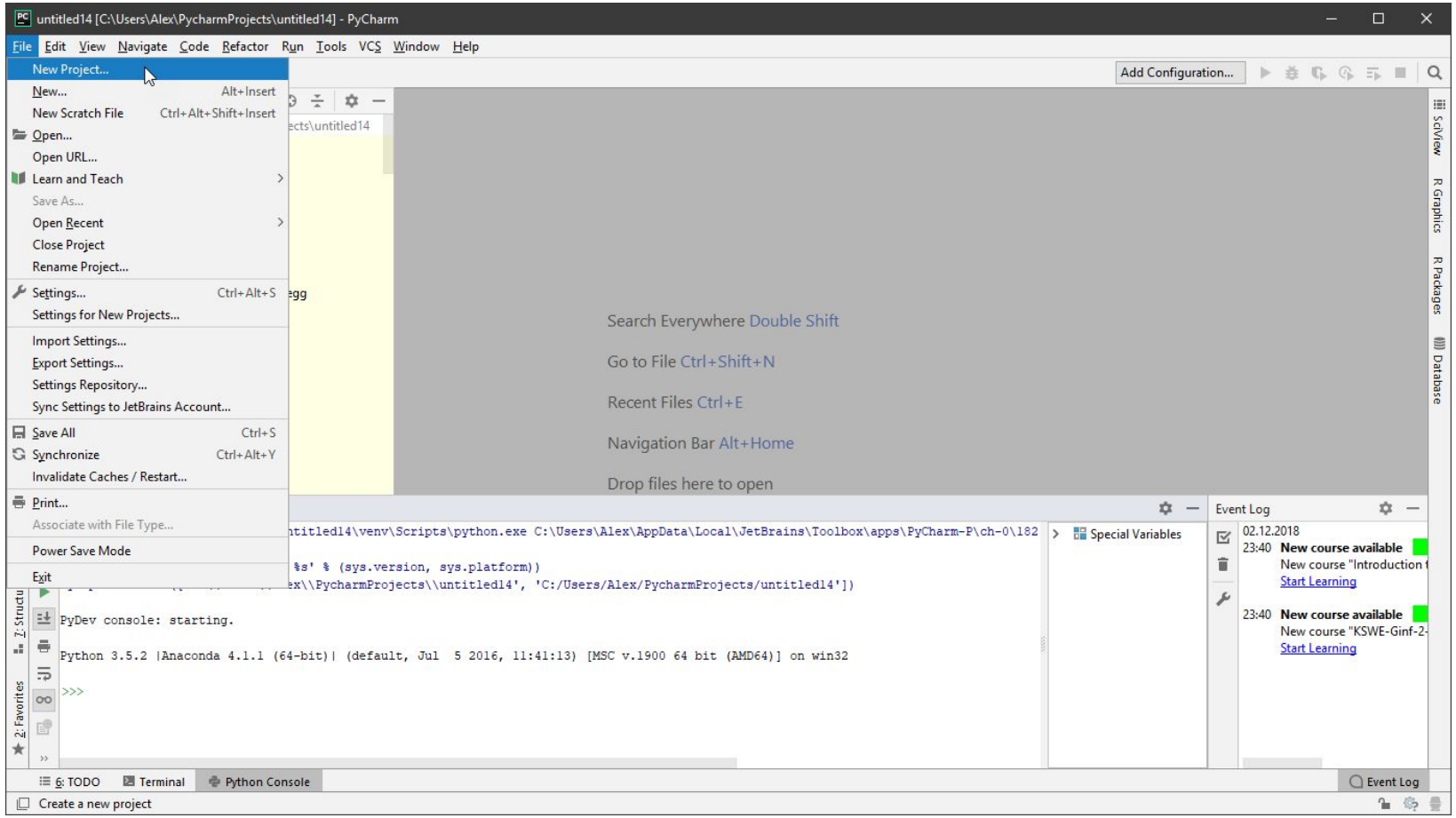
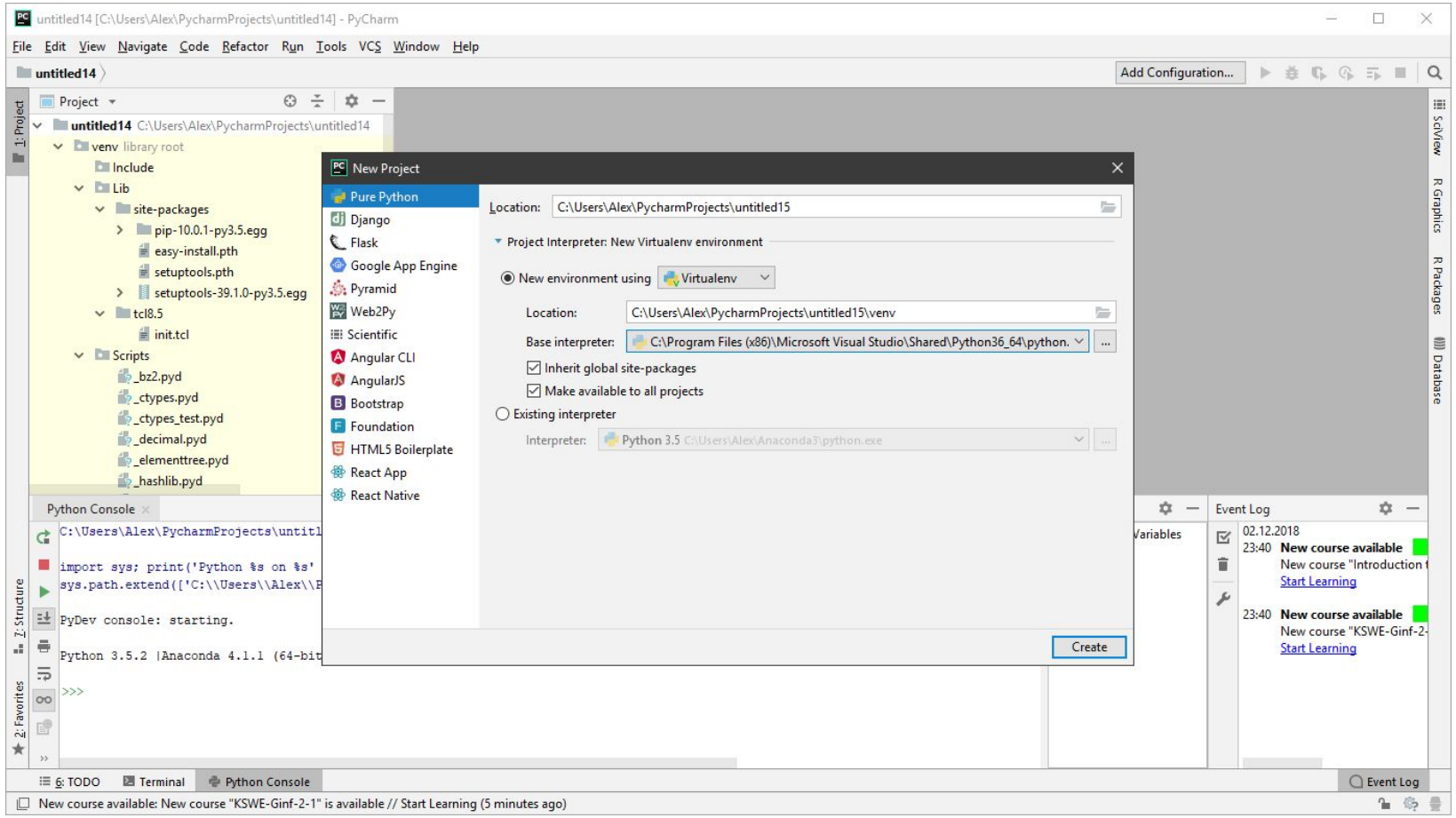
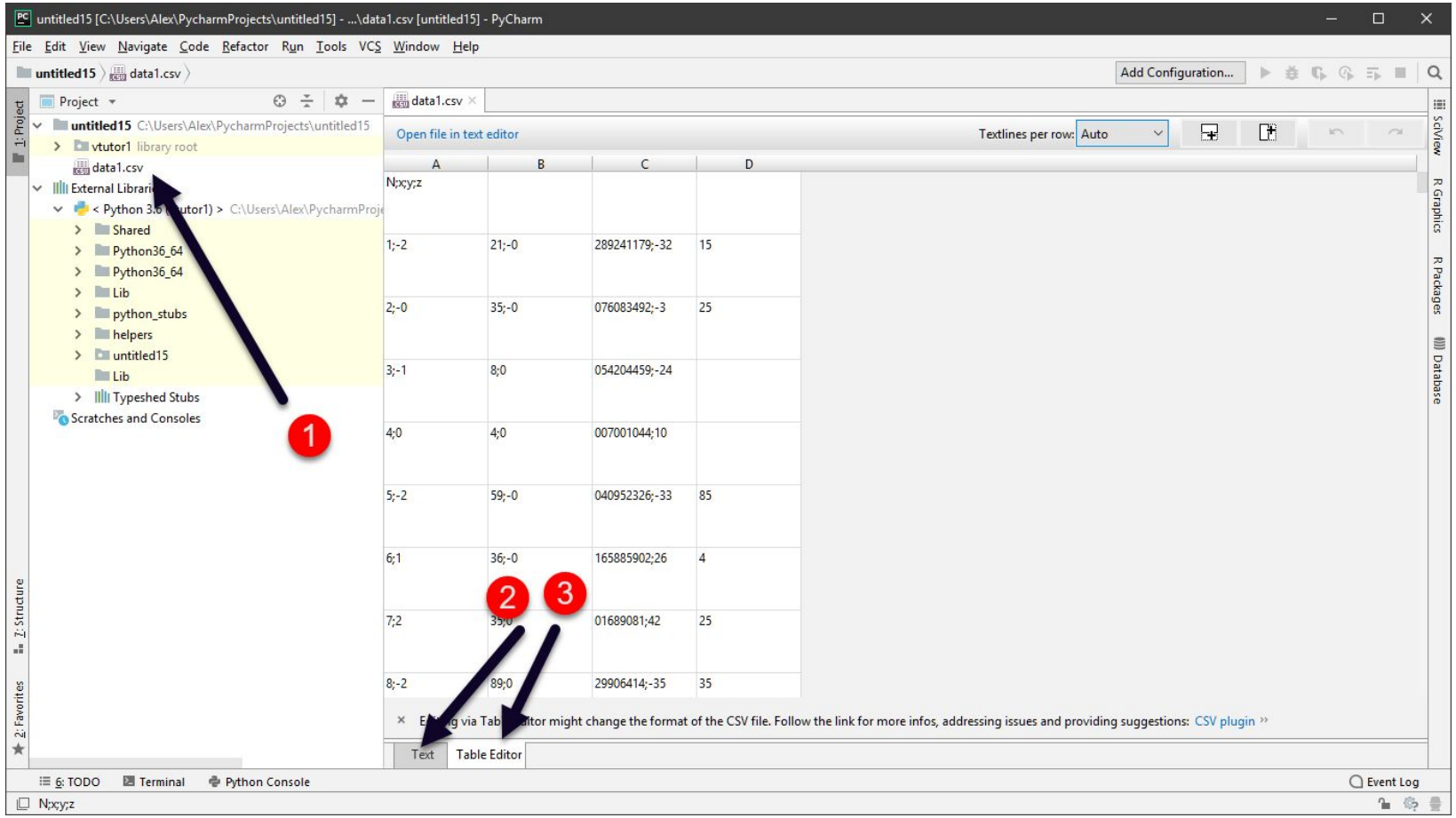
# Новый проект



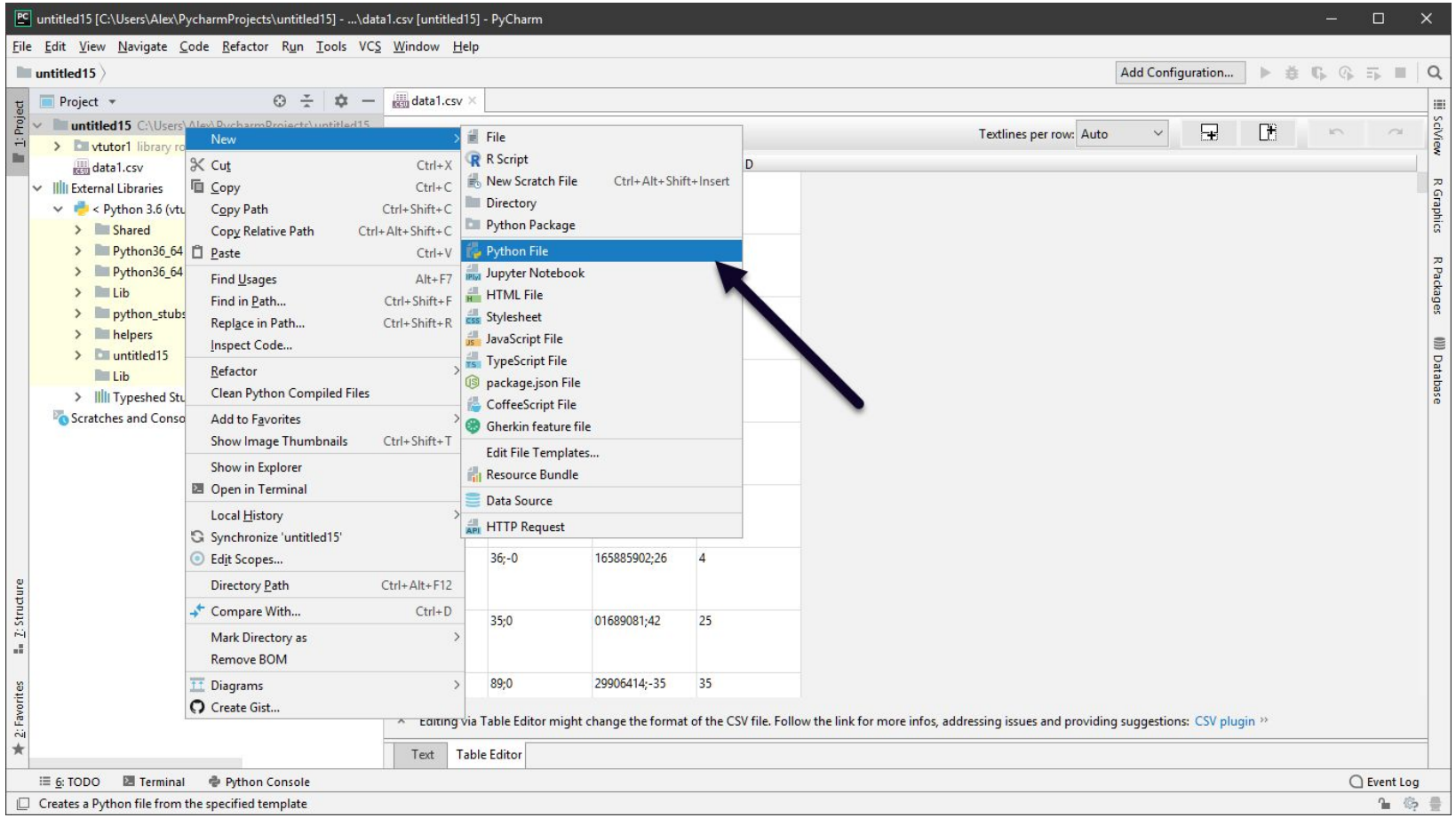
# Подключаем или создаем среду разработки python

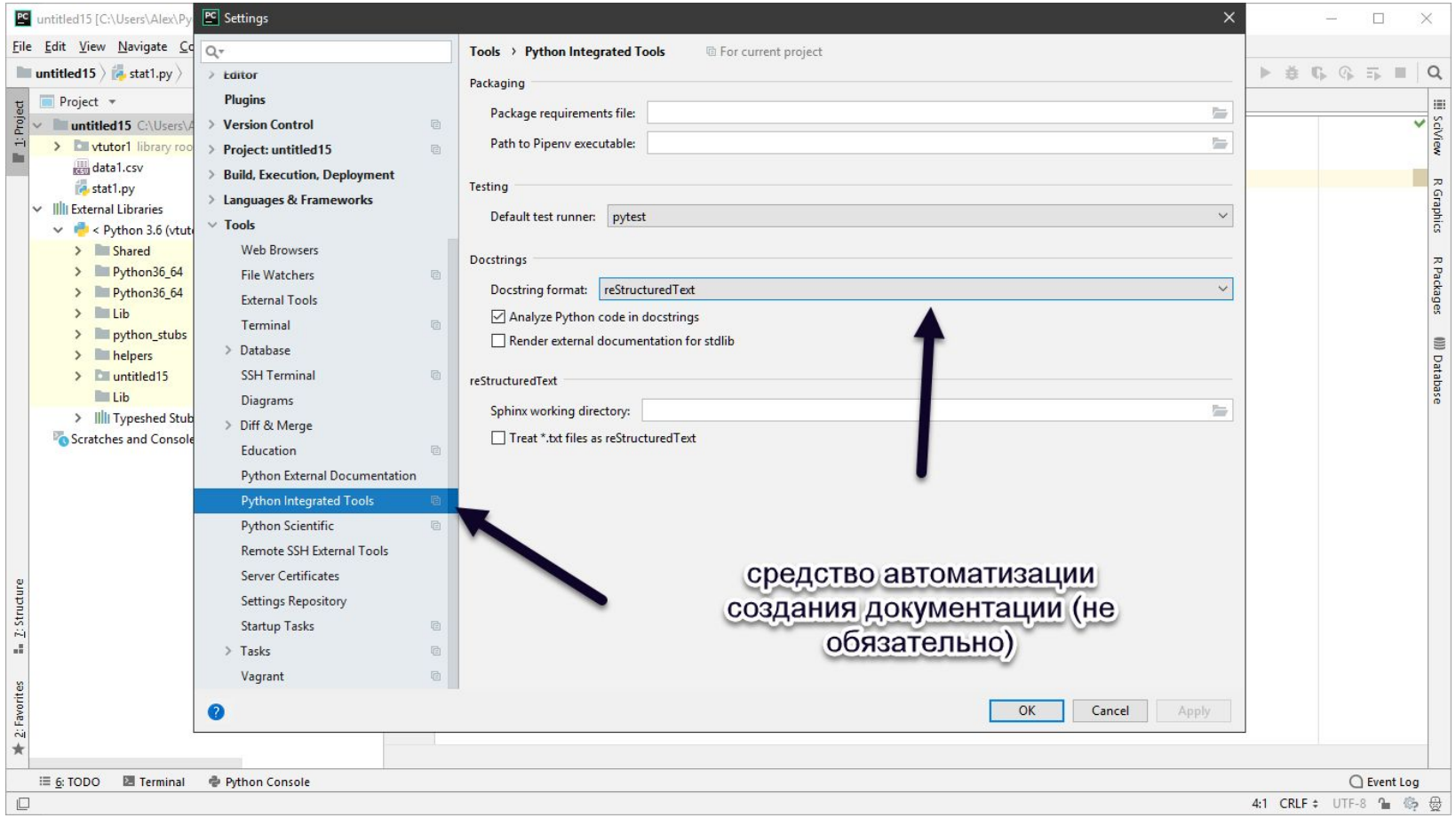


# Старый файл с данными



# Новый файл python



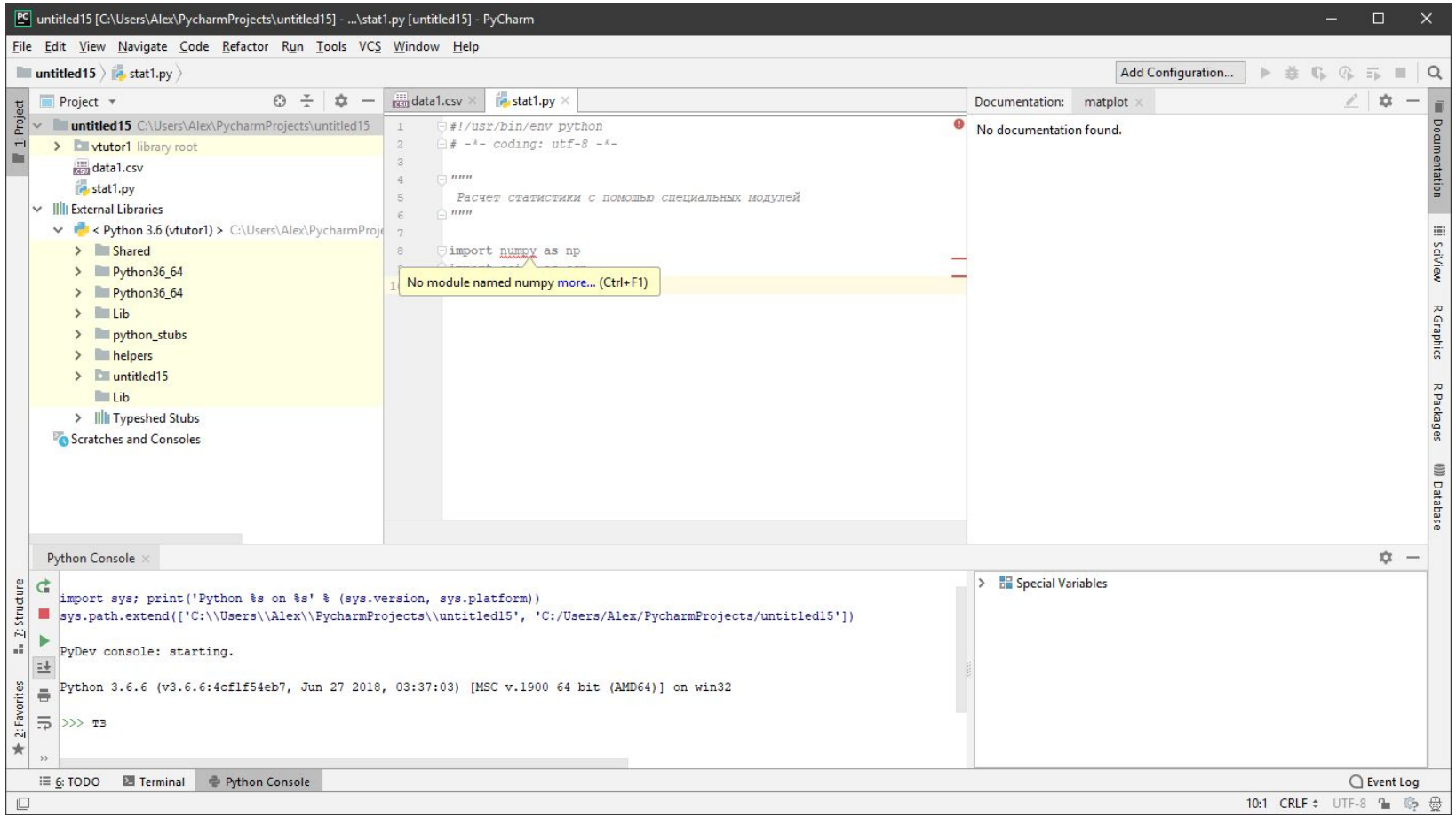

Settings
Tools › Python Integrated Tools
For current project
Packaging
Package requirements file:
Path to Pipenv executable:
Testing
Default test runner: pytest
Docstrings
Docstring format: reStructuredText
Analyze Python code in docstrings
Render external documentation for stdlib
reStructuredText
Sphinx working directory:
Treat *.txt files as reStructuredText
Python Integrated Tools
средство автоматизации создания документации (не обязательно)
OK
Cancel
Apply

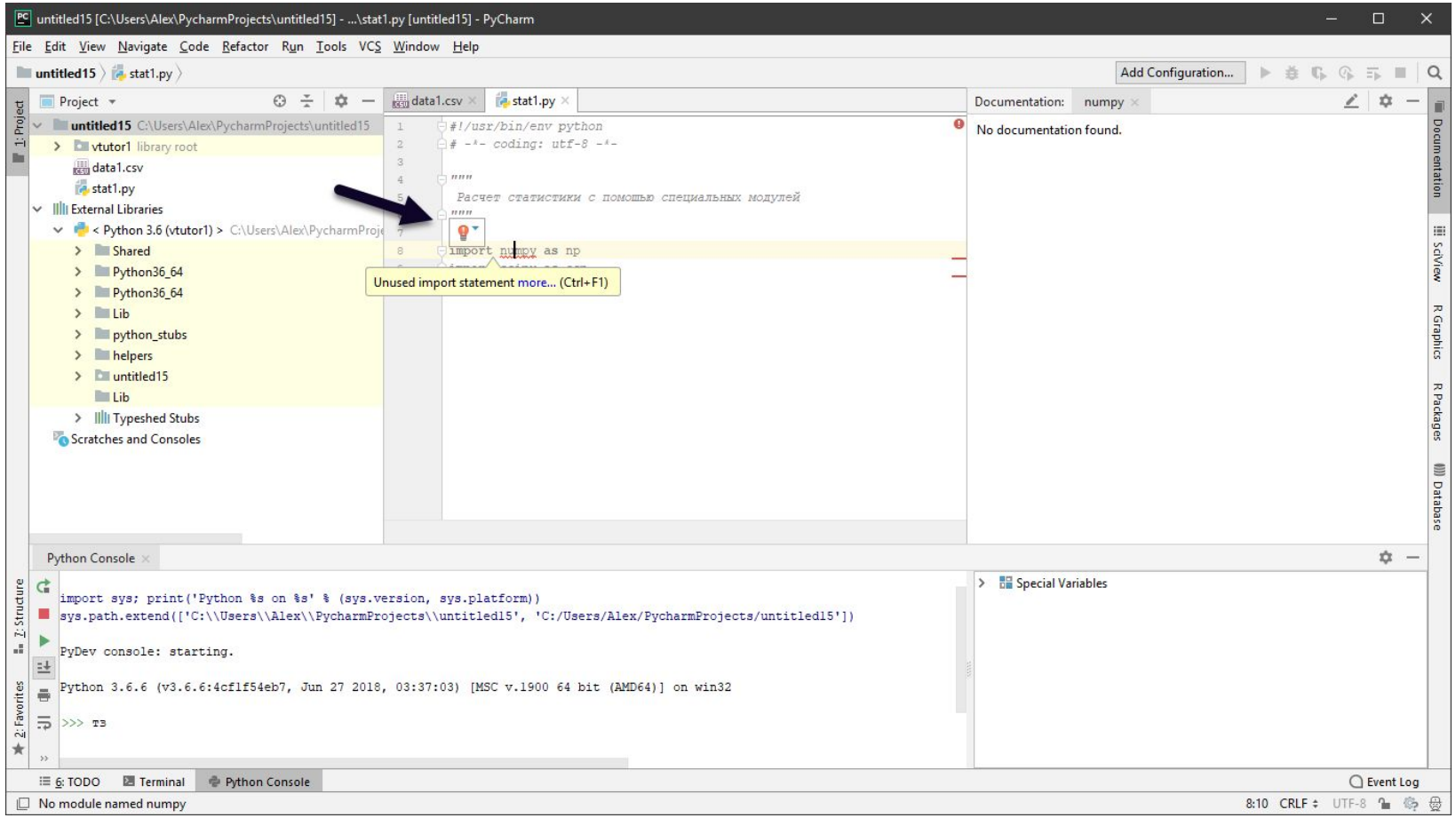
# Внешние модули

- Модули надо установить в текущее окружение
- Подключить к программе

- Среда PyCharm предлагает СНАЧАЛА подключить модуль
- Затем, если его нет в окружении – докачать через Интернет и установить

- После скачивания среда тратит время на анализ модуля, это требует времени


untitled15 [C:\Users\Alex\PycharmProjects\untitled15] - ...\stat1.py [untitled15] - PyCharm
File Edit View Navigate Code Refactor Run Tools VCS Window Help
untitled15 stat1.py
Add Configuration...
Project
untitled15 C:\Users\Alex\PycharmProjects\untitled15
vtutor1 library root
data1.csv
stat1.py
External Libraries
< Python 3.6 (vtutor1) > C:\Users\Alex\PycharmProj
Shared
Python36_64
Python36_64
Lib
python_stubs
helpers
untitled15
Lib
Typeshed Stubs
Scratches and Consoles
data1.csv
stat1.py
#!/usr/bin/env python
# -*- coding: utf-8 -*-
"""
Расчет статистики с помощью специальных модулей
"""
import numpy as np
No module named numpy more... (Ctrl+F1)
Documentation: matplot
No documentation found.
Python Console
import sys; print('Python %s on %s' % (sys.version, sys.platform))
sys.path.extend(['C:\\Users\\Alex\\PycharmProjects\\untitled15', 'C:/Users/Alex/PycharmProjects/untitled15'])
PyDev console: starting.
Python 3.6.6 (v3.6.6:4cf1f54eb7, Jun 27 2018, 03:37:03) [MSC v.1900 64 bit (AMD64)] on win32
>>> тз
Special Variables
1: Project
2: Favorites
7: Structure
Documentation
SciView
R Graphics
R Packages
Database
6: TODO
Terminal
Python Console
Event Log
10:1 CRLF UTF-8


untitled15 [C:\Users\Alex\PycharmProjects\untitled15] - ...\stat1.py [untitled15] - PyCharm
File Edit View Navigate Code Refactor Run Tools VCS Window Help
untitled15 stat1.py
Add Configuration...
Project
data1.csv
stat1.py
Documentation: numpy
No documentation found.
untitled15 C:\Users\Alex\PycharmProjects\untitled15
vtutor1 library root
data1.csv
stat1.py
External Libraries
< Python 3.6 (vtutor1) >
Shared
Python36_64
Python36_64
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helpers
untitled15
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Typeshed Stubs
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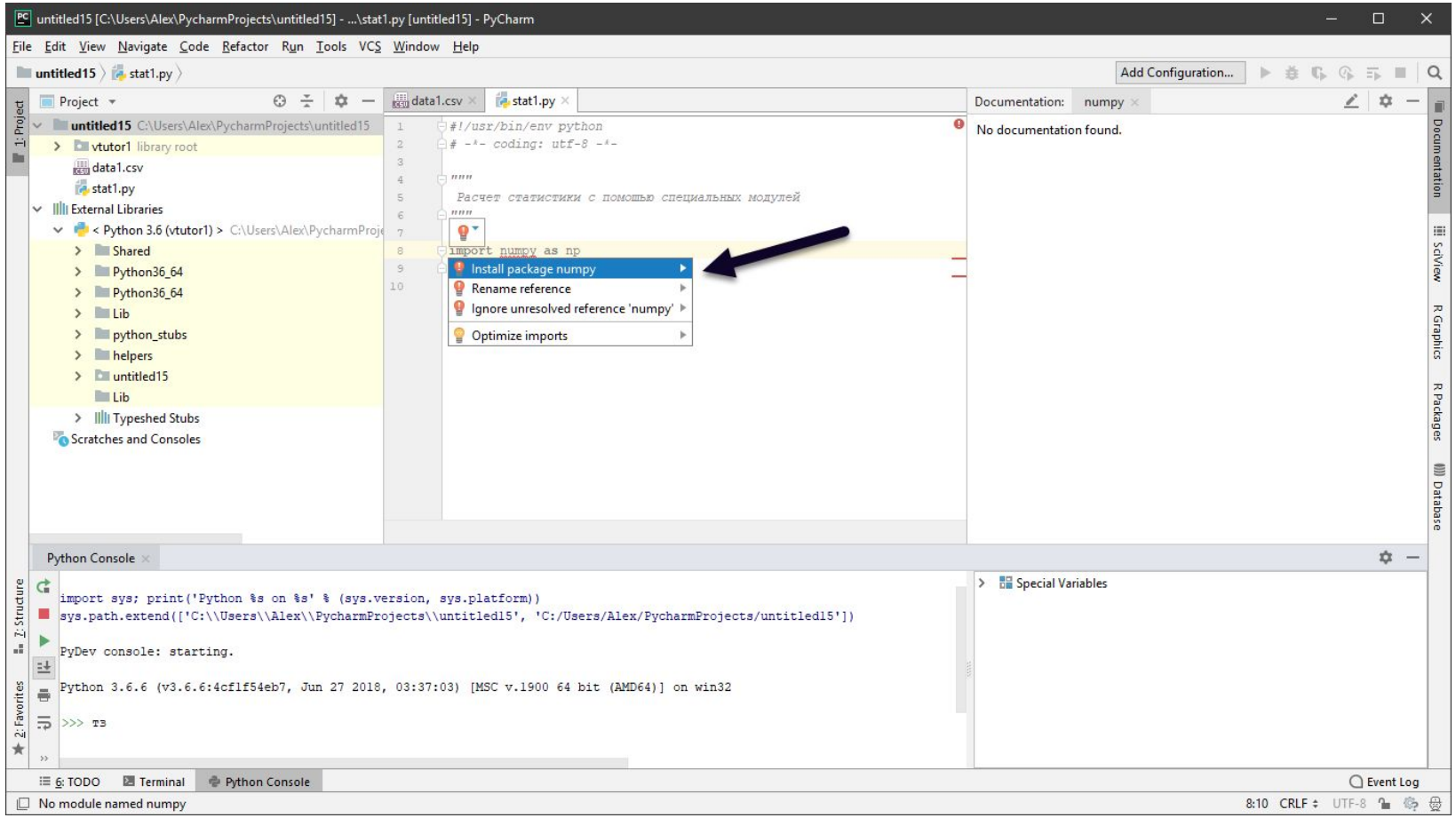
#!/usr/bin/env python
# -*- coding: utf-8 -*-
"""
Расчет статистики с помощью специальных модулей
"""
import numpy as np
Unused import statement more... (Ctrl+F1)
Python Console
import sys; print('Python %s on %s' % (sys.version, sys.platform))
sys.path.extend(['C:\\Users\\Alex\\PycharmProjects\\untitled15', 'C:/Users/Alex/PycharmProjects/untitled15'])
PyDev console: starting.
Python 3.6.6 (v3.6.6:4cf1f54eb7, Jun 27 2018, 03:37:03) [MSC v.1900 64 bit (AMD64)] on win32
>>> тз
Special Variables
6: TODO
Terminal
Python Console
Event Log
No module named numpy
8:10 CRLF UTF-8
1: Project
2: Favorites
7: Structure
Documentation
SciView
R Graphics
R Packages
Database


untitled15 [C:\Users\Alex\PycharmProjects\untitled15] - ...\stat1.py [untitled15] - PyCharm
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data1.csv
stat1.py
#!/usr/bin/env python
# -*- coding: utf-8 -*-
"""
Расчет статистики с помощью специальных модулей
"""
import numpy as np
Install package numpy
Rename reference
Ignore unresolved reference 'numpy'
Optimize imports
Documentation: numpy
No documentation found.
Python Console
import sys; print('Python %s on %s' % (sys.version, sys.platform))
sys.path.extend(['C:\\Users\\Alex\\PycharmProjects\\untitled15', 'C:/Users/Alex/PycharmProjects/untitled15'])
PyDev console: starting.
Python 3.6.6 (v3.6.6:4cf1f54eb7, Jun 27 2018, 03:37:03) [MSC v.1900 64 bit (AMD64)] on win32
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Special Variables
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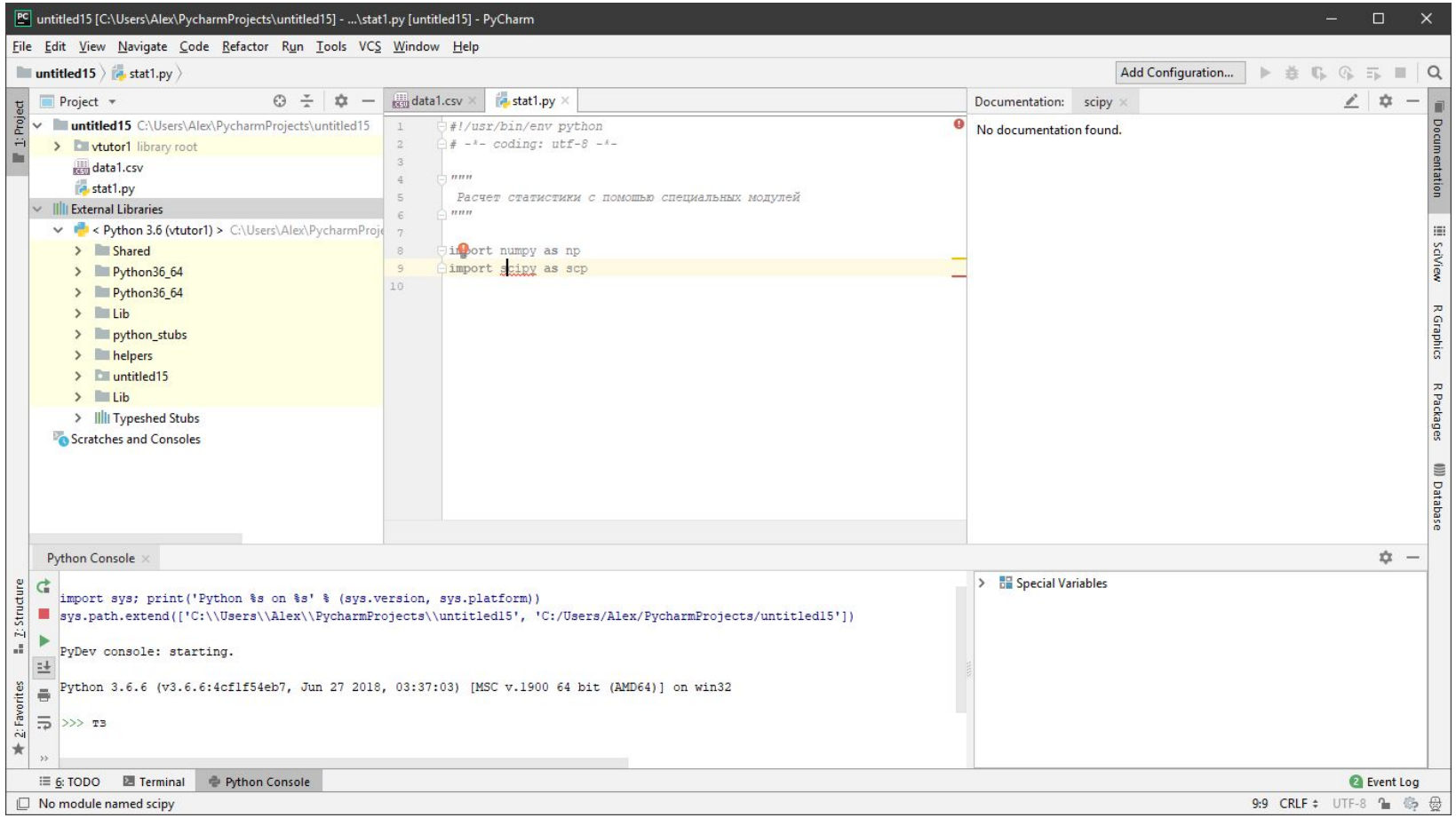
Database
6: TODO
Terminal
Python Console
Event Log
No module named numpy
8:10 CRLF UTF-8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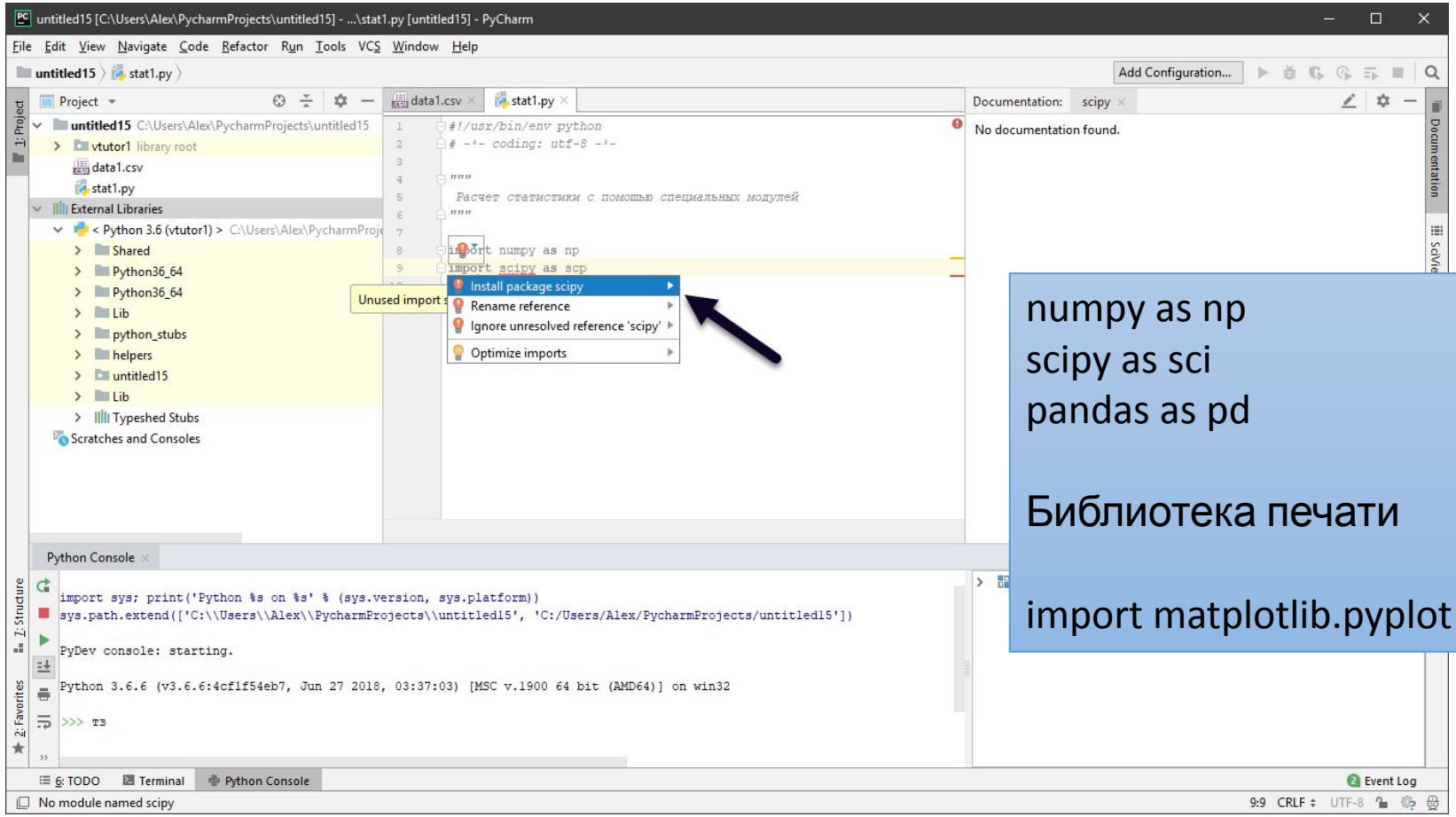
data1.csv
stat1.py
#!/usr/bin/env python
# -*- coding: utf-8 -*-
"""
Расчет статистики с помощью специальных модулей
"""
import numpy as np
import scipy as scp
Documentation: scipy
No documentation found.
Python Console
import sys; print('Python %s on %s' % (sys.version, sys.platform))
sys.path.extend(['C:\\Users\\Alex\\PycharmProjects\\untitled15', 'C:/Users/Alex/PycharmProjects/untitled15'])
PyDev console: starting.
Python 3.6.6 (v3.6.6:4cf1f54eb7, Jun 27 2018, 03:37:03) [MSC v.1900 64 bit (AMD64)] on win32
>>> тз
Special Variables
6: TODO
Terminal
Python Console
Event Log
No module named scipy
9:9 CRLF UTF-8
1: Project
2: Favorites
7: Structure
Documentation
SciView
R Graphics
R Packages
Database

# Добавьте (загрузите модули при необходимости)

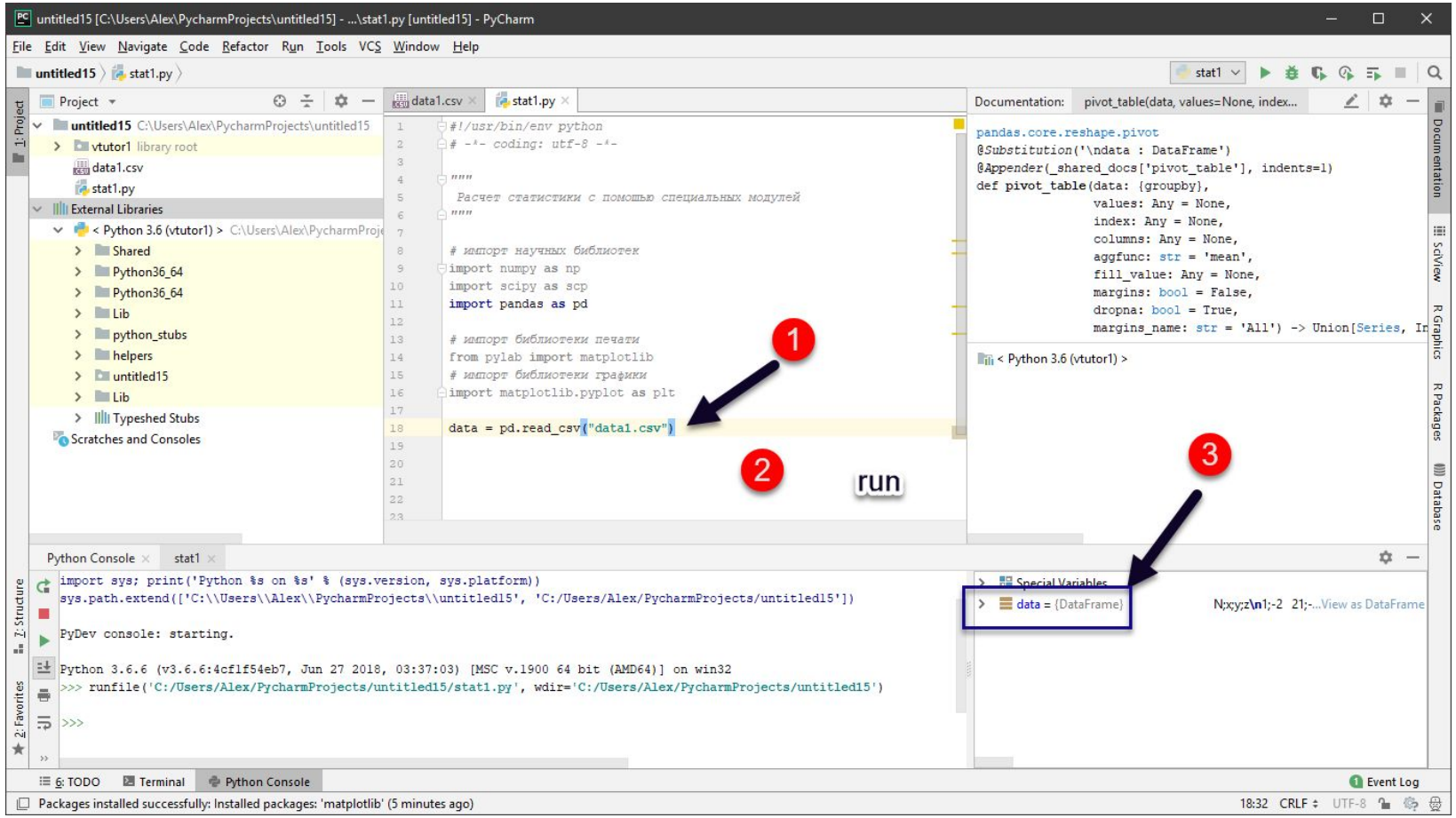



numpy as np
scipy as sci
pandas as pd

Библиотека печати

import matplotlib.pyplot as plt

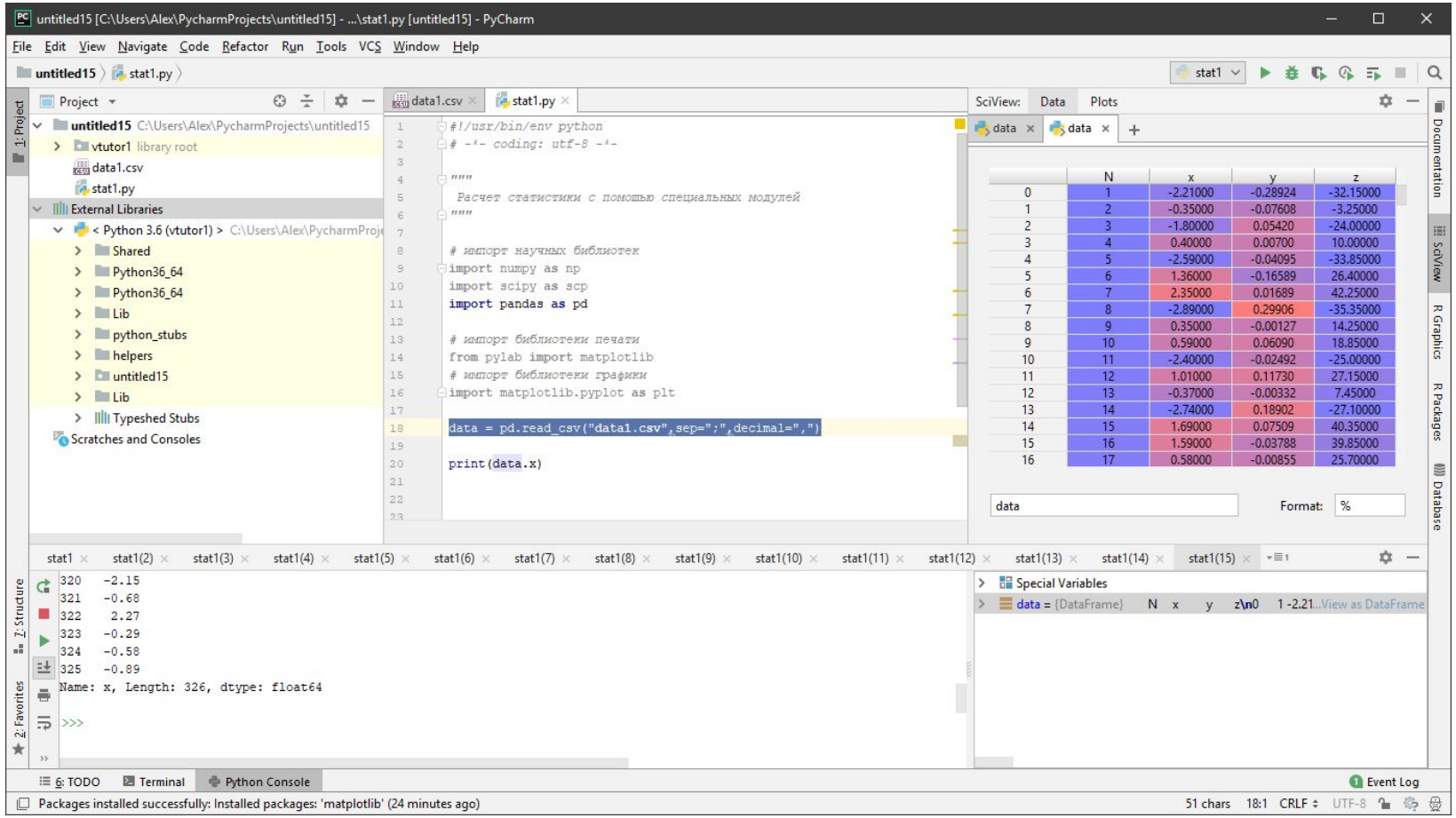
# Чтение данных



# Что неверно?

- Разделитель – точка с запятой
- Десятичная точка – запятая

- Лучше так
- data = pd.read_csv("data1.csv",sep=";",decimal=",")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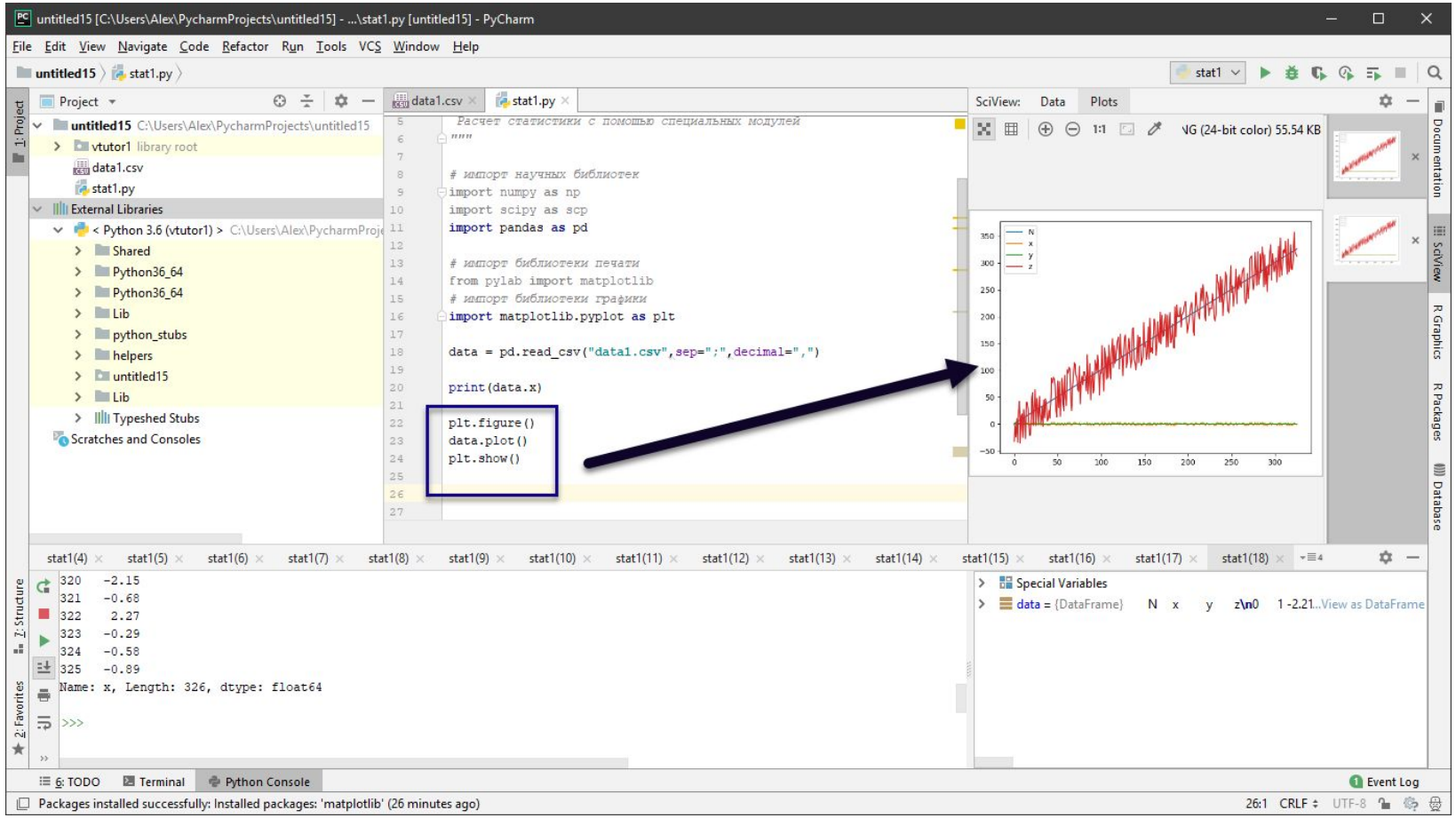
Typeshed Stubs
Scratches and Consoles
data1.csv
stat1.py
#!/usr/bin/env python
# -*- coding: utf-8 -*-
"""
Расчет статистики с помощью специальных модулей
"""
# импорт научных библиотек
import numpy as np
import scipy as scp
import pandas as pd
# импорт библиотеки печати
from pylab import matplotlib
# импорт библиотеки графики
import matplotlib.pyplot as plt
data = pd.read_csv("data1.csv",sep=";",decimal=",")
print(data.x)
SciView: Data Plots
data
data
N x y z
0 1 -2.21000 -0.28924 -32.15000
1 2 -0.35000 -0.07608 -3.25000
2 3 -1.80000 0.05420 -24.00000
3 4 0.40000 0.00700 10.00000
4 5 -2.59000 -0.04095 -33.85000
5 6 1.36000 -0.16589 26.40000
6 7 2.35000 0.01689 42.25000
7 8 -2.89000 0.29906 -35.35000
8 9 0.35000 -0.00127 14.25000
9 10 0.59000 0.06090 18.85000
10 11 -2.40000 -0.02492 -25.00000
11 12 1.01000 0.11730 27.15000
12 13 -0.37000 -0.00332 7.45000
13 14 -2.74000 0.18902 -27.10000
14 15 1.69000 0.07509 40.35000
15 16 1.59000 -0.03788 39.85000
16 17 0.58000 -0.00855 25.70000
data
Format: %
stat1 stat1(2) stat1(3) stat1(4) stat1(5) stat1(6) stat1(7) stat1(8) stat1(9) stat1(10) stat1(11) stat1(12) stat1(13) stat1(14) stat1(15)
320 -2.15
321 -0.68
322 2.27
323 -0.29
324 -0.58
325 -0.89
Name: x, Length: 326, dtype: float64
>>>
Special Variables
data = {DataFrame} N x y z\n0 1 -2.21...View as DataFrame
6: TODO Terminal Python Console
Event Log
Packages installed successfully: Installed packages: 'matplotlib' (24 minutes ago)
51 chars 18:1 CRLF UTF-8
1: Project
7: Structure
2: Favorites
Documentation
SciView
R Graphics
R Packages
Database


untitled15 [C:\Users\Alex\PycharmProjects\untitled15] - ...\stat1.py [untitled15] - PyCharm
File Edit View Navigate Code Refactor Run Tools VCS Window Help
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data1.csv
stat1.py
External Libraries
< Python 3.6 (vtutor1) > C:\Users\Alex\PycharmProj
Shared
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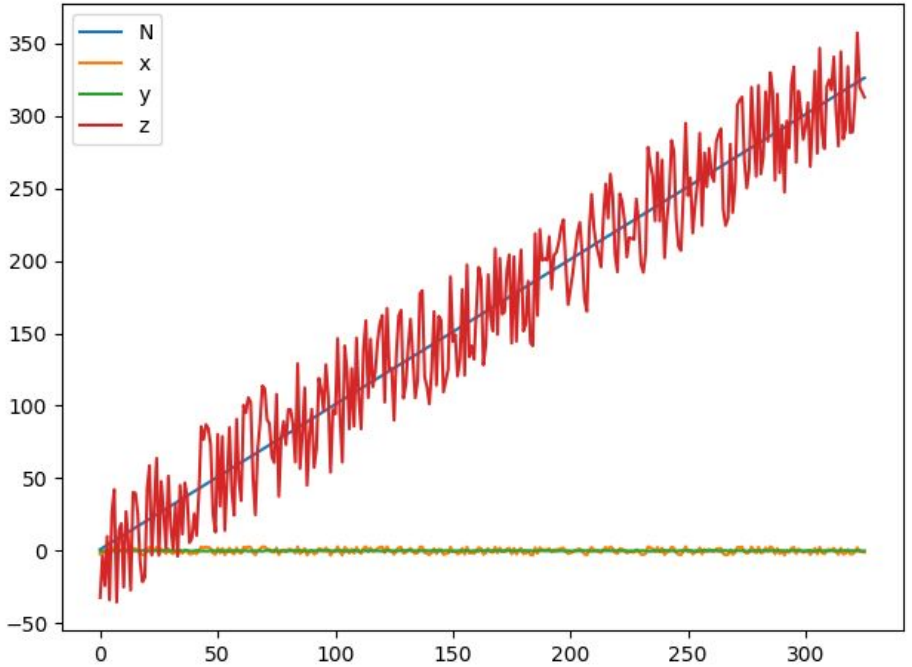
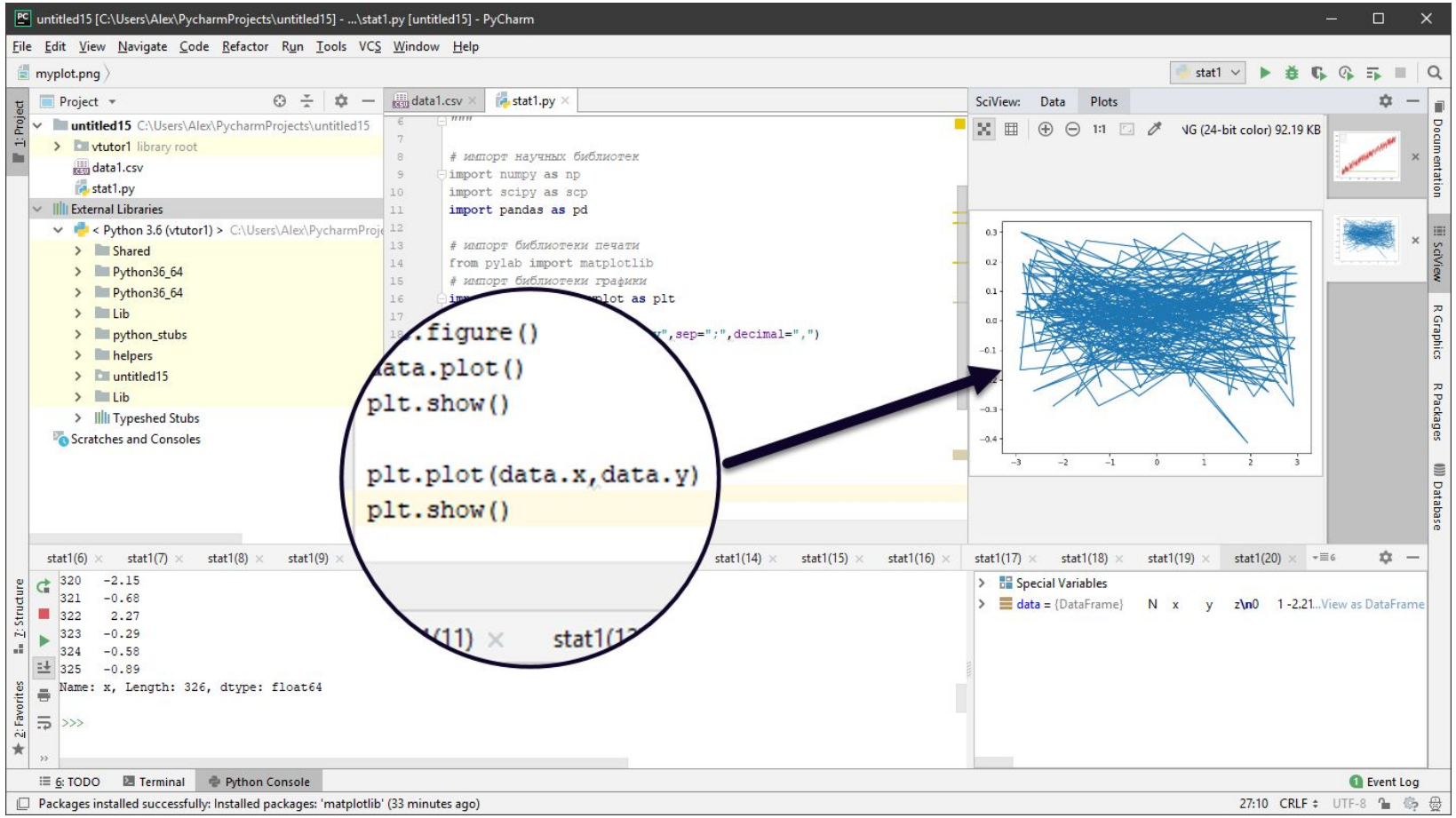
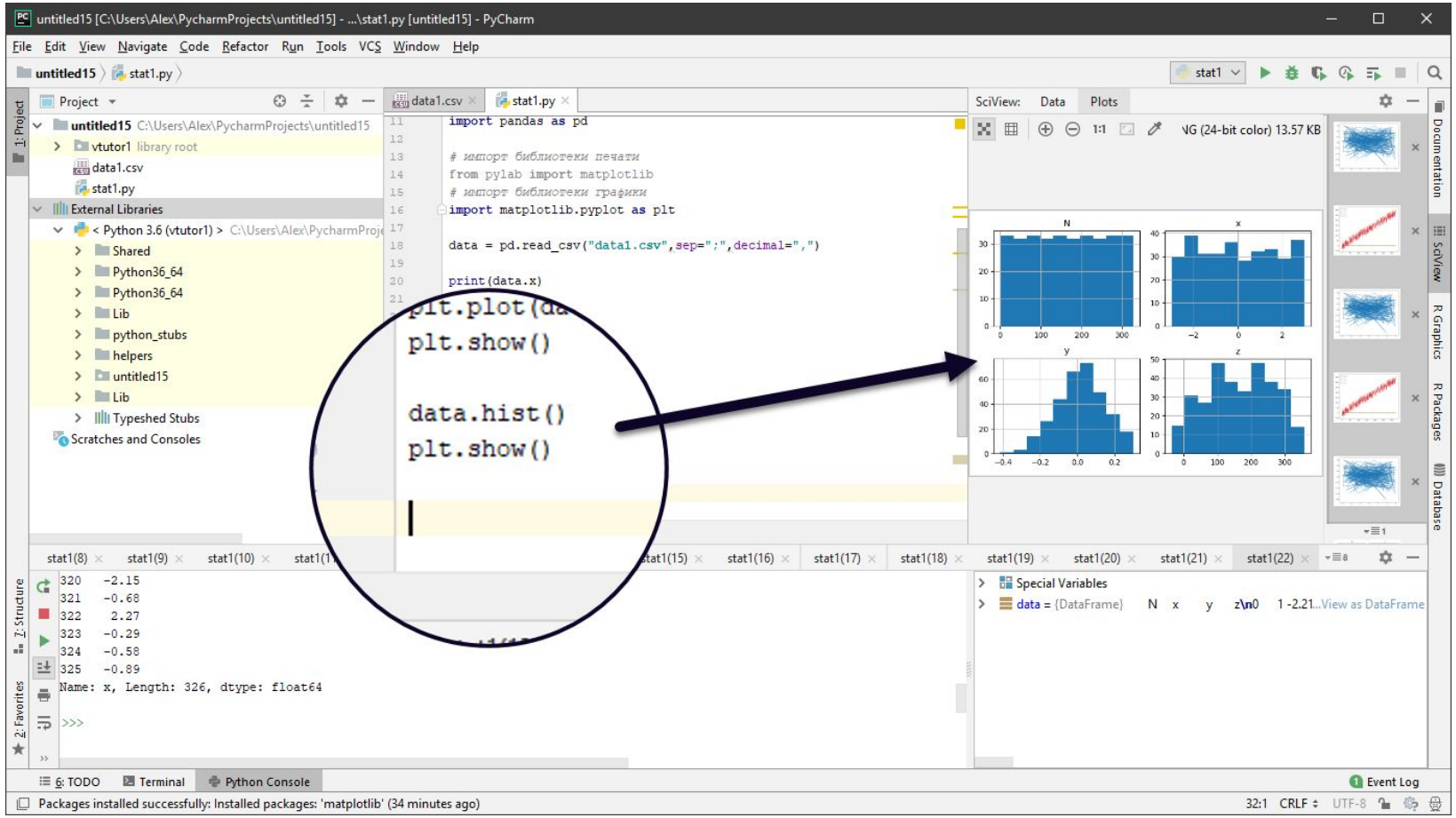
Python36_64
Lib
python_stubs
helpers
untitled15
Lib
Typeshed Stubs
Scratches and Consoles
data1.csv
stat1.py
"""Расчет статистики с помощью специальных модулей"""
# импорт научных библиотек
import numpy as np
import scipy as scp
import pandas as pd
# импорт библиотеки печати
from pylab import matplotlib
# импорт библиотеки графики
import matplotlib.pyplot as plt
data = pd.read_csv("data1.csv",sep=";",decimal=",")
print(data.x)
plt.figure()
data.plot()
plt.show()
SciView: Data Plots
stat1(4) stat1(5) stat1(6) stat1(7) stat1(8) stat1(9) stat1(10) stat1(11) stat1(12) stat1(13) stat1(14) stat1(15) stat1(16) stat1(17) stat1(18)
320 -2.15
321 -0.68
322 2.27
323 -0.29
324 -0.58
325 -0.89
Name: x, Length: 326, dtype: float64
>>>
Special Variables
data = {DataFrame} N x y z\n0 1 -2.21...View as DataFrame
6: TODO Terminal Python Console
Event Log
Packages installed successfully: Installed packages: 'matplotlib' (26 minutes ago)
26:1 CRLF UTF-8

| | |
|---|---|
| plt.figure() | Создает место для графика (в режиме научных расчетов не обязательно) |
| data.plot() | Формирует график |
| plt.show() | Отображает график |




untitled15 [C:\Users\Alex\PycharmProjects\untitled15] - ...\stat1.py [untitled15] - PyCharm
File Edit View Navigate Code Refactor Run Tools VCS Window Help
myplot.png
stat1
Project
untitled15 C:\Users\Alex\PycharmProjects\untitled15
vtutor1 library root
data1.csv
stat1.py
External Libraries
< Python 3.6 (vtutor1) >
Shared
Python36_64
Python36_64
Lib
python_stubs
helpers
untitled15
Lib
Typeshed Stubs
Scratches and Consoles
data1.csv
stat1.py
# импорт научных библиотек
import numpy as np
import scipy as scp
import pandas as pd
# импорт библиотеки печати
from pylab import matplotlib
# импорт библиотеки графики
plot as plt
.figure()
ata.plot()
plt.show()
plt.plot(data.x,data.y)
plt.show()
SciView: Data Plots
stat1(6) stat1(7) stat1(8) stat1(9) stat1(14) stat1(15) stat1(16) stat1(17) stat1(18) stat1(19) stat1(20)
320 -2.15
321 -0.68
322 2.27
323 -0.29
324 -0.58
325 -0.89
Name: x, Length: 326, dtype: float64
>>>
Special Variables
data = {DataFrame} N x y z\n0 1 -2.21...View as DataFrame
6: TODO Terminal Python Console
Event Log
Packages installed successfully: Installed packages: 'matplotlib' (33 minutes ago)
27:10 CRLF UTF-8

- Такая структура, как фрейм данных pandas является близким аналогом фрейма из языка R
- В частности, он сам «знает» что и как надо напечатать
- Фрейм состоит из переменных (колонок), и строк
- Существуют механизмы выбора отдельных колонок или их множества
- Существуют инструменты отбора данных в колонках (например по условию)
- Потенциально существует возможность поменять местами строки и столбцы (транспонировать таблицу)


untitled15 [C:\Users\Alex\PycharmProjects\untitled15] - ...\stat1.py [untitled15] - PyCharm
File Edit View Navigate Code Refactor Run Tools VCS Window Help
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vtutor1 library root
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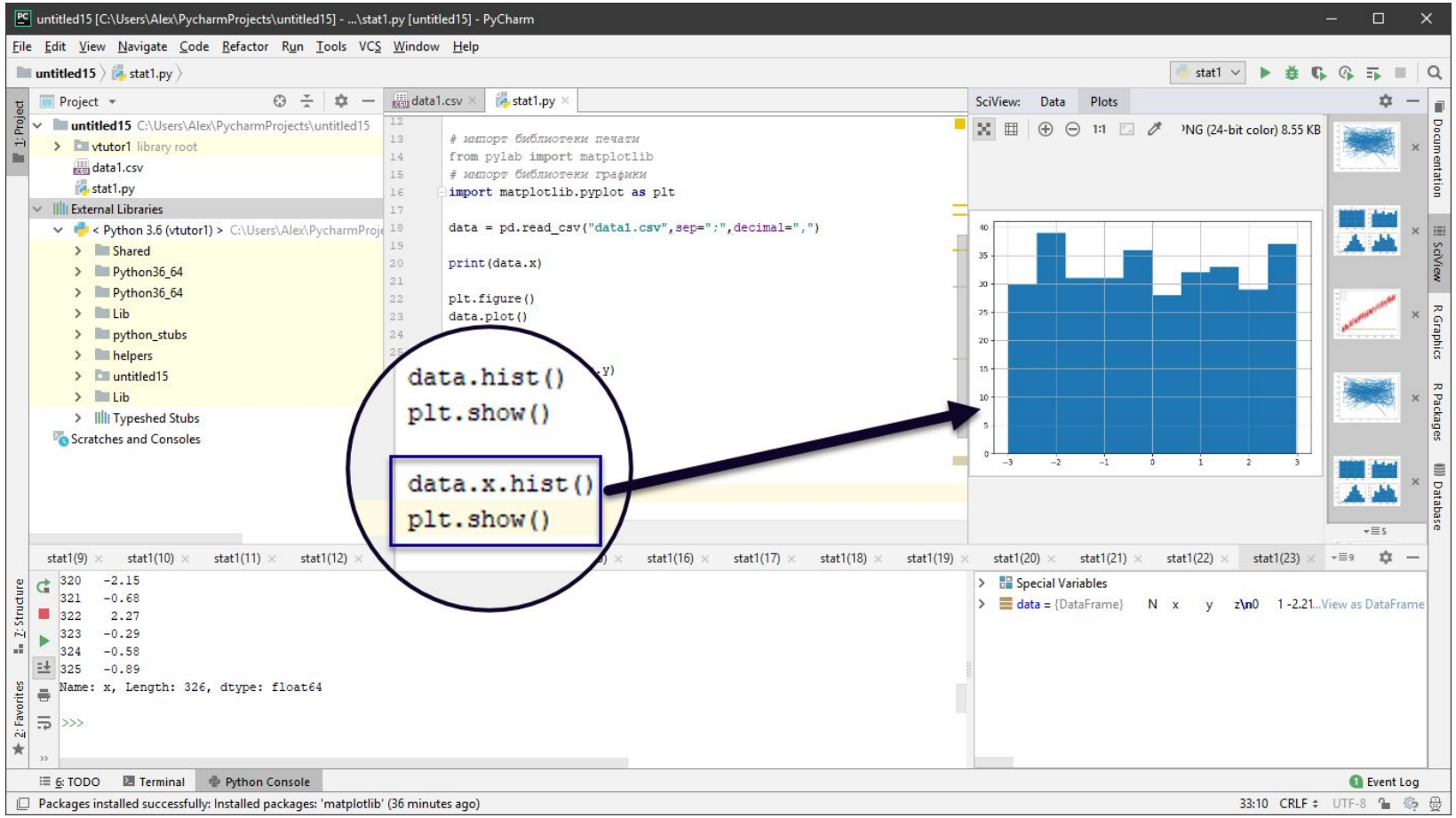
External Libraries
< Python 3.6 (vtutor1) >
Shared
Python36_64
Python36_64
Lib
python_stubs
helpers
untitled15
Lib
Typeshed Stubs
Scratches and Consoles
data1.csv
stat1.py
import pandas as pd
# импорт библиотеки печати
from pylab import matplotlib
# импорт библиотеки графики
import matplotlib.pyplot as plt
data = pd.read_csv("data1.csv",sep=";",decimal=",")
print(data.x)
plt.show()
data.hist()
plt.show()
SciView: Data Plots
stat1(8) stat1(9) stat1(10) stat1(15) stat1(16) stat1(17) stat1(18) stat1(19) stat1(20) stat1(21) stat1(22)
320 -2.15
321 -0.68
322 2.27
323 -0.29
324 -0.58
325 -0.89
Name: x, Length: 326, dtype: float64
>>>
Special Variables
data = {DataFrame} N x y z\n0 1 -2.21...View as DataFrame
6: TODO Terminal Python Console
Event Log
Packages installed successfully: Installed packages: 'matplotlib' (34 minutes ago)
32:1 CRLF UTF-8


untitled15 [C:\Users\Alex\PycharmProjects\untitled15] - ...\stat1.py [untitled15] - PyCharm
File Edit View Navigate Code Refactor Run Tools VCS Window Help
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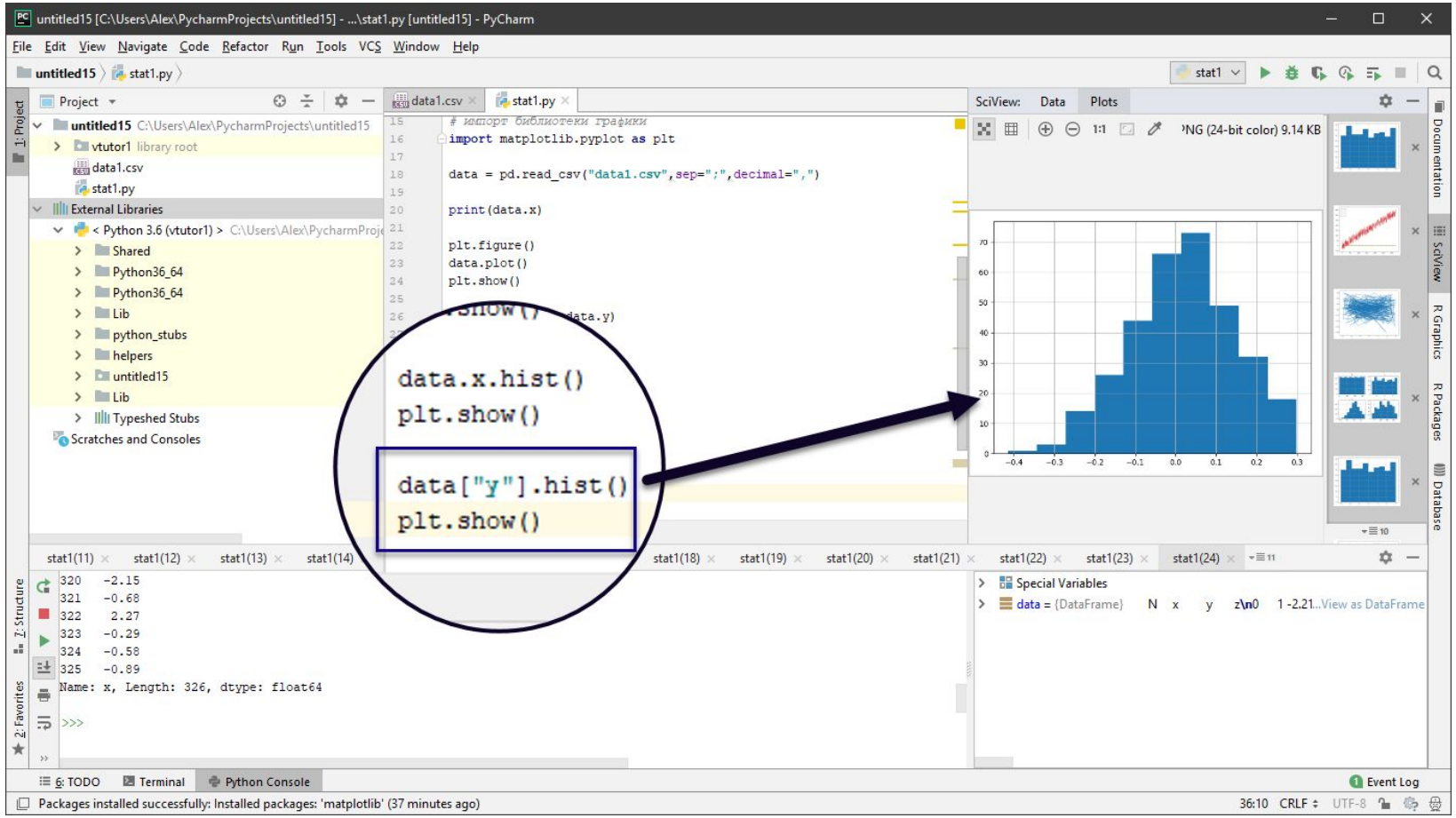
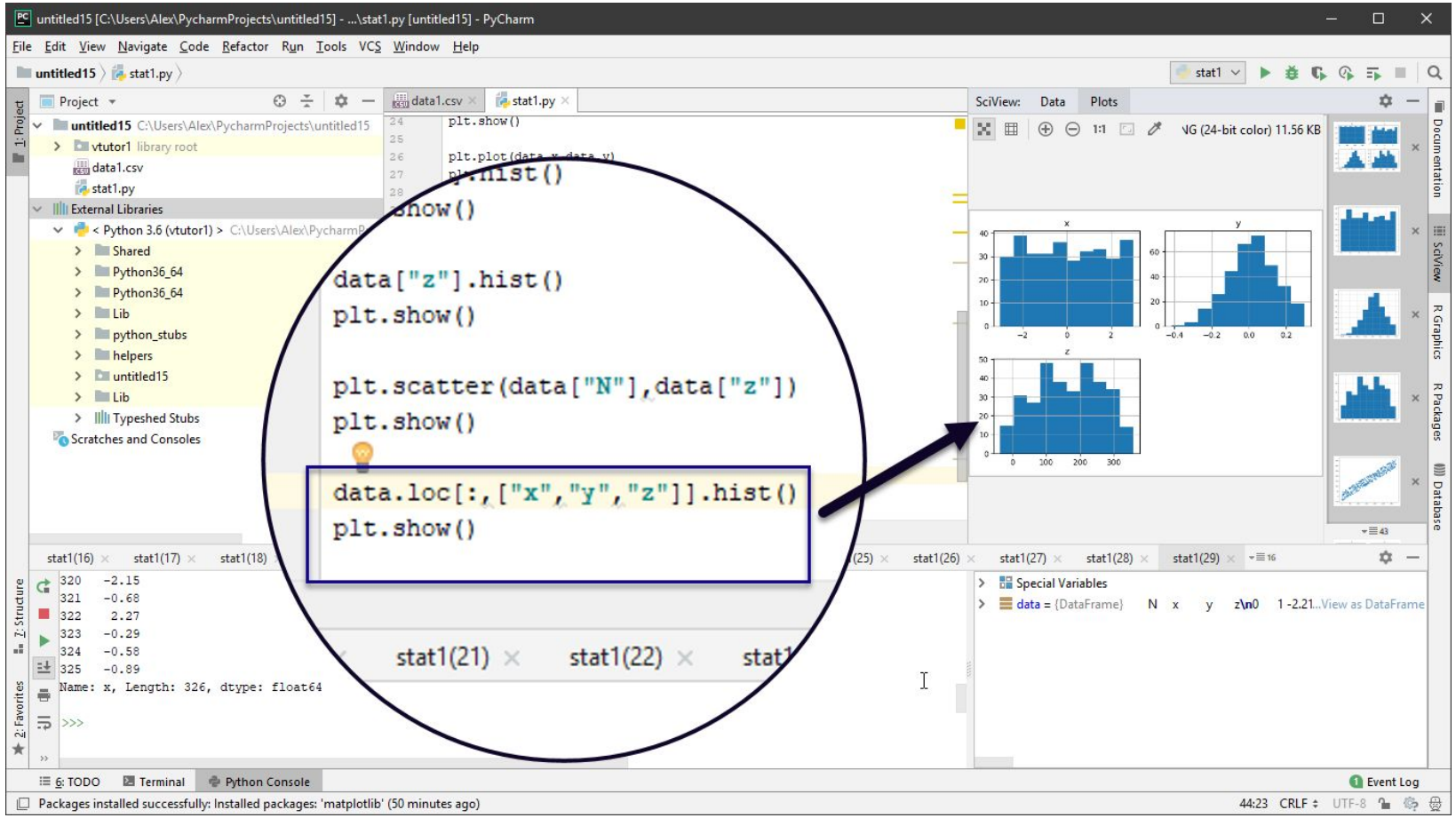
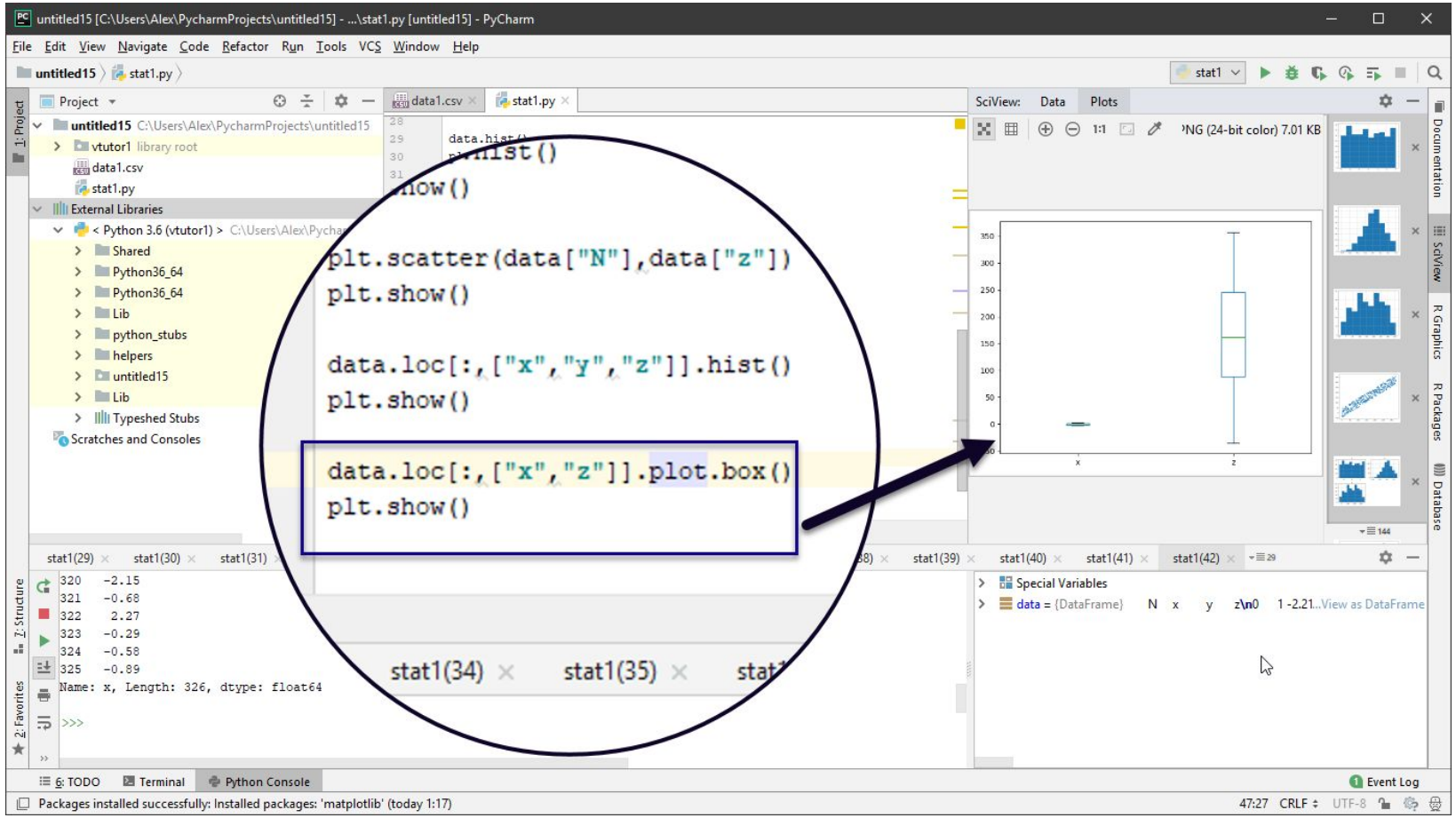
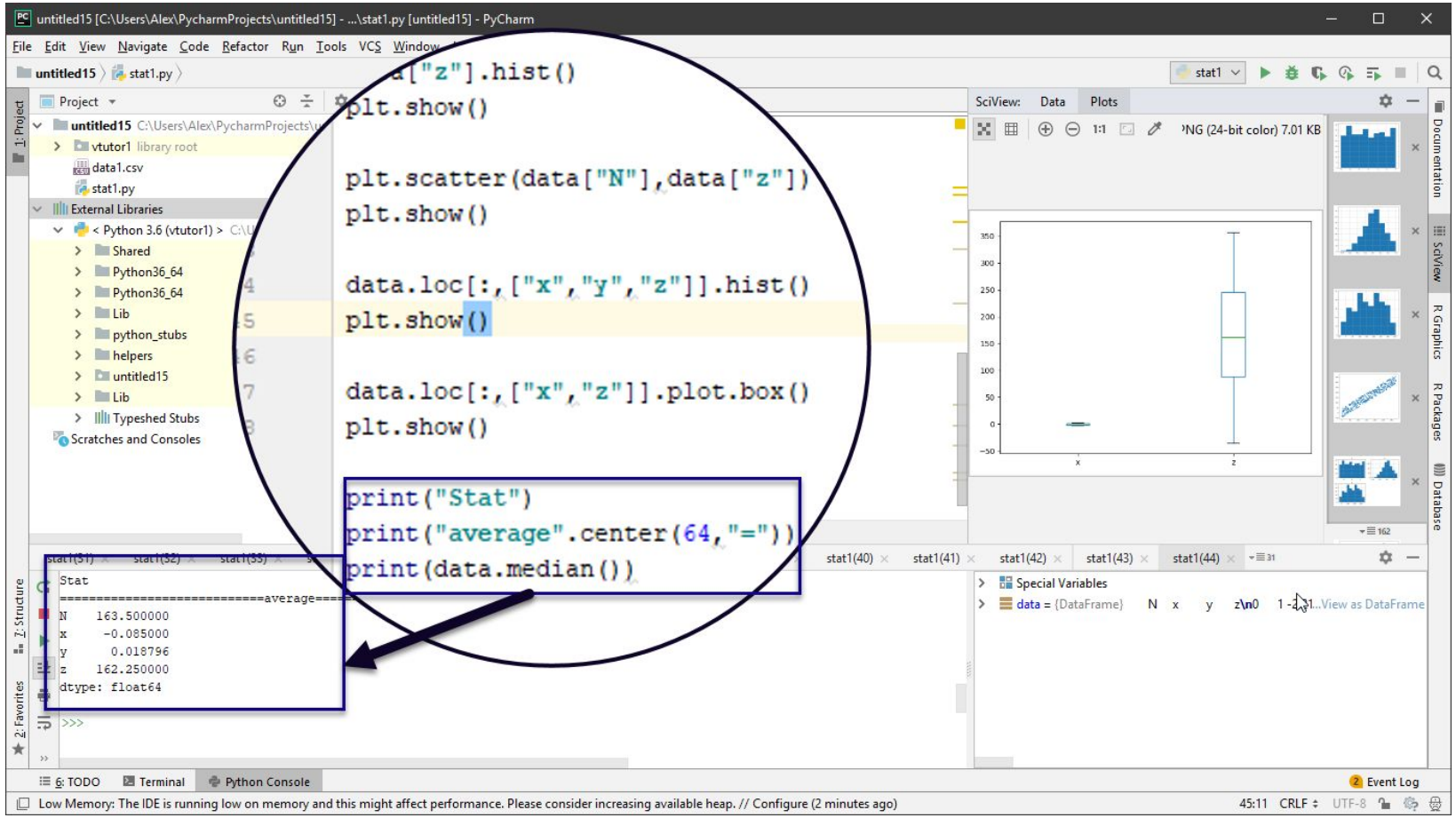
Typeshed Stubs
Scratches and Consoles
# импорт библиотеки печати
from pylab import matplotlib
# импорт библиотеки графики
import matplotlib.pyplot as plt
data = pd.read_csv("data1.csv",sep=";",decimal=",")
print(data.x)
plt.figure()
data.plot()
data.hist()
plt.show()
data.x.hist()
plt.show()
SciView: Data Plots
stat1(9) stat1(10) stat1(11) stat1(12) stat1(16) stat1(17) stat1(18) stat1(19) stat1(20) stat1(21) stat1(22) stat1(23)
320 -2.15
321 -0.68
322 2.27
323 -0.29
324 -0.58
325 -0.89
Name: x, Length: 326, dtype: float64
>>>
Special Variables
data = {DataFrame} N x y z\n0 1 -2.21...View as DataFrame
6: TODO Terminal Python Console
Event Log
Packages installed successfully: Installed packages: 'matplotlib' (36 minutes ago)
33:10 CRLF UTF-8


untitled15 [C:\Users\Alex\PycharmProjects\untitled15] - ...\stat1.py [untitled15] - PyCharm
File Edit View Navigate Code Refactor Run Tools VCS Window Help
untitled15 stat1.py
Project
untitled15 C:\Users\Alex\PycharmProjects\untitled15
vtutor1 library root
data1.csv
stat1.py
External Libraries
< Python 3.6 (vtutor1) >
Shared
Python36_64
Python36_64
Lib
python_stubs
helpers
untitled15
Lib
Typeshed Stubs
Scratches and Consoles
data1.csv
stat1.py
# импорт библиотеки графики
import matplotlib.pyplot as plt
data = pd.read_csv("data1.csv",sep=";",decimal=",")
print(data.x)
plt.figure()
data.plot()
plt.show()
data.x.hist()
plt.show()
data["y"].hist()
plt.show()
SciView: Data Plots
stat1
stat1(11) stat1(12) stat1(13) stat1(14) stat1(18) stat1(19) stat1(20) stat1(21) stat1(22) stat1(23) stat1(24)
320 -2.15
321 -0.68
322 2.27
323 -0.29
324 -0.58
325 -0.89
Name: x, Length: 326, dtype: float64
>>>
Special Variables
data = {DataFrame} N x y z\n0 1 -2.21...View as DataFrame
6: TODO Terminal Python Console
Event Log
Packages installed successfully: Installed packages: 'matplotlib' (37 minutes ago)
36:10 CRLF UTF-8


untitled15 [C:\Users\Alex\PycharmProjects\untitled15] - ...\stat1.py [untitled15] - PyCharm
File Edit View Navigate Code Refactor Run Tools VCS Window Help
data["z"].hist()
plt.show()
plt.scatter(data["N"],data["z"])
plt.show()
data.loc[:,["x","y","z"]].hist()
plt.show()
stat1(21)
stat1(22)
Packages installed successfully: Installed packages: 'matplotlib' (50 minutes ago)


untitled15 [C:\Users\Alex\PycharmProjects\untitled15] - ...\stat1.py [untitled15] - PyCharm
File Edit View Navigate Code Refactor Run Tools VCS Window Help
plt.scatter(data["N"],data["z"])
plt.show()
data.loc[:,["x","y","z"]].hist()
plt.show()
data.loc[:,["x","z"]].plot.box()
plt.show()
320 -2.15
321 -0.68
322 2.27
323 -0.29
324 -0.58
325 -0.89
Name: x, Length: 326, dtype: float64
>>>
Special Variables
data = {DataFrame}
6: TODO
Terminal
Python Console
Event Log
Packages installed successfully: Installed packages: 'matplotlib' (today 1:17)


plt.show()
data.loc[:,["x","y","z"]].hist()
plt.show()
data.loc[:,["x","z"]].plot.box()
plt.show()
print("Stat")
print("average".center(64,"="))
print(data.median())
Stat
==========average==========
N 163.500000
x -0.085000
y 0.018796
z 162.250000
dtype: float64

# Расчет отдельных показателей

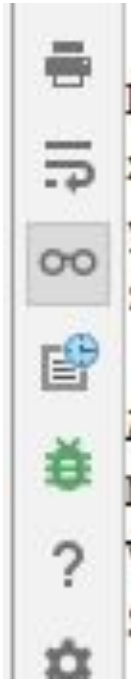
- print("Stat")
- print("average".center(64,"="))
- print(data.median())
- print("variance".center(64,"="))
- print(data.var())
- print("std dev".center(64,"="))
- print(data.std())

# Специальная таблица под статистику

- stat = pd.DataFrame()
- stat["Avg"] = data.mean()
- stat["Median"] = data.median()
- stat["Variance"] = data.var()
- stat["Std dev"] = data.std()
- print(stat)
- print(stat.T)

# Вывод на экран как в «прямом», так и «развернутом виде»

- print(stat)
- print(stat.T) – транспонированная таблица



| | Avg | Median | Variance | Std dev |
|---|---|---|---|---|
| N | 163.500000 | 163.500000 | 8883.500000 | 94.252321 |
| x | 0.006963 | -0.085000 | 3.043259 | 1.744494 |
| y | 0.016549 | 0.018796 | 0.016749 | 0.129420 |
| z | 163.604448 | 162.250000 | 9542.778126 | 97.687144 |

| | N | x | y | z |
|---|---|---|---|---|
| Avg | 163.500000 | 0.006963 | 0.016549 | 163.604448 |
| Median | 163.500000 | -0.085000 | 0.018796 | 162.250000 |
| Variance | 8883.500000 | 3.043259 | 0.016749 | 9542.778126 |
| Std dev | 94.252321 | 1.744494 | 0.129420 | 97.687144 |