or excel) for additional periods with empty measures, since those measures will be calculated later.

28	151.46
29	152.8
30	
31	
32	
33	
34	
35	
36	

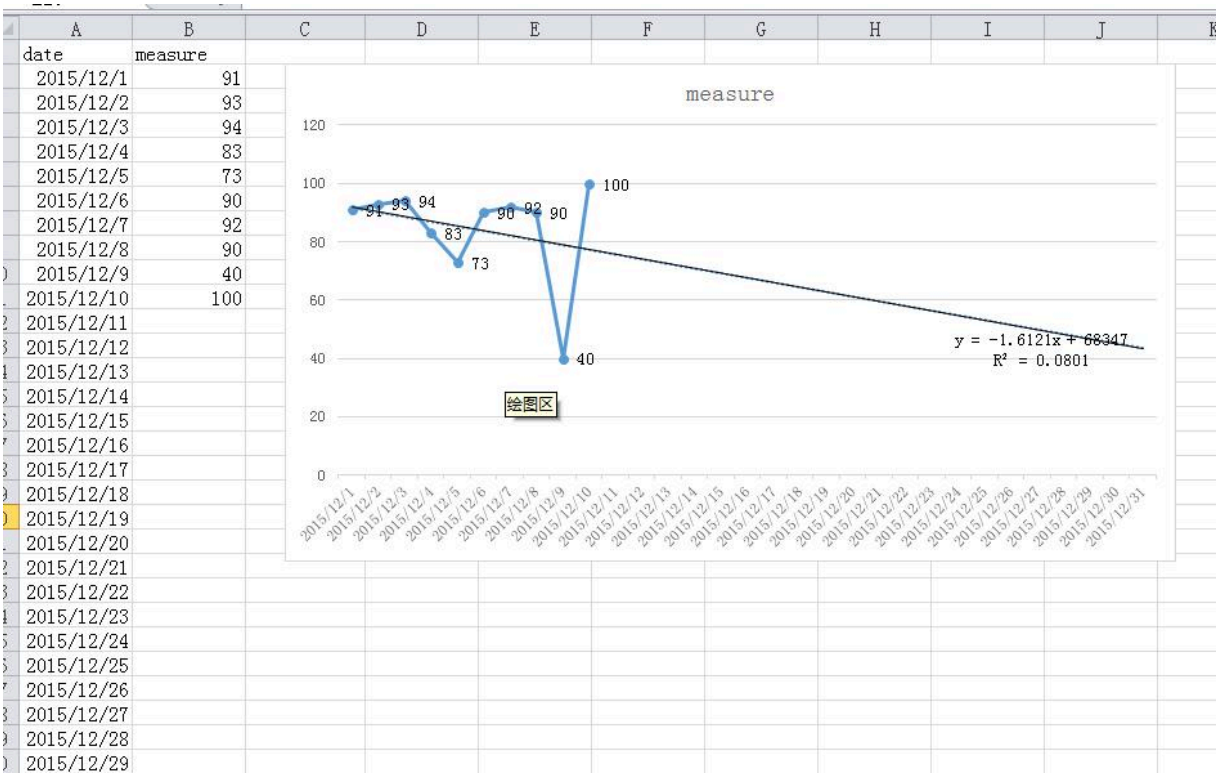
Former Member

2015 Dec 01 4:55 PM

0 Kudos

Hi experts,

I wanna draw a linear trend line in Webi , and i want the resule like excel(as attachment) .



marccocamoreno1
Discoverer

2020 Oct 27 5:31 PM

0 Kudos

Hi everyone!

First of all, awesome tutorial! I've been able to build a lineal and a polynomial (2 degree).

However, I'm stacked with building interpolation like Excel does (x steps ahead).

Yes, I expand the date vector to get more dates than available with data.

So, my question is: assuming I have a polynomial trend line, how can I interpolate it 14 days ahead (for example) without affecting the coefficients?

Any ideas???

Many thanks!

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