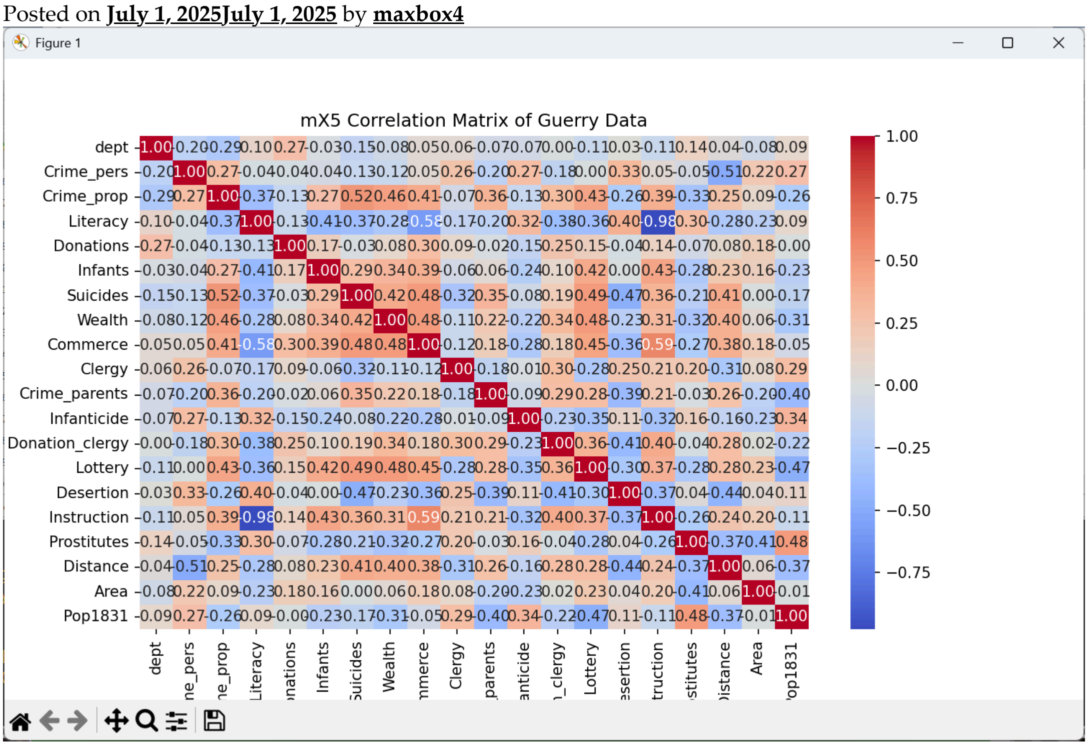
Welcome to maXbox Code (Blog)

maXbox

EKON 29

Posted on July 1, 2025July 1, 2025 by maxbox4



	dept	ne_pers	ne_prop	Literacy	onations	Infants	uicides	Wealth	mmerce	Clergy	parents	anticide	_clergy	Lottery	esertion	truction	stitutes	istance	Area	op1831
dept	1.00	-0.20	-0.29	0.10	0.27	-0.03	-0.15	-0.08	0.05	0.06	-0.07	-0.07	0.00	-0.11	0.03	-0.11	0.14	0.04	-0.08	0.09
Crime_pers	-0.20	1.00	0.27	-0.04	-0.04	-0.04	-0.13	-0.12	0.05	0.26	-0.20	0.27	-0.18	0.00	0.33	0.05	-0.05	-0.51	0.22	0.27
Crime_prop	-0.29	0.27	1.00	-0.37	-0.13	0.27	0.52	0.46	0.41	-0.07	0.36	-0.13	0.30	0.43	-0.26	0.39	-0.33	0.25	0.09	-0.26
Literacy	0.10	-0.04	-0.37	1.00	-0.13	-0.41	-0.37	-0.28	-0.58	-0.17	-0.20	0.32	-0.38	-0.36	0.40	-0.98	0.30	-0.28	-0.23	0.09
Donations	0.27	-0.04	-0.13	-0.13	1.00	0.17	-0.03	0.08	0.30	0.09	-0.02	-0.15	0.25	0.15	-0.04	0.14	-0.07	0.08	0.18	-0.00
Infants	-0.03	-0.04	0.27	-0.41	0.17	1.00	0.29	0.34	0.39	-0.06	0.06	-0.24	0.10	0.42	0.00	0.43	-0.28	0.23	0.16	-0.23
Suicides	-0.15	-0.13	0.52	-0.37	-0.03	0.29	1.00	0.42	0.48	-0.32	0.35	-0.08	0.19	0.49	-0.47	0.36	-0.21	0.41	0.00	-0.17
Wealth	-0.08	-0.12	0.46	-0.28	0.08	0.34	0.42	1.00	0.48	-0.11	0.22	-0.22	0.34	0.48	-0.23	0.31	-0.32	0.40	0.06	-0.31
Commerce	0.05	0.05	0.41	-0.58	0.30	0.39	0.48	0.48	1.00	-0.12	0.18	-0.28	0.18	0.45	-0.36	0.59	-0.27	0.38	0.18	-0.05
Clergy	0.06	0.26	-0.07	-0.17	0.09	-0.06	-0.32	-0.11	-0.12	1.00	-0.18	0.01	0.30	-0.28	0.25	0.21	0.20	-0.31	0.08	0.29
Crime_parents	-0.07	-0.20	0.36	-0.20	-0.02	0.06	0.35	0.22	0.18	-0.18	1.00	-0.09	0.29	0.28	-0.39	0.21	-0.03	0.26	-0.20	-0.40
Infanticide	-0.07	0.27	-0.13	0.32	-0.15	-0.24	-0.08	-0.22	-0.28	0.01	-0.09	1.00	-0.23	-0.35	0.11	-0.32	0.16	-0.16	-0.23	0.34
Donation_clergy	0.00	-0.18	0.30	-0.38	0.25	0.10	0.19	0.34	0.18	0.30	0.29	-0.23	1.00	0.36	-0.41	0.40	-0.04	0.28	0.02	-0.22
Lottery	-0.11	0.00	0.43	-0.36	0.15	0.42	0.49	0.48	0.45	-0.28	0.28	-0.35	0.36	1.00	-0.30	0.37	-0.28	0.28	0.23	-0.47
Desertion	0.03	0.33	-0.26	0.40	-0.04	0.00	-0.47	-0.23	-0.36	0.25	-0.39	0.11	-0.41	-0.30	1.00	-0.37	0.04	-0.44	0.04	0.11
Instruction	-0.11	0.05	0.39	-0.98	0.14	0.43	0.36	0.31	0.59	0.21	0.21	-0.32	0.40	0.37	-0.37	1.00	-0.26	0.24	0.20	-0.11
Prostitutes	0.14	-0.05	-0.33	0.30	-0.07	-0.28	-0.21	-0.32	-0.27	0.20	-0.03	0.16	-0.04	-0.28	0.04	-0.26	1.00	-0.37	-0.41	0.48
Distance	0.04	-0.51	0.25	-0.28	0.08	0.23	0.41	0.40	0.38	-0.31	0.26	-0.16	0.28	0.28	-0.44	0.24	-0.37	1.00	0.06	-0.37
Area	-0.08	0.22	0.09	-0.23	0.18	0.16	0.00	0.06	0.18	0.08	-0.20	-0.23	0.02	0.23	0.04	0.20	-0.41	0.06	1.00	-0.01
Pop1831	0.09	0.27	-0.26	0.09	-0.00	-0.23	-0.17	-0.31	-0.05	0.29	-0.40	0.34	-0.22	-0.47	0.11	-0.11	0.48	-0.37	-0.01	1.00

Statistic Packages for Delphi and Python

A truly cross-platform library for numerical analysis and statistical functions isn't easy to find in Delphi. Especially since quality and licensing are also important. In this session, we'll delve into the most useful packages and libraries suitable for performing statistical calculations, all the way up to advanced modeling and data visualization. We'll also compile a statistics on the top and flops of Delphi projects over the past 30 years.

https://entwickler-konferenz.de/delphi-innovations-fundamentals/statistic-packages-fuer-delphi-oder-python (https://entwickler-konferenz.de/delphi-innovations-fundamentals/statistic-packages-fuer-delphi-oder-python)

Hands-On

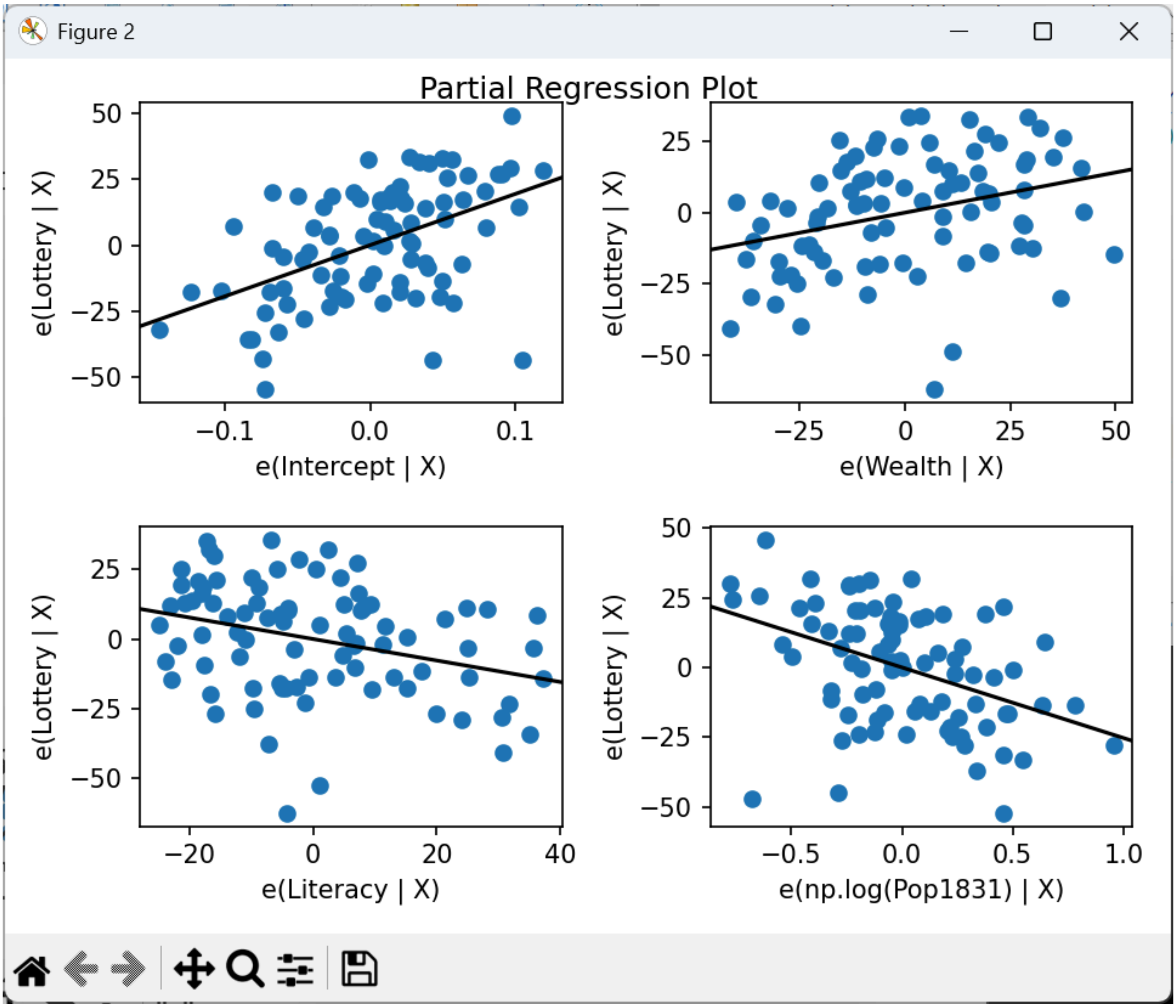
- Setting up the mrMath and mrMatrix mrAI toolchain
- Open AI for Delphi Demo
- Calculating DMath correlations, pattern recognition, and trends
- Introducing the 7 well-known statistical methods
- Demonstrating the 5 most important chart types (Bar Chart, Scatter Plot, Histogram, Box Plot and Correlationmatrix)
- Setting up an energy storage time series AGSI project statistics
- Descriptive statistics with the reference dataset for morale statistics (Guerry, "HistData")
- Data Science Tutorial AGSI or Guerry

Contents

- Overview of the statistical packages with Delphi and Python (P4D).
- Configuration and spec features of DMath, SKLearn, Statsmodels, & DataLab library
- Troubleshooting: Typical miscalculations and their solutions with cleaned data
- First steps in implementing regression, cluster analysis, and correlation matrix

We download the Guerry dataset, a collection **of** historical data used **in** support **of** Andre-Michel Guerry's 1833 Essay **on** the Moral Statistics **of** France. The data **set is** hosted online **in** comma-separated values format (CSV) by the Rdatasets repository. We could download the **file** locally **and then** load it using read_csv, but pandas takes care **of** all **of** this automatically **for** us:

```
                            OLS Regression Results
==============================================================================
Dep. Variable:                Lottery   R-squared:                       0.414
Model:                            OLS   Adj. R-squared:                  0.392
Method:                 Least Squares   F-statistic:                     19.30
Date:                Thu, 26 Jun 2025   Prob (F-statistic):           1.47e-09
Time:                        17:35:22   Log-Likelihood:                -375.28
No. Observations:                  86   AIC:                             758.6
Df Residuals:                      82   BIC:                             768.4
Df Model:                           3
Covariance Type:            nonrobust
================================================================================
                     coef    std err          t      P>|t|      [0.025      0.975]
--------------------------------------------------------------------------------
Intercept        194.3951     37.768      5.147      0.000    119.263     269.527
Wealth             0.2820      0.093      3.024      0.003      0.097       0.468
Literacy          -0.3840      0.127     -3.033      0.003     -0.636      -0.132
np.log(Pop1831)  -25.2363      6.047     -4.174      0.000    -37.265     -13.207
==============================================================================
Omnibus:                        7.602   Durbin-Watson:                   1.890
Prob(Omnibus):                  0.022   Jarque-Bera (JB):                7.051
Skew:                          -0.651   Prob(JB):                       0.0294
Kurtosis:                       3.524   Cond. No.                     1.13e+03
==============================================================================

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.
[2] The condition number is large, 1.13e+03. This might indicate that there are
strong multicollinearity or other numerical problems.
 mX5 executed: 26/06/2025 17:35:23  Runtime: 0:0:47.680  Memload: 58% use
```



Partial Regression Plot Grid

```
Execstring('import statsmodels.api as sm; import numpy as np');

Execstr('model = smf.ols("Lottery ~ Wealth + Literacy + np.log(Pop1831)", data=df).fit()');
execstr('print(model.summary())');
execstr('sm.graphics.plot_partregress_grid(model)');
```

Statsmodels is a Python **library** designed **for** statistical modeling, hypothesis testing, **and** data exploration. It provides a wide range **of** statistical models, including linear regression, time series analysis, **and** generalized linear models.
The **library** supports both formula-based modeling (similar **to** R) **and** direct use **of** NumPy arrays.
The **data science tutorial** explains the so called AGSI data storage **and** his visualization **of** the timeline. AGSI **is** the Aggregated Gas Storage Inventory **and** offers you the possibility **to** be kept up **to** date whenever a new service announcement **or** update from one **of** our data providers **is** posted **on** the website.

Data representation **of** gas **in** storage **as** a timeline AGSI dataset.

https://blogs.embarcadero.com/why-a-data-scientist-chooses-delphi-for-powerful-real-world-visualizations/ (https://blogs.embarcadero.com/why-a-data-scientist-chooses-delphi-for-powerful-real-world-visualizations/)

> Scikitlearns model.score(X,y) calculation works **on** coefficient **of** determination i.e R^2 **is** a simple **function**that takes model.score= (X_test,y_test). It doesn't require y_predicted value **to** be supplied externally **to** calculate the score **for** you, rather it calculates y_predicted internally **and uses** it **in** the calculations.

- Mean **Function**: Calculates the average **of** an **array**.
- Covariance **Function**: Computes the covariance between two arrays.
- Correlation: **Uses** covariance **and** standard deviations for the correlation coefficient.
- ComputeCorrelationMatrix: Iterates through all variable pairs **to** compute corr-matrix.
- PrintMatrix: Outputs the matrix **to** the console.

Delphi does **not** have a built-**in** correlation matrix **function** with a heatmap too, but you can implement one using standard math operations.

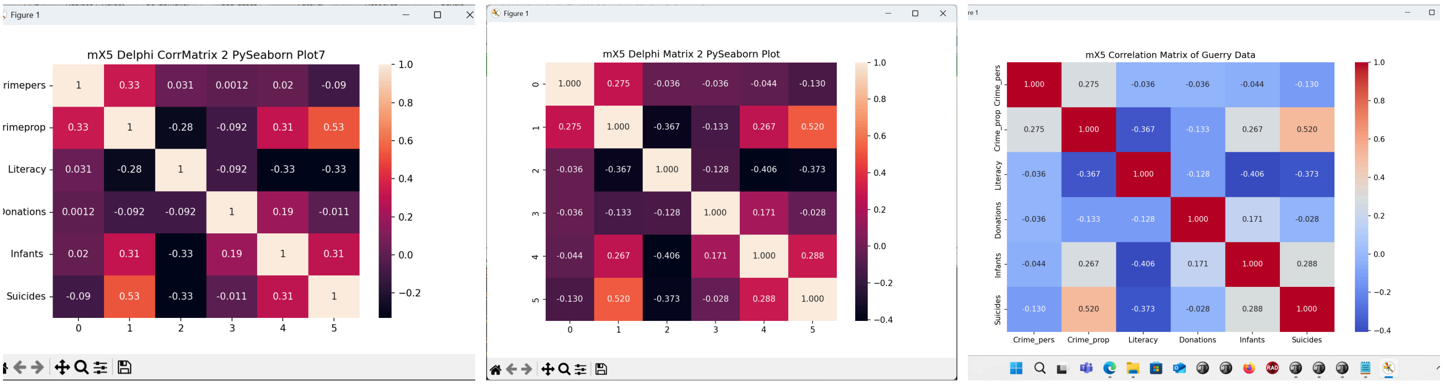


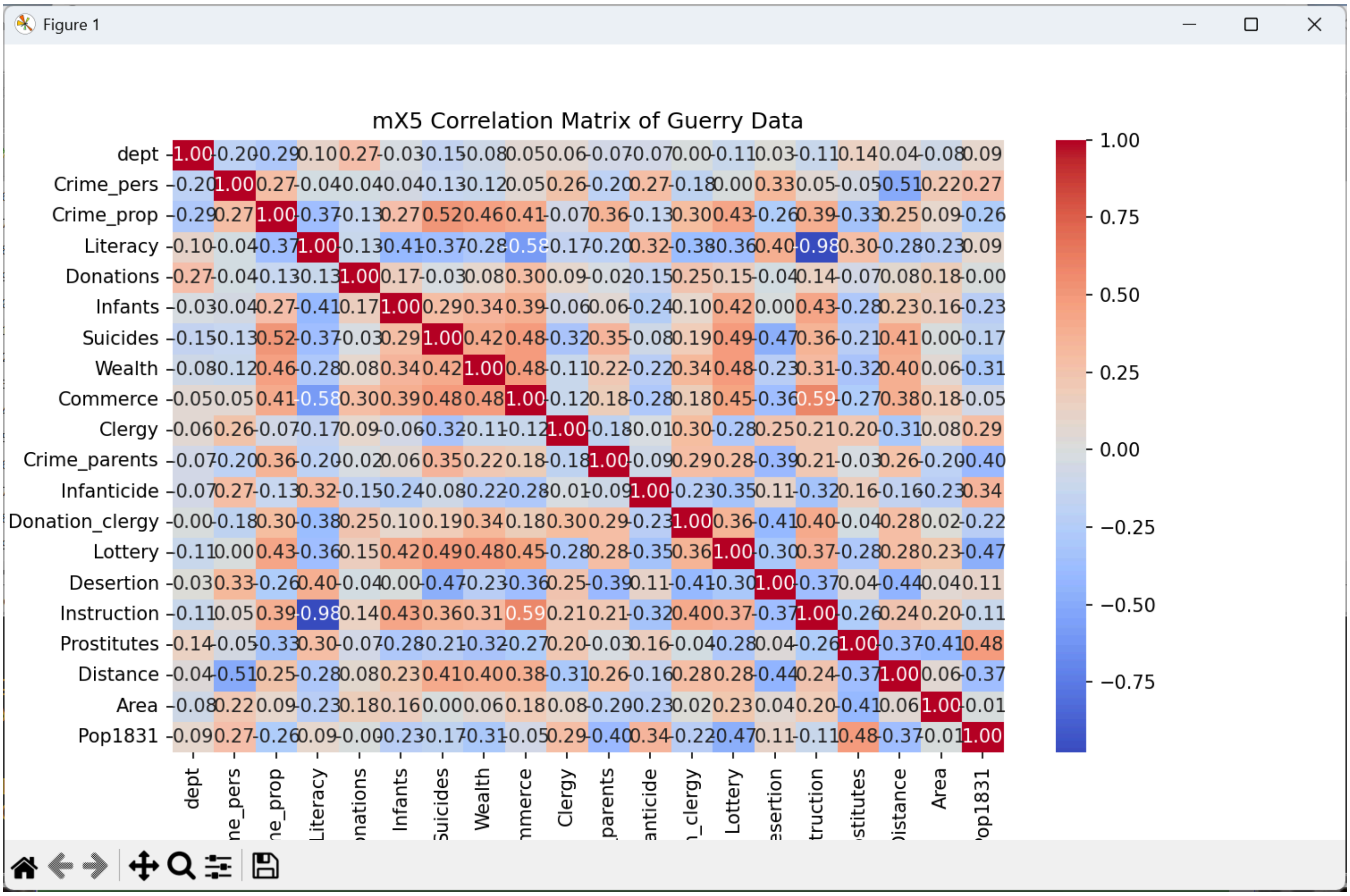
Figure 1
mX5 Delphi CorrMatrix 2 PySeaborn Plot7
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
Figure 1
mX5 Delphi Matrix 2 PySeaborn Plot
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4
re 1
mX5 Correlation Matrix of Guerry Data
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4

	0	1	2	3	4	5
rimepers	1	0.33	0.031	0.0012	0.02	-0.09
rimeprop	0.33	1	-0.28	-0.092	0.31	0.53
Literacy	0.031	-0.28	1	-0.092	-0.33	-0.33
)onations	0.0012	-0.092	-0.092	1	0.19	-0.011
Infants	0.02	0.31	-0.33	0.19	1	0.31
Suicides	-0.09	0.53	-0.33	-0.011	0.31	1

	0	1	2	3	4	5
0	1.000	0.275	-0.036	-0.036	-0.044	-0.130
1	0.275	1.000	-0.367	-0.133	0.267	0.520
2	-0.036	-0.367	1.000	-0.128	-0.406	-0.373
3	-0.036	-0.133	-0.128	1.000	0.171	-0.028
4	-0.044	0.267	-0.406	0.171	1.000	0.288
5	-0.130	0.520	-0.373	-0.028	0.288	1.000

	Crime_pers	Crime_prop	Literacy	Donations	Infants	Suicides
Crime_pers	1.000	0.275	-0.036	-0.036	-0.044	-0.130
Crime_prop	0.275	1.000	-0.367	-0.133	0.267	0.520
Literacy	-0.036	-0.367	1.000	-0.128	-0.406	-0.373
Donations	-0.036	-0.133	-0.128	1.000	0.171	-0.028
Infants	-0.044	0.267	-0.406	0.171	1.000	0.288
Suicides	-0.130	0.520	-0.373	-0.028	0.288	1.000

Seaborn Heatmap



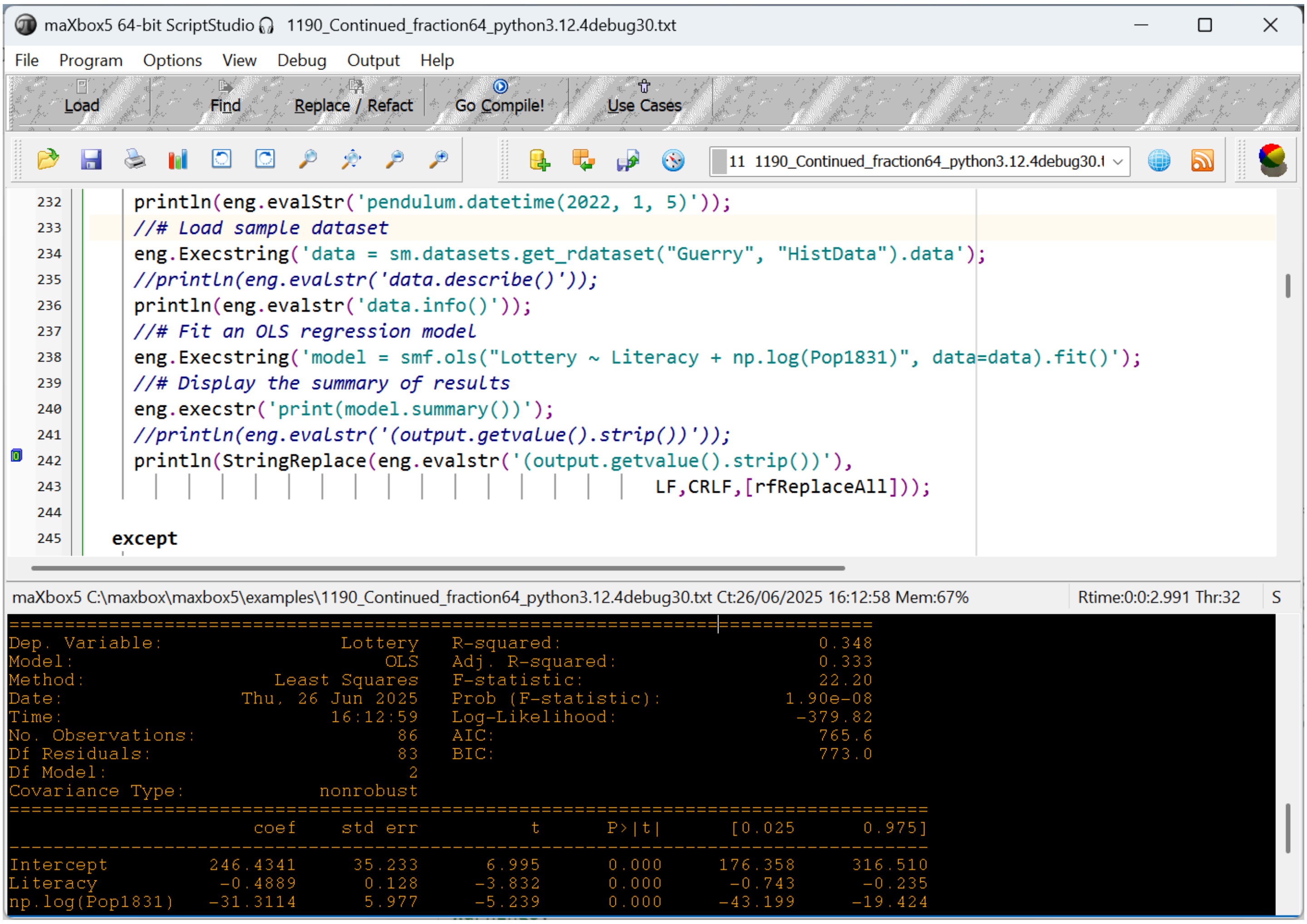
mX5 Correlation Matrix of Guerry Data

	dept	ne_pers	ne_prop	Literacy	onations	Infants	Suicides	Wealth	mmerce	Clergy	parents	anticide	n_clergy	Lottery	esertion	truction	stitutes	istance	Area	op1831
dept	1.00	-0.20	-0.29	0.10	0.27	-0.03	-0.15	-0.08	0.05	0.06	-0.07	-0.07	0.00	-0.11	0.03	-0.11	0.14	0.04	-0.08	0.09
Crime_pers	-0.20	1.00	0.27	-0.04	-0.04	-0.04	-0.13	-0.12	0.05	0.26	-0.20	0.27	-0.18	0.00	0.33	0.05	-0.05	-0.51	0.22	0.27
Crime_prop	-0.29	0.27	1.00	-0.37	-0.13	0.27	0.52	0.46	0.41	-0.07	0.36	-0.13	0.30	0.43	-0.26	0.39	-0.33	0.25	0.09	-0.26
Literacy	0.10	-0.04	-0.37	1.00	-0.13	-0.41	-0.37	-0.28	-0.58	-0.17	-0.20	0.32	-0.38	-0.36	0.40	-0.98	0.30	-0.28	-0.23	0.09
Donations	0.27	-0.04	-0.13	-0.13	1.00	0.17	-0.03	0.08	0.30	0.09	-0.02	-0.15	0.25	0.15	-0.04	0.14	-0.07	0.08	0.18	-0.00
Infants	-0.03	-0.04	0.27	-0.41	0.17	1.00	0.29	0.34	0.39	-0.06	0.06	-0.24	0.10	0.42	0.00	0.43	-0.28	0.23	0.16	-0.23
Suicides	-0.15	-0.13	0.52	-0.37	-0.03	0.29	1.00	0.42	0.48	-0.32	0.35	-0.08	0.19	0.49	-0.47	0.36	-0.21	0.41	0.00	-0.17
Wealth	-0.08	-0.12	0.46	-0.28	0.08	0.34	0.42	1.00	0.48	-0.11	0.22	-0.22	0.34	0.48	-0.23	0.31	-0.32	0.40	0.06	-0.31
Commerce	0.05	0.05	0.41	-0.58	0.30	0.39	0.48	0.48	1.00	-0.12	0.18	-0.28	0.18	0.45	-0.36	0.59	-0.27	0.38	0.18	-0.05
Clergy	0.06	0.26	-0.07	-0.17	0.09	-0.06	-0.32	-0.11	-0.12	1.00	-0.18	0.01	0.30	-0.28	0.25	0.21	0.20	-0.31	0.08	0.29
Crime_parents	-0.07	-0.20	0.36	-0.20	-0.02	0.06	0.35	0.22	0.18	-0.18	1.00	-0.09	0.29	0.28	-0.39	0.21	-0.03	0.26	-0.20	-0.40
Infanticide	-0.07	0.27	-0.13	0.32	-0.15	-0.24	-0.08	-0.22	-0.28	0.01	-0.09	1.00	-0.23	-0.35	0.11	-0.32	0.16	-0.16	-0.23	0.34
Donation_clergy	0.00	-0.18	0.30	-0.38	0.25	0.10	0.19	0.34	0.18	0.30	0.29	-0.23	1.00	0.36	-0.41	0.40	-0.04	0.28	0.02	-0.22
Lottery	-0.11	0.00	0.43	-0.36	0.15	0.42	0.49	0.48	0.45	-0.28	0.28	-0.35	0.36	1.00	-0.30	0.37	-0.28	0.28	0.23	-0.47
Desertion	0.03	0.33	-0.26	0.40	-0.04	0.00	-0.47	-0.23	-0.36	0.25	-0.39	0.11	-0.41	-0.30	1.00	-0.37	0.04	-0.44	0.04	0.11
Instruction	-0.11	0.05	0.39	-0.98	0.14	0.43	0.36	0.31	0.59	0.21	0.21	-0.32	0.40	0.37	-0.37	1.00	-0.26	0.24	0.20	-0.11
Prostitutes	0.14	-0.05	-0.33	0.30	-0.07	-0.28	-0.21	-0.32	-0.27	0.20	-0.03	0.16	-0.04	-0.28	0.04	-0.26	1.00	-0.37	-0.41	0.48
Distance	0.04	-0.51	0.25	-0.28	0.08	0.23	0.41	0.40	0.38	-0.31	0.26	-0.16	0.28	0.28	-0.44	0.24	-0.37	1.00	0.06	-0.37
Area	-0.08	0.22	0.09	-0.23	0.18	0.16	0.00	0.06	0.18	0.08	-0.20	-0.23	0.02	0.23	0.04	0.20	-0.41	0.06	1.00	-0.01
Pop1831	0.09	0.27	-0.26	0.09	-0.00	-0.23	-0.17	-0.31	-0.05	0.29	-0.40	0.34	-0.22	-0.47	0.11	-0.11	0.48	-0.37	-0.01	1.00

Guerry Dataset – from a csv file to a dataframe

The **mrMath**, mrStats, mrMatrix, mrImgUtils package includes:

- Standard Fisher LDA classifier
- Robust (and Fast Robust) version of this classifier
- Incremental (and Robust) Fisher LDA classifier learning.
- Support Vector Machines (least squares and lagrangian learning)
- Naive Bayes
- Simple Decission stumps
- Radial basis function
- C4.5 Decission trees.
- K-means
- Ensemble classifiers: AdaBoost, Gentle Boost, Bagging
- Simple feed forward Neural Nets


maXbox5 64-bit ScriptStudio 1190_Continued_fraction64_python3.12.4debug30.txt
File Program Options View Debug Output Help
Load Find Replace / Refact Go Compile! Use Cases
11 1190_Continued_fraction64_python3.12.4debug30.t

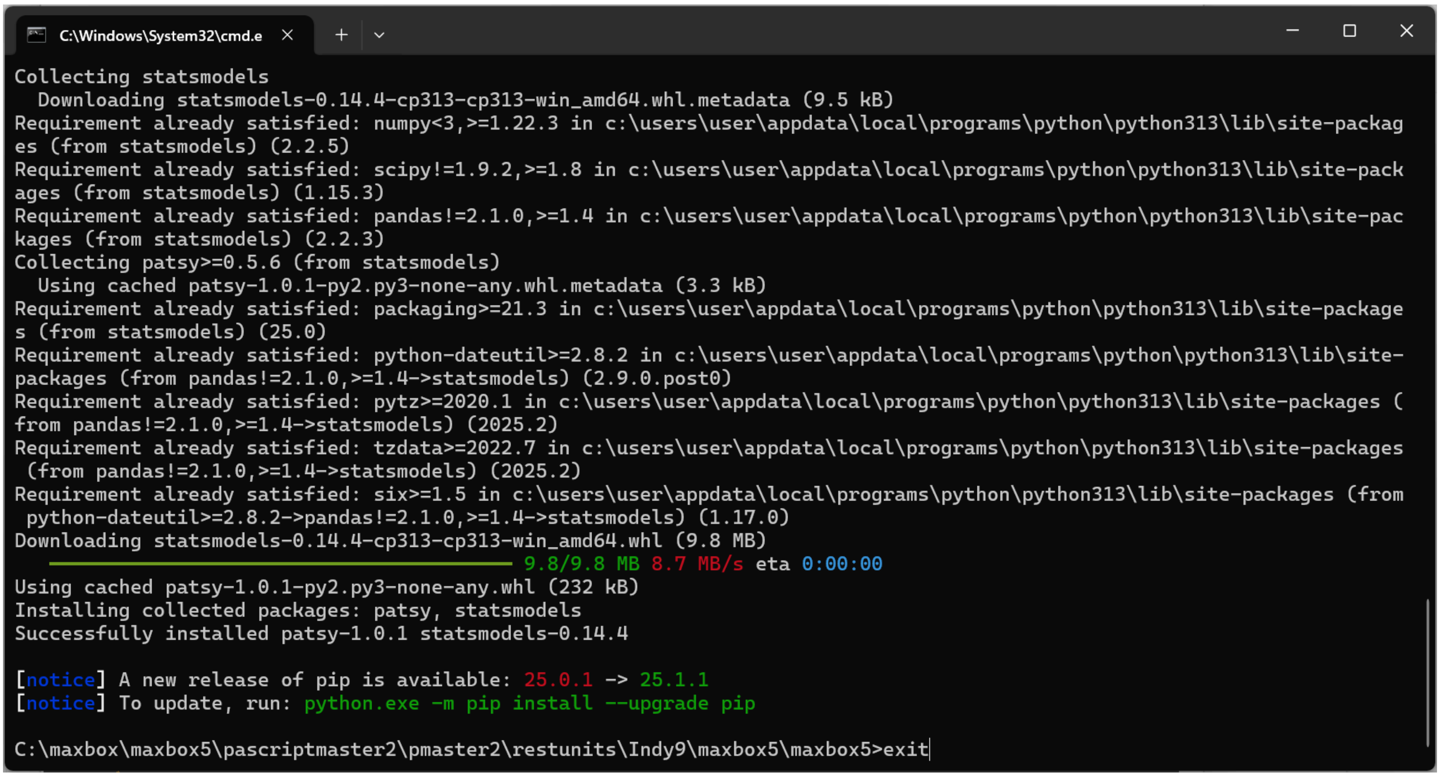
```
      println(eng.evalStr('pendulum.datetime(2022, 1, 5)'));
      //# Load sample dataset
      eng.Execstring('data = sm.datasets.get_rdataset("Guerry", "HistData").data');
      //println(eng.evalstr('data.describe()'));
      println(eng.evalstr('data.info()'));
      //# Fit an OLS regression model
      eng.Execstring('model = smf.ols("Lottery ~ Literacy + np.log(Pop1831)", data=data).fit()');
      //# Display the summary of results
      eng.execstr('print(model.summary())');
      //println(eng.evalstr('(output.getvalue().strip())'));
      println(StringReplace(eng.evalstr('(output.getvalue().strip())'),
                                                      LF,CRLF,[rfReplaceAll]));

    except
```

maXbox5 C:\maxbox\maxbox5\examples\1190_Continued_fraction64_python3.12.4debug30.txt Ct:26/06/2025 16:12:58 Mem:67% Rtime:0:0:2.991 Thr:32 S

```
==============================================================================
Dep. Variable:                Lottery   R-squared:                       0.348
Model:                            OLS   Adj. R-squared:                  0.333
Method:                 Least Squares   F-statistic:                     22.20
Date:                Thu, 26 Jun 2025   Prob (F-statistic):           1.90e-08
Time:                        16:12:59   Log-Likelihood:                -379.82
No. Observations:                  86   AIC:                             765.6
Df Residuals:                      83   BIC:                             773.0
Df Model:                           2
Covariance Type:            nonrobust
===================================================================================
                      coef    std err          t      P>|t|      [0.025      0.975]
-----------------------------------------------------------------------------------
Intercept         246.4341     35.233      6.995      0.000     176.358     316.510
Literacy           -0.4889      0.128     -3.832      0.000      -0.743      -0.235
np.log(Pop1831)   -31.3114      5.977     -5.239      0.000     -43.199     -19.424
```

mX5.2 with Statsmodels Console Output

Learn how to **install statsmodels,** a Python package for statistical modeling, using Anaconda, PyPI, source or development version.



```
Collecting statsmodels
  Downloading statsmodels-0.14.4-cp313-cp313-win_amd64.whl.metadata (9.5 kB)
Requirement already satisfied: numpy<3,>=1.22.3 in c:\users\user\appdata\local\programs\python\python313\lib\site-packag
es (from statsmodels) (2.2.5)
Requirement already satisfied: scipy!=1.9.2,>=1.8 in c:\users\user\appdata\local\programs\python\python313\lib\site-pack
ages (from statsmodels) (1.15.3)
Requirement already satisfied: pandas!=2.1.0,>=1.4 in c:\users\user\appdata\local\programs\python\python313\lib\site-pac
kages (from statsmodels) (2.2.3)
Collecting patsy>=0.5.6 (from statsmodels)
  Using cached patsy-1.0.1-py2.py3-none-any.whl.metadata (3.3 kB)
Requirement already satisfied: packaging>=21.3 in c:\users\user\appdata\local\programs\python\python313\lib\site-package
s (from statsmodels) (25.0)
Requirement already satisfied: python-dateutil>=2.8.2 in c:\users\user\appdata\local\programs\python\python313\lib\site-
packages (from pandas!=2.1.0,>=1.4->statsmodels) (2.9.0.post0)
Requirement already satisfied: pytz>=2020.1 in c:\users\user\appdata\local\programs\python\python313\lib\site-packages (
from pandas!=2.1.0,>=1.4->statsmodels) (2025.2)
Requirement already satisfied: tzdata>=2022.7 in c:\users\user\appdata\local\programs\python\python313\lib\site-packages
 (from pandas!=2.1.0,>=1.4->statsmodels) (2025.2)
Requirement already satisfied: six>=1.5 in c:\users\user\appdata\local\programs\python\python313\lib\site-packages (from
 python-dateutil>=2.8.2->pandas!=2.1.0,>=1.4->statsmodels) (1.17.0)
Downloading statsmodels-0.14.4-cp313-cp313-win_amd64.whl (9.8 MB)
   ---------------------------------------- 9.8/9.8 MB 8.7 MB/s eta 0:00:00
Using cached patsy-1.0.1-py2.py3-none-any.whl (232 kB)
Installing collected packages: patsy, statsmodels
Successfully installed patsy-1.0.1 statsmodels-0.14.4

[notice] A new release of pip is available: 25.0.1 -> 25.1.1
[notice] To update, run: python.exe -m pip install --upgrade pip

C:\maxbox\maxbox5\pascriptmaster2\pmaster2\restunits\Indy9\maxbox5\maxbox5>exit
```

Statsmodels Py 3.13.4

You can compute a correlation matrix **in** Delphi by iterating over all pairs **of** variables, extracting columns,
and applying the Pearson correlation formula. **For** more advanced matrix operations **or** large datasets, consider using a Delphi matrix **library**.

```
procedure ComputeCorrelationMatrix(const Data: DMatrix; var CorrMatrix: DMatrix);
var
  i, j, k, nVars, nObs: Integer;
  colI, colJ: array of Double;
begin
  nObs:= Length(Data);
  nVars:= Length(Data[0]);
  //SetLength(CorrMatrix, nVars, nVars);
  SetMatrixLength(corrMatrix, nvars, nvars);
  for i:= 0 to nVars-1  do begin
    SetLength(colI, nObs);
    for j:= 0 to nObs - 1 do
      colI[j]:= Data[j][i];
    for j:= i to nVars-1  do begin
      SetLength(colJ, nObs);
      for k:= 0 to nObs - 1 do
        colJ[k]:= Data[k][j];
      CorrMatrix[i][j]:= PearsonCorrelation(colI, colJ);
      CorrMatrix[j][i]:= CorrMatrix[i][j]; // Matrix is symmetric
    end;
  end;
end;
```

To transform the CSV data from file to matrix and dataframe you need 4 steps:

```
S:= TStringList.Create;
  try
    //S.StrictDelimiter := True;
    S.LineBreak := #10;
    //S1.Delimiter := ',';
    s.loadfromfile(exepath+'\examples\1417_export_dataframe.csv');
    writ('size: '+itoa(s.count));
    SetMatrixLength(mData, 86, 6);
    TStringListToMatrix(s, mData);
```

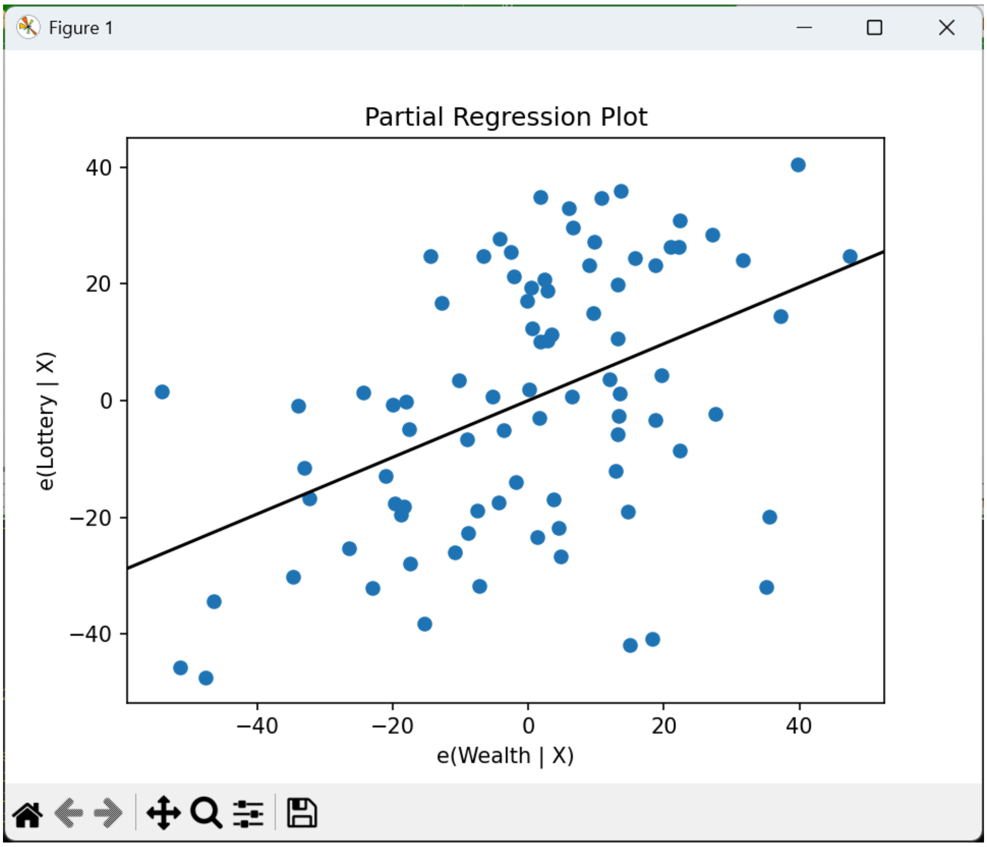
Input:
The `StringList` contains rows of data as strings, separated commas.

Parsing: Each string is split into columns using `CommaText` of a temporary `TStringList`.

Matrix Population: The parsed values are stored in a 2D array (`Matrix`).

Output: The matrix is printed to verify the conversion.

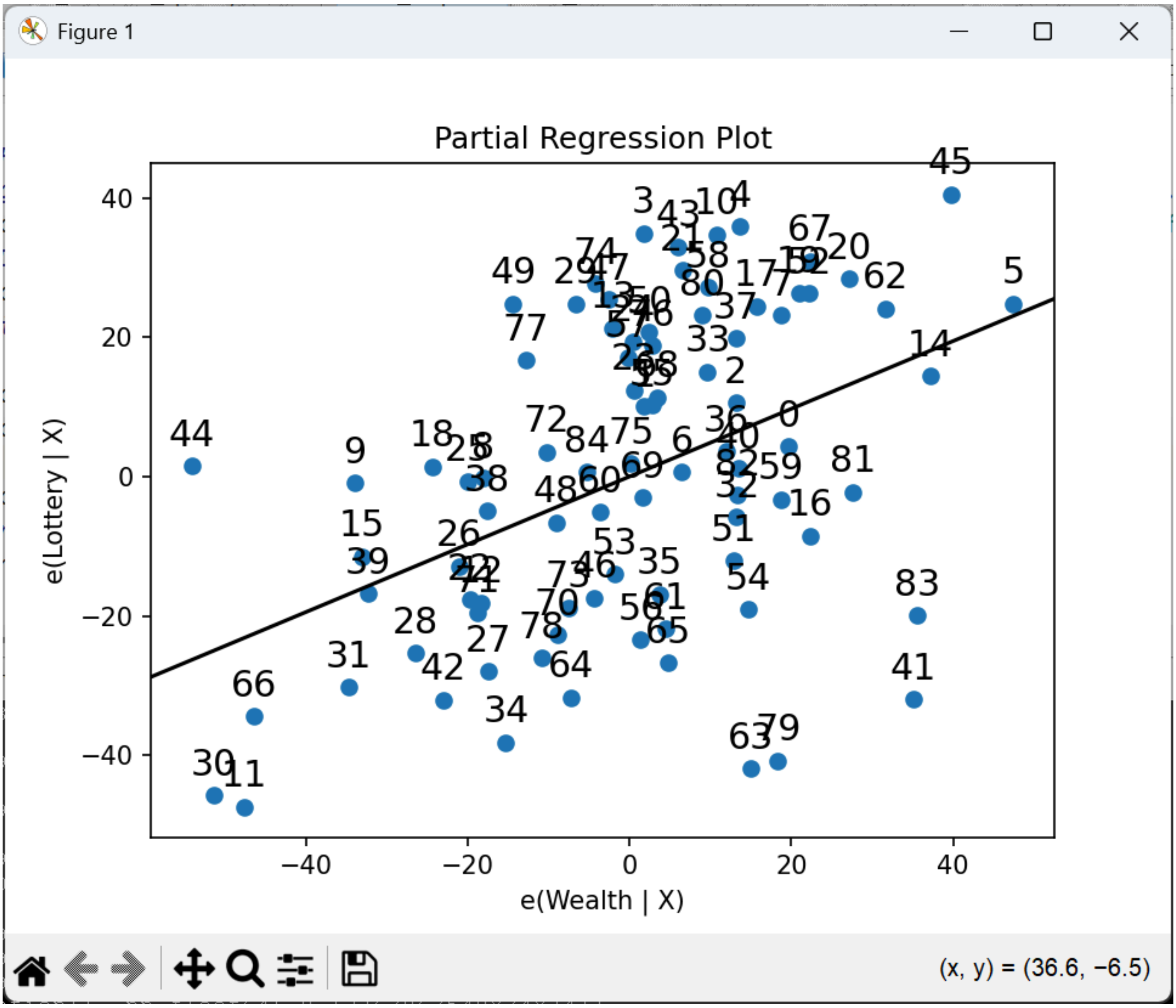
```
procedure TStringListToMatrix(strList: TStringList; var matrix: DMatrix);
var i, j: Integer;
  RowData: TStringList;
begin
  if strList.Count = 0 then Exit;
  // Create a temporary TStringList to parse each row
  RowData:= TStringList.Create;
  try
    RowData.Delimiter:= ','; // Assuming comma-separated values
    RowData.StrictDelimiter:= True;
    //RowData.commatext
    // Resize matrix to match the TStringList dimensions
    SetLength(matrix, strList.Count);
    for i := 1 to strList.Count - 1 do begin
      RowData.DelimitedText:= strList[i];
      //writ('debug '+itoa(rowdata.count));
      SetLength(Matrix[i], RowData.Count);
      for j:= 4 to RowData.Count - 15 do begin   //slice 4-9
        Matrix[i][j-4]:= strtofloat(RowData[j]);
        //writ('debug '+flots(matrix[i][j]));
      end;
    end;
  finally
    RowData.Free;
  end;
end;
```



Partial Regression Plot with Statsmodels

debug: 208-RuntimeError: CPU dispatcher tracer already initlized 865 err:20
debug: 209-RuntimeError: CPU dispatcher tracer already initlized 865 err:20
Exception: RuntimeError: CPU dispatcher tracer already initlized at 865.3134

```
//# Fit an OLS regression model
  //eng.Execstring('model = smf.ols("Lottery ~ Literacy + np.log(Pop1831)", data=data).fit()');
   Execstr('model = smf.ols("Lottery ~ Wealth + Literacy + np.log(Pop1831)", data=df).fit()');
  //# Display the summary of results
   execstr('print(model.summary())');
  {Notice that there is one missing observation in the Region column.
                  We eliminate it using a DataFrame method provided by pandas:}
   execstr('df = df.dropna()');
   execstr('sm.graphics.plot_partregress("Lottery","Wealth", ["Region","Distance"],'+
                                                     'data=df, obs_labels=False)');
   ExecStr('plt.show()');
```

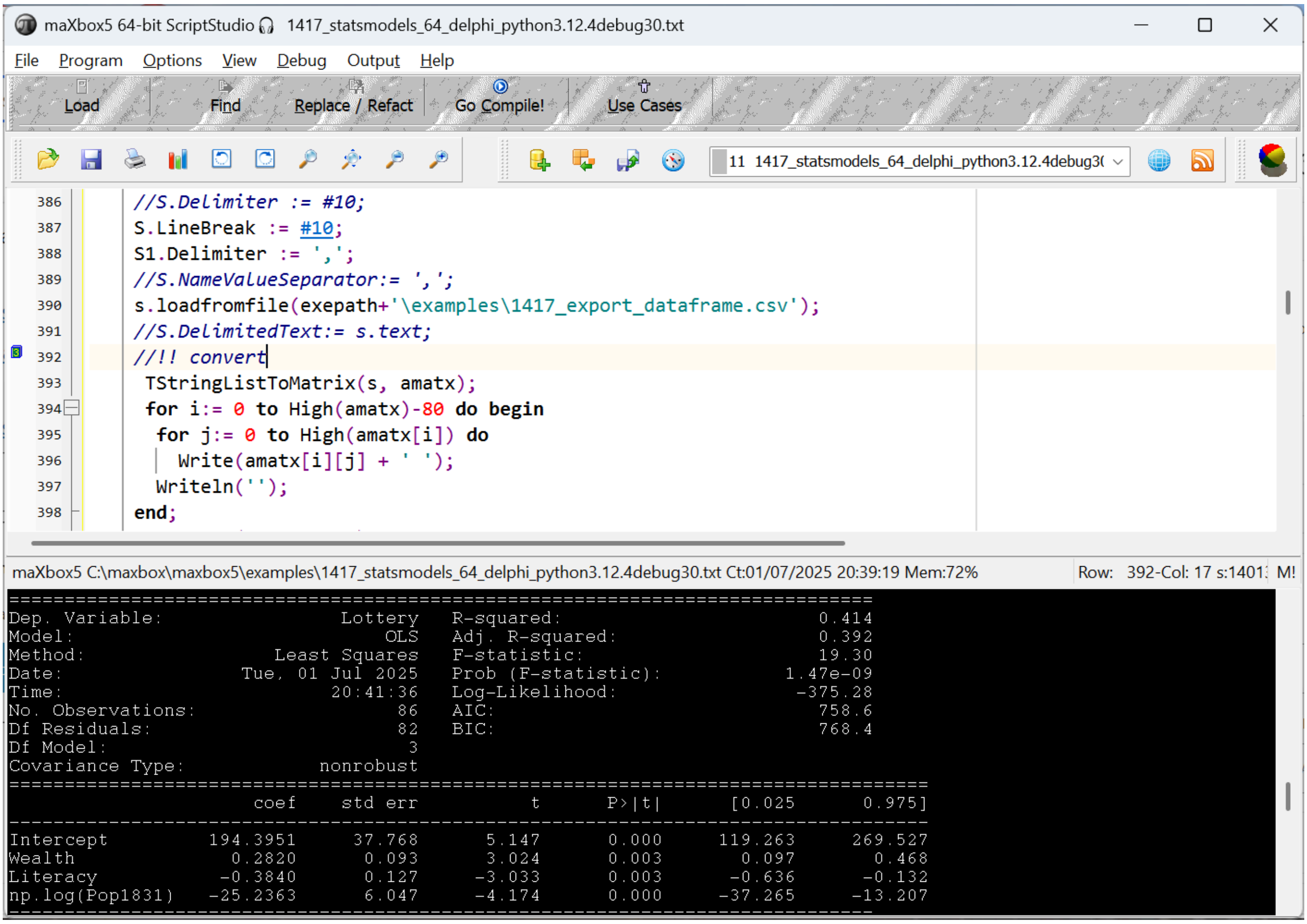


sample or observation tracer obs_labels=True

Scripts at:

https://sourceforge.net/projects/maxbox5/files/EKON29/1385_DCorrelation3SeabornPyCompare2_uc.txt/download (https://sourceforge.net/projects/maxbox5/files/EKON29/1385_DCorrelation3SeabornPyCompare2_uc.txt/download)

https://sourceforge.net/projects/maxbox5/files/examples/1417_statsmodels_64_delphi_python3.12.4debug30.txt/download (https://sourceforge.net/projects/maxbox5/files/examples/1417_statsmodels_64_delphi_python3.12.4debug30.txt/download)


maXbox5 64-bit ScriptStudio 1417_statsmodels_64_delphi_python3.12.4debug30.txt
File
Program
Options
View
Debug
Output
Help
Load
Find
Replace / Refact
Go Compile!
Use Cases
11 1417_statsmodels_64_delphi_python3.12.4debug3(

```
//S.Delimiter := #10;
S.LineBreak := #10;
S1.Delimiter := ',';
//S.NameValueSeparator:= ',';
s.loadfromfile(exepath+'\examples\1417_export_dataframe.csv');
//S.DelimitedText:= s.text;
//!! convert
 TStringListToMatrix(s, amatx);
 for i:= 0 to High(amatx)-80 do begin
  for j:= 0 to High(amatx[i]) do
    Write(amatx[i][j] + ' ');
  Writeln('');
end;
```

maXbox5 C:\maxbox\maxbox5\examples\1417_statsmodels_64_delphi_python3.12.4debug30.txt Ct:01/07/2025 20:39:19 Mem:72% Row: 392-Col: 17 s:1401: M!

```
==============================================================================
Dep. Variable:                Lottery   R-squared:                       0.414
Model:                            OLS   Adj. R-squared:                  0.392
Method:                 Least Squares   F-statistic:                     19.30
Date:                Tue, 01 Jul 2025   Prob (F-statistic):           1.47e-09
Time:                        20:41:36   Log-Likelihood:                -375.28
No. Observations:                  86   AIC:                             758.6
Df Residuals:                      82   BIC:                             768.4
Df Model:                           3
Covariance Type:            nonrobust
===================================================================================
                      coef    std err          t      P>|t|      [0.025      0.975]
-----------------------------------------------------------------------------------
Intercept         194.3951     37.768      5.147      0.000     119.263     269.527
Wealth              0.2820      0.093      3.024      0.003       0.097       0.468
Literacy           -0.3840      0.127     -3.033      0.003      -0.636      -0.132
np.log(Pop1831)   -25.2363      6.047     -4.174      0.000     -37.265     -13.207
------------------------------------------------------------------------------
```

Python for Delphi at maXbox statsmodels console

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Date: 2025.07.01 21:38:25
+02'00'