

MEM104 Γλώσσα Προγραμματισμού Ι

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22 Δεκεμβρίου 2020

Μαθηματικά και Εφαρμοσμένα Μαθηματικά

Περιεχόμενα

1. Η βιβλιοθήκη matplotlib
2. Η βιβλιοθήκη SymPy
3. Άλλες χρήσιμες βιβλιοθήκες

Η βιβλιοθήκη matplotlib

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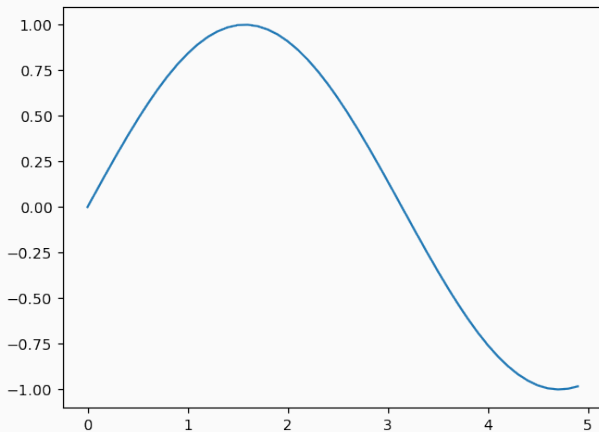
Η ανάπτυξη της ξεκίνησε το 2003 από τον John D. Hunter (1968-2012). Το 2012 η ανάπτυξη πέρασε στην κοινότητα χρηστών της Python.

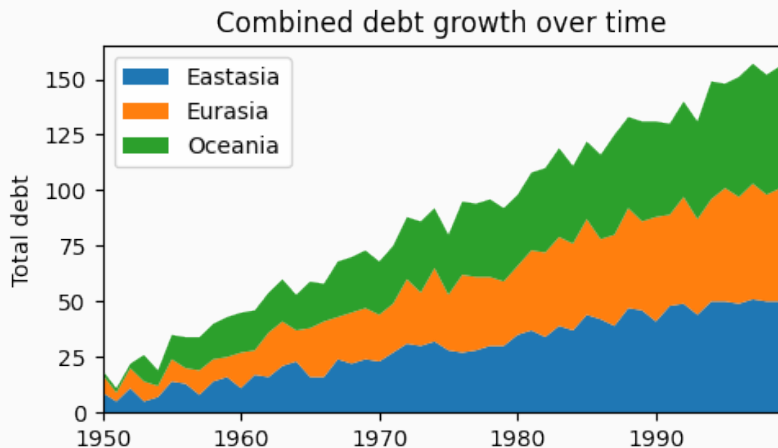
Σήμερα η βιβλιοθήκη πάνω από 70 000 γραμμές κώδικα και υποστηρίζει δεκάδες είδη γραφικών παραστάσεων.

Η διαδραστική χρήση της **matplotlib** γίνεται μέσω του κελύφους **pyplot**, χρήσιμο για την προγραμματική παραγωγή γραφικών παραστάσεων.

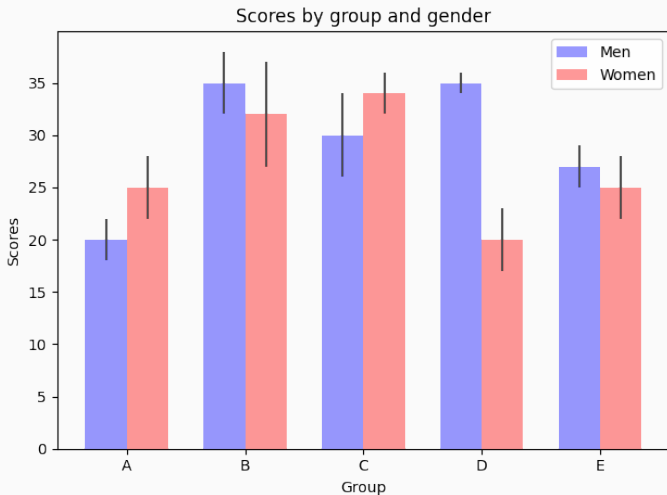
```
import matplotlib.pyplot as plt
import numpy as np
x = np.arange(0, 5, 0.1)
y = np.sin(x)
plt.plot(x, y)
plt.show()
```

Η βιβλιοθήκη matplotlib

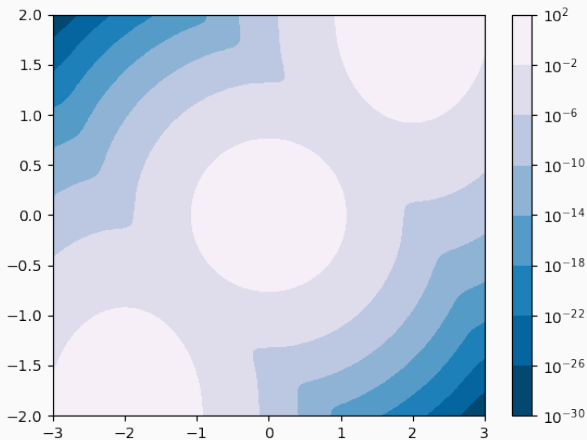




Η βιβλιοθήκη matplotlib - Παραδείγματα



Η βιβλιοθήκη matplotlib - Παραδείγματα



Η βιβλιοθήκη matplotlib

Η πλήρης λίστα γραφικών παραστάσεων με τη matplotlib είναι στον σύνδεσμο

https://matplotlib.org/api/axes_api.html#plotting

Δεκάδες παραδείγματα γραφικών παραστάσεων υπάρχουν στην ιστοσελίδα <https://matplotlib.org/examples/index.html>

Συχνές ερωτήσεις (FAQ) για την matplotlib απαντούνται στην ιστοσελίδα https://matplotlib.org/faq/usage_faq.html

Οδηγοί εκμάθησης της matplotlib, τόσο για αρχάριους όσο και για προχωρημένους χρήστες υπάρχουν στην ιστοσελίδα <https://matplotlib.org/tutorials/index.html>

Η βιβλιοθήκη SymPy

Η βιβλιοθήκη SymPy εκτελεί συμβολικούς υπολογισμούς, χειρίζεται δηλαδή μαθηματικές εκφράσεις με συμβολικές μεταβλητές ακριβώς, χωρίς να καταφεύγει στον αριθμητικό υπολογισμό τους.

```
>>> from sympy import *  
>>> x, y = symbols('x y')  
>>> expand((x+y)**3)  
x**3 + 3*x**2*y + 3*x*y**2 + y**3
```

```
>>> integrate(exp(x)*sin(x), x)  
exp(x)*sin(x)/2 - exp(x)*cos(x)/2
```

```
>>> diff(sin(x)*exp(x), x)
exp(x)*sin(x) + exp(x)*cos(x)
```

```
>>> integrate(log(x), (x, 0, 2))
-2 + 2*log(2)
```

```
>>> solve(x**2 - 2, x)
[-sqrt(2), sqrt(2)]
```

```
>>> Matrix([[1, 2], [2, 2]]).eigenvals()
{3/2 - sqrt(17)/2: 1, 3/2 + sqrt(17)/2: 1}
```

Η ιστοσελίδα της SymPy είναι στον σύνδεσμο

<https://www.sympy.org/en/index.html>

Ένα online κέλυφος της SymPy βρίσκεται στον σύνδεσμο

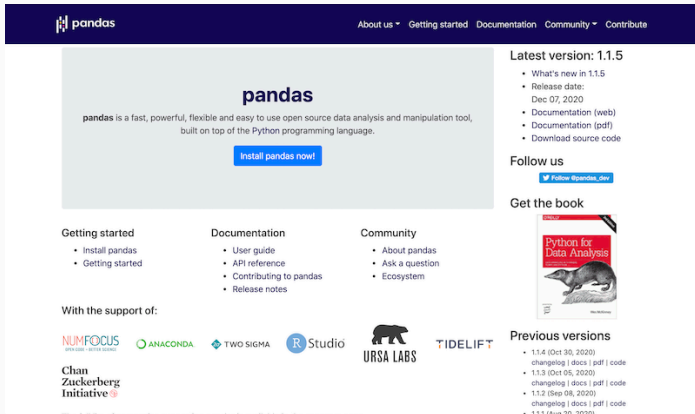
<https://live.sympy.org/>

Το εγχειρίδιο χρήσης της SymPy είναι στον σύνδεσμο [https:](https://docs.sympy.org/latest/tutorial/index.html)

[//docs.sympy.org/latest/tutorial/index.html](https://docs.sympy.org/latest/tutorial/index.html)

Άλλες χρήσιμες βιβλιοθήκες

<https://pandas.pydata.org/>



The screenshot shows the pandas website homepage. At the top is a dark blue navigation bar with the pandas logo and links for 'About us', 'Getting started', 'Documentation', 'Community', and 'Contribute'. The main content area has a light gray background with the pandas logo and a description: 'pandas is a fast, powerful, flexible and easy to use open source data analysis and manipulation tool, built on top of the Python programming language.' Below this is a blue button that says 'Install pandas now!'. To the right, under 'Latest version: 1.1.5', there is a list of links: 'What's new in 1.1.5', 'Release date: Dec 07, 2020', 'Documentation (web)', 'Documentation (pdf)', and 'Download source code'. Below this is a 'Follow us' section with a Twitter icon and a link to '@pandas_dev'. The 'Get the book' section features the cover of the book 'Python for Data Analysis'. The 'With the support of:' section lists several organizations: NUMFOCUS, ANACONDA, TWO SIGMA, R Studio, URSA LABS, and TIDELIFT. At the bottom right, the 'Previous versions' section lists versions 1.1.4, 1.1.3, 1.1.2, and 1.1.1 with links to their respective changelogs, docs, pdfs, and code.

pandas

pandas is a fast, powerful, flexible and easy to use open source data analysis and manipulation tool, built on top of the Python programming language.

[Install pandas now!](#)

Latest version: 1.1.5

- What's new in 1.1.5
- Release date: Dec 07, 2020
- Documentation (web)
- Documentation (pdf)
- Download source code

Follow us

[Follow @pandas_dev](#)

Get the book

With the support of:

NUMFOCUS
OPEN CODE • BETTER TOGETHER

ANACONDA

TWO SIGMA

R Studio


URSA LABS

TIDELIFT

Previous versions

- 1.1.4 (Oct 30, 2020)
changelog | docs | pdf | code
- 1.1.3 (Oct 05, 2020)
changelog | docs | pdf | code
- 1.1.2 (Sep 04, 2020)
changelog | docs | pdf | code
- 1.1.1 (Jun 20, 2020)

<https://scikit-learn.org/stable/>

 [Install](#) [User Guide](#) [API](#) [Examples](#) [More ▾](#)

scikit-learn

Machine Learning in Python

[Getting Started](#) [Release Highlights for 0.23](#) [GitHub](#)

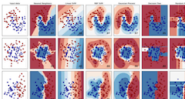
- Simple and efficient tools for predictive data analysis
- Accessible to everybody, and reusable in various contexts
- Built on NumPy, SciPy, and matplotlib
- Open source, commercially usable - BSD license

Classification

Identifying which category an object belongs to.

Applications: Spam detection, image recognition.

Algorithms: SVM, nearest neighbors, random forest, and more...

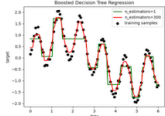


Regression

Predicting a continuous-valued attribute associated with an object.

Applications: Drug response, Stock prices.

Algorithms: SVR, nearest neighbors, random forest, and more...




Clustering

Automatic grouping of similar objects into sets.

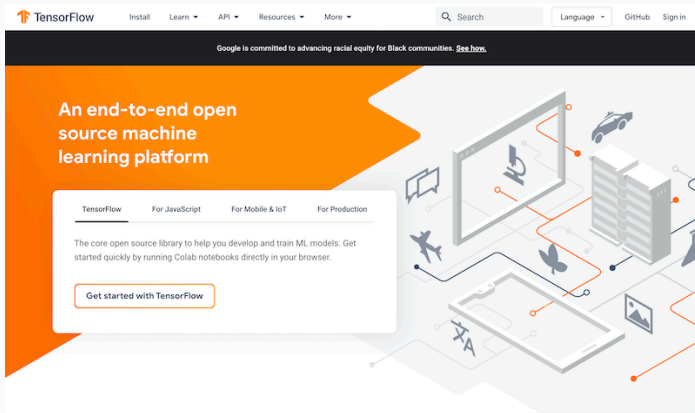
Applications: Customer segmentation, Grouping experiment outcomes

Algorithms: k-Means, spectral clustering, mean-shift, and more...

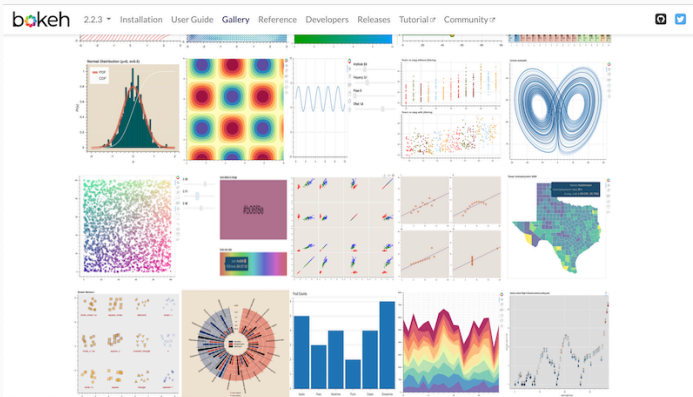


https://scikit-learn.org/stable/supervised_learning.html#supervised-learning

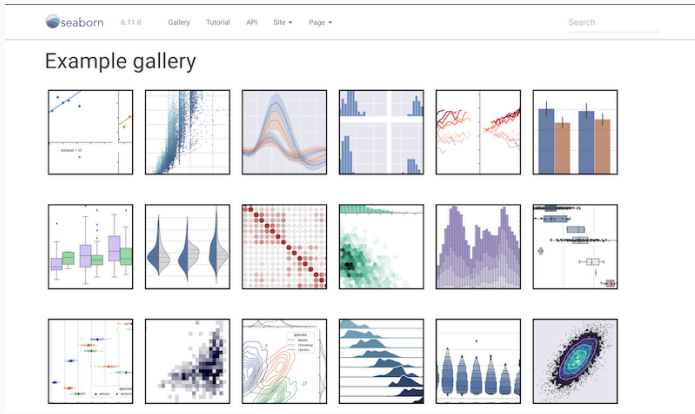
<https://www.tensorflow.org/>



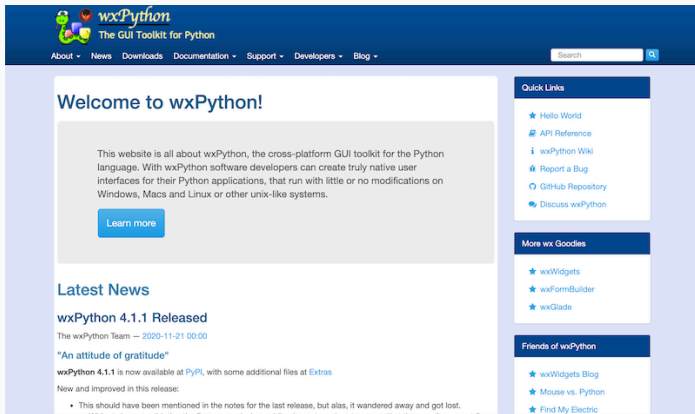
<https://docs.bokeh.org/en/latest/index.html>



<https://seaborn.pydata.org/index.html>



<https://www.wxpython.org/>



The screenshot shows the homepage of the wxPython website. The header is dark blue with the wxPython logo and tagline 'The GUI Toolkit for Python'. A navigation bar contains links for About, News, Downloads, Documentation, Support, Developers, and Blog. A search bar is located on the right. The main content area has a large 'Welcome to wxPython!' heading. Below it, a text block explains that wxPython is a cross-platform GUI toolkit for Python, allowing developers to create native user interfaces for Windows, Macs, Linux, and other Unix-like systems. A 'Learn more' button is provided. The 'Latest News' section features the announcement of 'wxPython 4.1.1 Released' on 2020-11-21, with a quote 'An attitude of gratitude' and information about its availability on PyPI. A sidebar on the right contains 'Quick Links' (Hello World, API Reference, wxPython Wiki, Report a Bug, GitHub Repository, Discuss wxPython) and 'More wx Goodies' (wxWidgets, wxFormBuilder, wxGlade). At the bottom of the sidebar, 'Friends of wxPython' lists the wxWidgets Blog, Mouse vs. Python, and Find My Electric.

wxPython
The GUI Toolkit for Python

About News Downloads Documentation Support Developers Blog

Search

Welcome to wxPython!

This website is all about wxPython, the cross-platform GUI toolkit for the Python language. With wxPython software developers can create truly native user interfaces for their Python applications, that run with little or no modifications on Windows, Macs and Linux or other unix-like systems.

[Learn more](#)

Latest News

wxPython 4.1.1 Released

The wxPython Team — 2020-11-21 00:00

"An attitude of gratitude"

wxPython 4.1.1 is now available at [PyPI](#), with some additional files at [Extras](#)

New and improved in this release:

- This should have been mentioned in the notes for the last release, but alas, it wandered away and got lost.

Quick Links

- ★ Hello World
- 📖 API Reference
- 📖 wxPython Wiki
- 🐛 Report a Bug
- 🔗 GitHub Repository
- 💬 Discuss wxPython


More wx Goodies

- ★ wxWidgets
- ★ wxFormBuilder
- ★ wxGlade

Friends of wxPython

- ★ wxWidgets Blog
- ★ Mouse vs. Python
- ★ Find My Electric

<https://www.pygame.org/news>

pip install  Projects ▾ News About Getting Started Docs Info ▾ Development ▾

News


[New here?](#)

pygame 2 -- 28 Oct, 2020

It's happy dance time.
pygame 2 is out.

pygame 20th birthday -- 28 Oct, 2020


It looks like we're 20 years old.





ps. we have a present for you coming shortly.

Ludum Dare 46 -- 8 Apr, 2020

Recent Releases

20 Dec, 2020 
Basic Blind Chess - v1.1.5c

18 Dec, 2020 
Wuxia World - Beta 1.4

16 Dec, 2020 

Άλλες βιβλιοθήκες

1. calendar: Χρήσιμες μέθοδοι για διαχείριση ημερολογίων
<https://docs.python.org/3/library/calendar.html>
2. emojis: Πλήρης σειρά από emojis
<https://pypi.org/project/emoji/>
3. turtle: Εισαγωγή στον προγραμματισμό (για αρχάριους)
<https://docs.python.org/3/library/turtle.html>
4. pyEphem: Αστρονομία με την Python
<https://rhodesmill.org/pyephem/>
5. cartopy: Δεδομένα πάνω σε χάρτες
<https://scitools.org.uk/cartopy/docs/latest/>