

Time Series Analyzer

Step-by-step Tutorial

version 1.1.0

C) Josef Pirkl 2010-2012

Web pages

Sorry for my English :-)

How to..¹

New project

- ...create simplest the new project ?
- ...create new project with data from external text file ?
- ...create new DATA project with random generated data ?
- ..create project with seasonal support ?

Others

...read some data from project and use it for new project ?

Modelling / support tools

- ...compute regression value for some X ?
- ...show regression model ?
- ...<u>change prediction interval range ?</u>
- ...dock graph/list into dock sites ?
- ..compare two data series ?

Section settings

...change initial aplha smoothing factor in Exponential smoothing section ?

Graph settings

...make permanent user changes in some graph in Graphbox ?

Printing

- ..print selected graphs in section ?
- ...print selected graphs from all Graphboxs ?
- ...change printed graphs columns count ?
- ..remove graphs axis titles in printing ?

Contact

¹ Used pictures can be from older versions.

<u>Contact information</u>.

How to create the simplest new project ?

- 1. Run the application.
- 2. Click on the button for creating empty DATA project.



3. Add three new rows into first column. Then click on button 🛃 (in toolbar above or left) for creating new TIME SERIE project.

	🛃 Time Series Analyzer®	,					_
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	III Data 🕲 Davling site						
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5. The "Make TIME SERIE" dialog is shown. Select column for "Y axis column (values)" Then click on "OK" button.

X axis column (time):		•	imes period size (optional):	
Y axis column (values);	Field nr. 1. (Column_1)	•	imes axis labels (optional):	
	More axis			
- Titles				
Title:				
X axis title:			Y axis title:	
Advanced.				

6. New time serie project is created !

You can save it by clicking on "Save project" in "Program" menu.

🐻 Time Series Analyzer®			
Program Edit Project (TIME SERIE)	Project (common)	Help	
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© Four Spaces - Josef Pirkl 2010-2011	v.0.8.9 Modifie	ed.	x=1.865, y=31.581

How to create new project with data from text file ?

- 1. Run the application.
- 2. Click on the button for creating empty DATA project.



3. Click on button for showing "Data import from text/excel file" dialog.

	💼 📉 Column title: Column_1	8	• 💽 题
ject	Data		
a pro	Column_1		Column_2
Dat	•		

4. Select import file "Examples\ 1 - semicolon.txt"².

Import file select	tion				? X
Oblast hledání:	🔁 examples		•	🗢 🗈 💣 🎟	
Poslední dokumenty	1 - semicolon.t	t.			
Plocha Dokumenty					
Tento počítač					
Místa v síti	Název souboru:	1 - semicolon.txt		•	Otevřít
	Soubory typu:	Text files (*.txt)		•	Storno

 Check, if at dialog bottom is set "First row contains column names = true" (that specify, that first row is not data).

² "Examples" is subdirectory.

Text file import setting	
First row contains column names = true Fix column size = false Separator = ; Delimiter = ''	Settings

If there is **false** value then show "**Text file import/export settings**" dialog (by clicking on "**Settings..**" button), and change that setting here.

🛃 Text file import/export settings	
Settings	
 ✓ First row contains column names ✓ Fix column size Separator: ✓ ✓ 	
ОК	Cancel

 Click into "Next" button. You will be moved into next page, in background will be performed data file analyze. Now you can see data file analyze results.

TML.	Caption	Туре	Value example
1 .	id	number	1
2.	document	number	994566
ab 3.	date_	text	13.01.2010
[] 4.	inventory	number	868.796
Skippe	d rows		[45/
Nr.	Original row	Rejection reason	
<mark>×</mark> 1.	id;document;date_;in	First row with columns caption	(deleted).

7. Click again into "Finish" button.

8. The data are now imported into DATA project list. Click on button 🜌 (above or left) for creating new TIME SERIE project.

× 6 📾 🗠	Column title: Column_1			
ta 🖄 Docking site 🕺 🖞 Data				
summary g	id	document	date_	inventory
is 💡 🛃 🛃		994566	13.01.2010	868.796
tive row 1	2	0	25.01.2010	668.796
www.count 100	3	68895	15.02.2010	1728.796
tive column 1	4	8655	17.02.2010	1728.796
lumns count 5	5	8670	17.02.2010	1528.796
ted rows	6	17804	11.03.2010	1328.796
ected rows count 0	7	21404	17.03.2010	1128.796
	8	21405	17.03.2010	1126.948
	9	24431	23.03.2010	1124.948
	10	34166	08.04.2010	924.948
	11	45980	27.04.2010	724.948
	12	45983	27.04.2010	524.948
	13	45984	27.04.2010	324.948
	14	69836	29.04.2010	2140.948
	15	50759	04.05.2010	2140.948
	16	50760	04.05.2010	2138.948
	17	53579	07.05.2010	2137.1
	18	66012	25.05.2010	1937.1
	19	66013	25.05.2010	1737.1
	20	74404	08.06.2010	1537.1
	21	89097	28.06.2010	1337.1
	22	89098	28.06.2010	1137.1
	23	110116	28.07.2010	937.1
	24	116857	25.08.2010	737.1
	25	116858	25.08.2010	537.1
	26	116859	25.08.2010	337.1
	27	116860	25.08.2010	335.252
	28	116946	25.08.2010	333.252
	29	71479	07.09.2010	1305.252
	30	131141	14.09.2010	1305.252
	31	142484	04.10.2010	1105.252
	32	152018	14.10.2010	905,252
	33	163379	27.10.2010	705,252
	34	168566	08.11.2010	505,252
take DATA and make TIME SERIE project	35	170017	09.11.2010	481.252
	36	72648	18.11.2010	881.252
	37	178402	23.11.2010	881.252
Time Cories	38	178427	23.11.2010	681.252
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Donate	71	107031	07.12.2010	TULIEUL

9. Here you must select at least that two fields:

- 1. X axis column (time) set into "ID" field here³
- 2. Y axis column (values) set into "INVENTORY" field here.

³ Column is not mandary field yet (since version 0.7.0).

Time serie Gelde se			
 Time serie fields se 	ttings		
X axis column (time):	Field nr. 1. (id)	💽 X period size (optional): 🛛	
Y axis column (value	Field nr. 4. (inventory)	💽 📐 axis labels (optional):	
	More axis		
- Titles			
Title:			
V			
∧ axis uue.		T dxis title.	
– 🗖 Advanced —			

7. New project is created !



How to create new DATA project with random generated data ?

Steps are equivalent like in example <u>How to create simplest new project ?</u> only click on that button in DATA project toolbar.



By this button will be generated 25 rows of some random data, that will be used as base for new time serie project (..then use "**Make TIME SERIE project..**" menu item for TIME SERIE project creation).

6		📉 Column title: 🛛	🗑 - 💽 题
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pro		×	у
Data	►		28
		2	77
_		3	80
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		5	96
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		7	71
		8	99
		9	95
		10	72
		11	36
		12	16
		13	11
		14	51
		15	39
		16	2
		17	79
		18	38
	-		

How to create project with seasonal support ?

- 1. Data for seasonal adjustment must contain seasonal key column, for example in form (for quarter description): 3/2011.
- 2. Next image shows DATA project with column with quarter description.

- 3. When you move into "Make TIME SERIE.." dialog you must select at least:
 - 1. "Y axis column (values)" set into "Field Nr. 2 (y)" field here.

Click on the "Advanced" checkbox. Click on the "Seasonal settings" tab.

 Time serie fields settin 	qs			
Y suis ostumn (time):	-		Y pariad size (aptional):	
A axis column (unle).			A penod size (optional).	
<u>Y axis column (values):</u>	📗 Field nr. 2. (y)	-) $ imes$ axis labels (optional):	
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Advanced 3 X column converting Seasonal support Seasonal setting Seasonal column: Seasonal mask: Period length: Recompute X	Seasonal settings for X axis q/y Quarter period size (m)	¥		
Advanced 3 X column converting Seasonal support Seasonal setting Seasonal column: Seasonal mask: Period length: Recompute X	Seasonal settings for X axis q/y Quarter period size (m)	¥		
Advanced 3 X column converting Seasonal support Seasonal setting Seasonal column: Seasonal mask: Period length: Recompute X	Seasonal settings for X axis q/y Quarter period size (m)	¥		

- 4. On the "Seasonal settings" tab make this changes:
 - Set "Field nr. 1 (Period)" into "Seasonal column".
 Seasonal column is column, which contains data with seasonal key, for example "3/2011" for quarter identification.
 - 2. Set "q/y" for "seasonal mask".

That mask inform, that in the selected "**Seasonal column**" is information about quarter, year, separated in this case by slash.

3. Select "Period length" for calculation.

-V Advanced.		
X column converting Seasonal settings		
Seasonal support for X axis		
Seasonal column: Field nr. 1. (Period)		
Seasonal mask: q/y		
Period length: Quarter		
Recompute X period size (m)		

5. After clicking to "**Finish**" button is new project with seasonal adjustment created ! This project has special tab "**Seasonal adjustment**".



How to read some data from project and use it for new project ?

- 1. When you have opened some TIME SERIE project, is possible read its data and use it as base for new DATA project.
- 2. Click on the this button for opening "Data serie selection" dialog.



 By "Data serie selection" is possible select data serie and read its data into "Data creation" dialog⁴. In this example is selected "Polynomial 1th" regression (linear regression).⁵

⁴ Original data serie is on the top in the dialog.

⁵ Is not supported NULL values for new project creation yet (0.7.0). Please, select data without NULL only.

Data serie selection	×
Data serie selecting	,
Vot null only	Refresh
Time serie 🖉 🔺	Data serie 🔺
	Partial sum(3)
Partial sum(4) (Partial sums)	
	Partial sum(4)
Partial sum(5) (Partial sums)	
	Partial sum(5)
Partial sum(6) (Partial sums)	
	Partial sum(6)
Polynomial (0th), Original copy (Regression section)	
	Polynomial (Oth)
	Original copy
Polynomial (1th), Original copy (Regression section)	
	Polynomial (1th)
	Original copy
Polynomial (2th), Original copy (Regression section)	
	Polynomial (2th)
	Original copy
Polynomial (3th), Original copy (Regression section)	
	Polynomial (3th)
	Original copy
Polynomial (4th). Original conv	
	OK Cancel

5. By clicking on "**OK**" button (or doubleclick on row) will be created new DATA project with selected series data.

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Rows count	100	2	302,903199403199	1		
olumns	- per	3	310,832501132501	1		
Active column	1 10	4	316,279922779923	1		
Columns count	5	5	325,927209427204	1		
elected rows	ect	6	333,574646074646	1		
Selected rows count		/	341,222007722008	1		
	- St.	8	348,869369369369	1		
		9	356,516731016731	1		
	<u> </u>	10	364,164092664093	1		
		11	371,811454311454	1		
		12	379,458815958816	1		
		13	387,106177606178	1		
		14	394,753539253539	1		
		15	402,400900900901	1		
		16	410,048262548263	1		
		17	417,695624195624	1		
		18	425,342985842986	1		
		19	432,990347490348	1		
		20	440,637709137709	1		
		21	448,285070785071	1		
		22	455,932432432432	1		
		23	463,579794079794	1		
		24	471,227155727156	1		
		25	478,874517374517	1		
		26	486,521879021879	1		
		27	494,169240669241	1		
		28	501,816602316602	1		
		29	509,463963963964	1		
		30	517,111325611326	1		
		31	524,758687258687	1		
		32	532,406048906049	1		
		33	540,053410553411	1		
-		34	547,700772200772	1		
take DATA and make TD	ME SERIE project	35	555,348133848134	1		
		36	562,995495495496	1		
				•		
Tim	Corioc					
<u> </u>	e series					
Δn	alvzer					
	41744					

How to compute regression value for some X ?

 On the graph in the Graphbox you can show context (popup) menu by right button mouse clicking. For the graph with regression data serie is then accessible "Regression -> Predict value(Y) for X" option.



2. Click on that for show "**Predict value**" dialog. If you fill "**X value**", by clicking on "**Calc**" button you can compute "**Result**" - Y value.

Predict value (Polynomial (5th))	×
Predict value	
Regression - X value X value: 50 Calc	>
Result (Y) Result: -3202.540 Copy	
	Close

How to show regression model?

1. On the graph in the Graphbox you can show detailed model informations.

On graph (with model) click by right mouse buton a select "**Model -> Output to text**". For selected model are shown detailed model informations.



2. Detailed model informations could be printed.

Text			
Regression m	odel		
Type: Polyno	mial (5th)		
T1			
ine regressi	on equation is	7 1 F	
y = 0.0000y	$-5 = 0.0003 \times 4 + 0.0003 \times 5 = 0.00003 \times 5 + 0.000000000000000000000000000000000$	1382¥^3 - 1 9362¥^2 + 42 8344¥ + 728 213	3
,			-
Predictor	Coef		
A	0.000		
B	0.000		
с п	-1 925		
P	-1.536		
F	729 213		
-	/20.210		
Number of ob	servations: 142		
SSE (Sum of	squared errors)	: 18478146.019	
MSE (Mean sq	uared error)	: 130127.789	
MAPE (Mean a	bsolute percent err	or) : 0.212	
RMSE (Root m	ean squared error)	: 360.732	
ME (Mean err	or)	: 0.000	
MAE (Mean ab	solute error)	: 271.013	
MPE (Mean pe	rcent error)	: -0.070	
R2(R-Squared	1)	: 0.539	
Thiel inequa	lity coeff.	: 0.116	
AIC (Akaike`	s information crite	(ia): 1684.231	
AICc (Akaike	's information crit	eria: 1684.853	
BIC (Bayesia	n information crite	ria): 1701.966	
Durbin-Watso	n	: 1.121	

How to change prediction interval range ?

 In opened TIME SERIE project click on "Project prediction settings.." button (next to "Settings.." button).



2. The "**Prediction settings..**" dialog will be shown. Change starting, ending interval, or step. Then click on "**OK**" button.

Predi	iction setttings	×
_	ettings	
	Original X range: 1.000 - 36.0	00
	Prediction X starting interval value:	37 🚖
	Prediction X ending interval value:	73 🜩
	Step size:	1 🌻
	Prediction X range: 37.000 - 73.	000
	ОК	Cancel

3. Prediction range interval for the project will be changed⁶. New interval size is saved into project file.

⁶ For regression, mainly.

How to dock graph/list into dock sites ?

- 1. When you have opened some project, you can dock graph, list and some other window into dock sites.
- 2. If you click on the graph title in Graphbox, the graph will be opened in window.



3. For lists - if you click on lists title in Graphbox, the list will be opened in window.

Differences section First difference Second difference Third difference Third difference First difference values	
First difference Second difference Third difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference Image: Second difference <	
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First difference values	🗖 🔯 🗎 (
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6.000 First difference values	^
7.000 × y	
1.000 <null></null>	
Relative incremen 2.000 237.000	
3.000 -9.000	
4.000 -248.000	
5.000 -11.000	
300- 6.000 466.000	
7.000 95.000	
8.000 -455.000	

4. If you want, you can those window dock into left, right and bottom dock site (by mouse dragging). That docked window is saved into project file.



How to compare two data series ?

- 1. It is possible to compare two data series with special dialog.
- 2. On first graph (data serie) click with right mouse button, select "**Compare -> Add..**".⁷



 If in the graph is only one data serie, that serie will be selected as first for comparing. If there are more data series, then will be shown
 "Data serie selection" dialog.

⁷ Since version 0.7.4 is there command for fast adding "Original" data serie too.

Data serie selection			×
Data serie selecting			
Not null only	Unique datas	eries	Refresh
Time serie	Δ	Data	serie
Polynomial (1th), Or (Regression section	iginal copy 1)		
		Origina	і сору
		Polynom	ial (1th)
		ОК	Cancel

- 4. Select first data serie (in this example "Polynomial (1th)").
- 5. Repeat that for secord serie, choose "Polynomial (2th)".
- After finishing of second serie selection is shown "Dataseries compare" dialog. This dialog can be docked into specific dock site⁸.

Pataseries compare Polynomial (1th) vs. Polynomial (2th)				×	
Data Statistics comp	are Residuals graph				
X value	Polynomial (1th) (Y1)	Polynomial (2th) (Y2)	Difference (Y1-Y2)	Ratio (Y1/Y2)	
1.000	295.338	256.503	38.835	1.151	
2.000	302.985	270.808	32.177	1.119	
3.000	310.633	284.721	25.912	1.091	
4.000	318.280	298.242	20.037	1.067	
5.000	325.927	311.372	14.555	1.047	
6.000	333.575	324.111	9.464	1.029	
7 000	341 222	336 457	4 765	1 014	_

⁸ "Dataseries compare" dialog is saved into project file.

How to change initial aplha smoothing factor in Exponential smoothing section ?

1. On some sections is possible to display "**Section settings**" dialog by clicking on "**Section settings**" button.



2. In "Settings - Exponential smoothing" dialog change "First alpha" to 0.2 and "Alpha step" to 0.25.

Setttings - Exponential sn	noothing 🛛 🗵
Settings	
First alpha:	0.2 🚍
Alpha step:	0.25
First value initial type:	By first value 💌
OK	Cancel

Alter click on the "OK" button the all "Exponential smoothing section" will be recalculated and refreshed. In the section will be time series with aplha = 0.2, 0.45, 0.7 and 0.95.⁹



⁹ New settings for section will be saved into project file for next opening.

How to make permanent user changes in some graph in Graphbox ?

- 1. On every graph is possible make some permanent user changes. This changes are saved into project file and are restored in next project loading.
- 2. Click by right mouse button on the graph for displaing graph context menu. Click on the "**Settings dialog..**".

🖹 Copy	
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3. It display "Specific graph settings" dialog.

Click on the "Bottom axis" page, and write new title for bottom axis.

Specific graph settings
800 600 400 200 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 47 18 19 29 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 Time [day]
Base settings Titles Left ave Bottom axis Brid
✓ Visible
Bottom axis title:
Time [day]
Clear OK Cancel

4. After click on the "**OK**" button the graph will be refreshed.

How to print selected graphs in section ?

1. It is possible to print all or selected graphs in every Graphbox section. Click on "Print" button above section and choose "Print selected..".



2. If some graphs in section are selected (checkbox above graph), then is shown "**Print preview**" dialog¹⁰.



¹⁰ Default setting - other variant is direct print without "Print preview" dialog.

How to print selected graphs from all Graphboxs ?

- 1. If are some graphs selected, is possible to print that selected graphs through all project's Graphboxs.
- 2. Click on "**Print**" button on main toolbar, or in main "**Program**" menu. Selected project`s graphs will be printed.

Zime Series Analyzer Program Edit Project Help			_8>
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C) Josef Pirkl 2010-2011 v.0.7.1			

How to change printed graphs columns count ?

1. If you have some graphs for printing, from "**Print preview**" dialog is possible to change some print report characteristics. Click on "**Print settings..**" button.

Print preview	
Regression section	
Polynomial (Oth), Original co	Polynomial (lth), Original copy
Polynomial (2th), Original co	py Polynomial (3th), Original copy

2. After click is displayed "**Settings**" dialog with "**Printing**" settings only. Change "**Graph columns count**" to 3 and then click on "**OK**" button.

Program options	
Print Fonts	Header printing: All pages Footer printing: Footer with pages
···· » Print preview ···· » Graph adjustments	Custom text for header:
	Footer mask for date:
	Text report Graph report
	Horizontal gap between graphs [as ratio from 0.1 graphs [as ratio from 0.1 page width 0-1]: 0.1
	Graph columns count: 3 Graph rows count: 4
	OK Cancel

3. Report layout will be refreshed (three graphs at row).¹¹



¹¹ Changes will be saved into application settings.

How to remove graphs axis titles in printing ?

- 1. Before every graph printing is possible to "filter" its properties and update its layout.
- 2. Suppose, we have this output for section printing. For removing left graphs axis titles, click on "**Print settings..**" button in toolbar.



3. In "Settings" dialog go into "Graph adjustment" page. Uncheck option "Y axis title (left)" here.

Settings Program options	
Program options Print - » Fonts - » Bisk preview Graph adjustments	Optional graph updates before print Graph backcolor: □ clw/hite □ Legend □ Main title □ X axis title [bottom] □ Y axis title [bottom] □ Vertical grid □ Horizontal grid
	OK Cancel

 After "OK" button clicking the report will be refreshed. Left axis in graphs is removed¹².



¹² Changes will be saved into application settings.

Contact information

Contact address. All suggestions for program improvement will be welcomed.

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