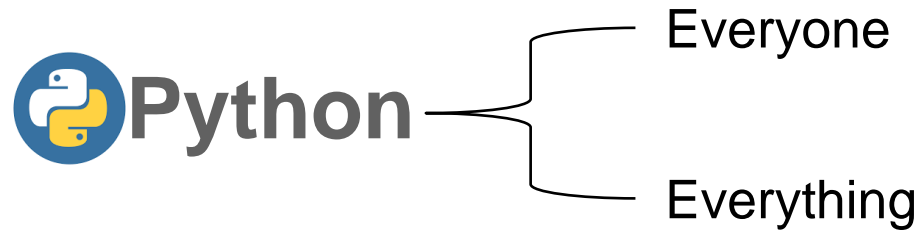


VOLVO



GTT Process & IT

Python – An Overview

Python is an interpreted, general-purpose programming language

- First released in 1991 (v 0.9.0) by Guido van Rossum at CWI in the Netherlands
- Interpreted – requires no compiler, it can run after you type code and press 'enter'
- General purpose – systems administration, networking, graphical applications, engineering, etc

Design philosophy:

- Readable code matters
- Code should be simpler to write

Assembly

```
section .text
    global _start ;must be declared for linker (ld)

_start:
    ;tells linker entry point
    mov     edx,len      ;message length
    mov     ecx,msg      ;message to write
    mov     ebx,1        ;file descriptor (stdout)
    mov     eax,4        ;system call number (sys_write)
    int     0x80         ;call kernel

    mov     eax,1        ;system call number (sys_exit)
    int     0x80         ;call kernel

section .data
msg db 'Hello, world!', 0xa ;string to be printed
len equ $ - msg           ;length of the string
```

C++

```
#include<iostream>
int main() {
    std::cout << "Hello World\n";
}
```

Python

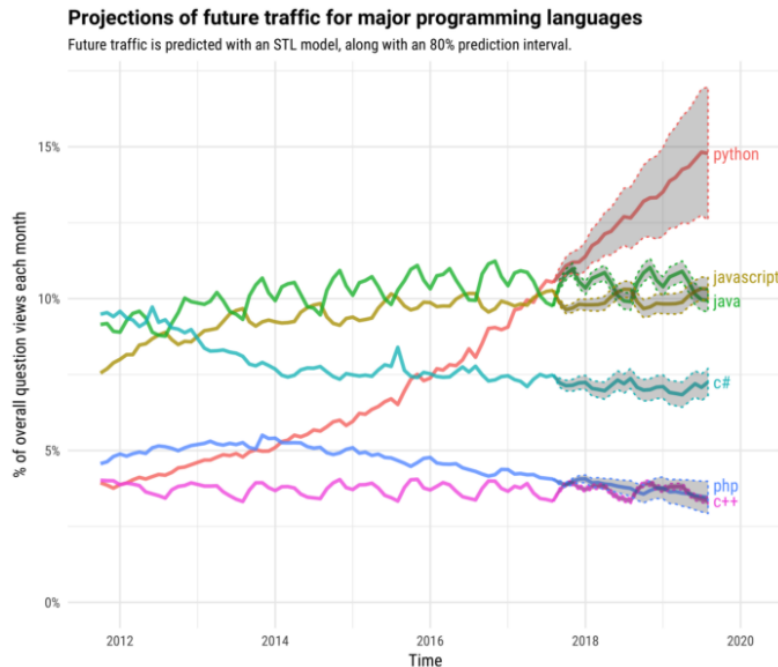
```
print("Hello, World!")
```

Why should we use Python?

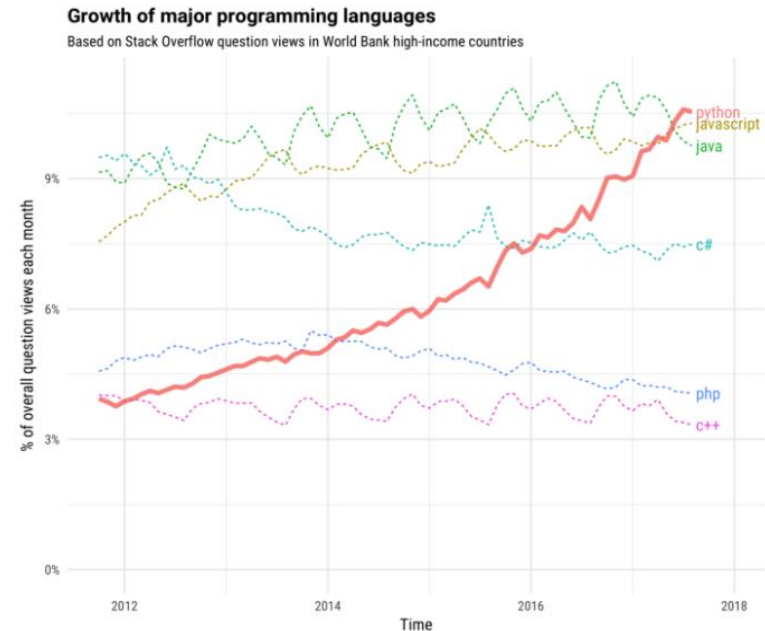
Python is extensively used by major companies

- | | | | | |
|-----------|-----------|---------|--------|---------|
| • Google | Facebook | Netflix | Amazon | Reddit |
| • YouTube | Instagram | Spotify | Quora | Dropbox |

Python popularity by usage inquiries ([Stack Overflow](#)) is growing rapidly



Picture Credits: [Stack Overflow](#)



Picture Credits: [Stack Overflow](#)

Getting Started 1: Standard Python Installation

[Python.org](https://python.org)

- Open Source – free for download and use
- Linux, Windows, and Macintosh
- Package management is totally manual
- Dependency resolution can get out of hand (200K+ packages)
- Assumes some background in
 - Programming
 - System administration
 - Python ecosystem
 - Command Line Interfaces

Bash Shell

```
ud0114v@vbox: ~/Desktop
ud0114v@vbox:~/Desktop$ echo 'Hello World'
Hello World
ud0114v@vbox:~/Desktop$
```

Python Shell

```
ud0114v@vbox: ~/Desktop
ud0114v@vbox:~/Desktop$ echo 'Hello World!'
Hello World!
ud0114v@vbox:~/Desktop$ python3
Python 3.8.5 (default, Jul 28 2020, 12:59:40)
[GCC 9.3.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>> print('Hello World!')
Hello World!
>>> quit()
ud0114v@vbox:~/Desktop$
```

Getting Started 2: The Anaconda Individual Edition

A Python 'distribution' for science and engineering

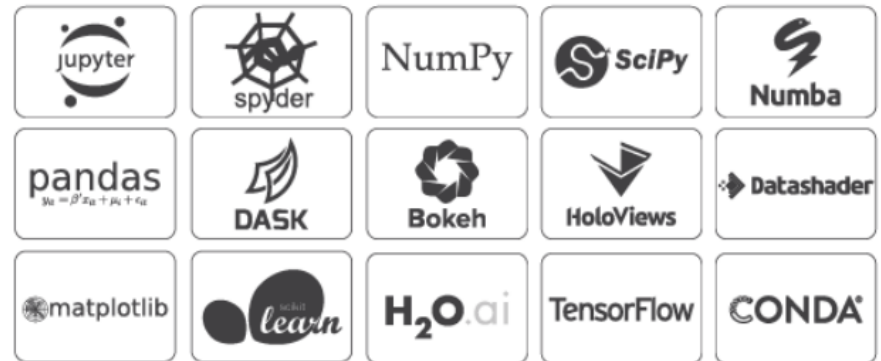
- Anaconda pre-packages a set of libraries (functionality) for science and engineering applications
- Includes a graphical package manager
- Provides advanced usage options (i.e. shells), just like standard Python

Anaconda core packages

- Numpy – numerical calculations
- SciPy – Libraries useful to engineers built on Numpy
- Matplotlib – a Matlab-like (similar syntax/methods) charting library
- Pandas – a tabular representation of data integrated with Numpy, Scipy and Matplotlib
- Spyder – Scientific Python IDE
- Jupyter – Notebook-based IDE for Julia, Python and R

Popular included or add-on packages

- Dask – Scalable analytics
- TensorFlow – Google's ML/AI
- Bokeh – Interactive visualization library
- Datashader – 'Big Data' visualization library





Anaconda Installation 1: FAROS

Applications

These are services (software programs) that run on your computer and are sent out as an installation packet to the PC. Examples of an application under this heading include SAP machine, Microsoft Office, Adobe Acrobat, Java script etc.

To search for these services or programs enter your search term in the search field below and click on Search.

It's also possible to search for all applications services available under this heading by leaving the search field empty and clicking on Search.

Search		Search Result	
<input type="text" value="Anaconda"/>			
<input type="button" value="Search"/>			
Info	Service name	Description	Add to cart
	Anaconda Python 3.7 English (US)	Anaconda is a free and open source distribution of the Python and R programming languages for data science and machine learning related applications.	

Additional information can be found here:

- V&V Portal (wiki): http://cae.it.volvo.net/wiki/applications/python#useful_document
- Users community on Yammer: https://www.yammer.com/volvo.com/#/threads/inGroup?type=in_group&feedId=17232551936&view=all







Anaconda Installation 2: Manual

Applications

These are services (software programs) that run on your computer and are sent out as an installation packet to the PC. Examples of an application under this heading include SAP machine, Microsoft Office, Adobe Acrobat, Java script etc.

To search for these services or programs enter your search term in the search field below and click on Search.

It's also possible to search for all applications services available under this heading by leaving the search field empty and clicking on Search.

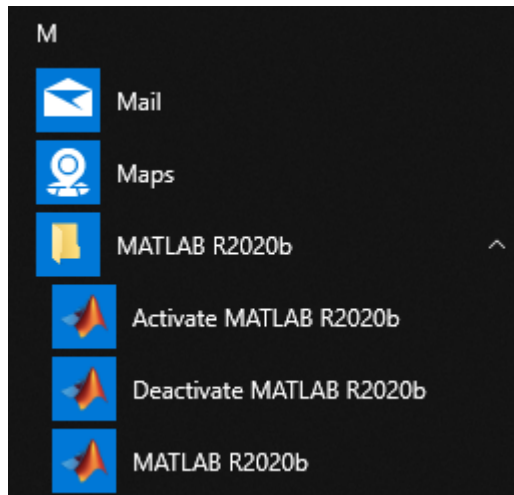
short term local admin	Search	<table><tr><th>Info</th><th>Service name</th><th>Description</th></tr><tr><td></td><td>Long Term Local Admin Access 1.0 English (US)</td><td>This application gives a user time limited rights to a MyPlace computer. Please note that the target group of users of this service are servers and IT infrastructure technicians. If you have permanent local administrative access, you should not use this service. The service will have a yearly renewal. If you have permanent administrative access, you should not use this service. If the service is enabled with an Auto Approval, access will be granted within 30 minutes of the request, is granted over the VPN, and access will automatically expire after five days. With this solution, you can ensure that applications or plugins that are installed on the computer are not in your work.</td></tr><tr><td></td><td>Short Term Local Admin Access 1.0 English (US)</td><td>This application gives a user time limited rights to a MyPlace computer. The user will have access to the server of the computer.</td></tr></table>	Info	Service name	Description		Long Term Local Admin Access 1.0 English (US)	This application gives a user time limited rights to a MyPlace computer. Please note that the target group of users of this service are servers and IT infrastructure technicians. If you have permanent local administrative access, you should not use this service. The service will have a yearly renewal. If you have permanent administrative access, you should not use this service. If the service is enabled with an Auto Approval, access will be granted within 30 minutes of the request, is granted over the VPN, and access will automatically expire after five days. With this solution, you can ensure that applications or plugins that are installed on the computer are not in your work.		Short Term Local Admin Access 1.0 English (US)	This application gives a user time limited rights to a MyPlace computer. The user will have access to the server of the computer.
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	Short Term Local Admin Access 1.0 English (US)	This application gives a user time limited rights to a MyPlace computer. The user will have access to the server of the computer.									

Anaconda is installed ... now what?

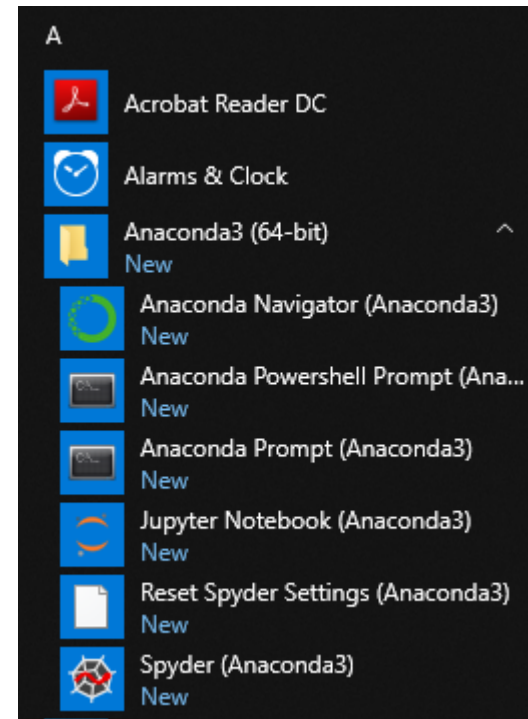
Matlab vs Anaconda

- Matlab offers a single/unified GUI experience
- One starts it in the usual way
- Anaconda offers a variety of usage profiles
- One starts each in the usual way, but ...
- New users may not know which to start

Matlab

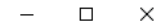


Anaconda



Anaconda Navigator: Home

Anaconda Navigator



File Help



Sign in to Anaconda Cloud

Home

Environments

Learning

Community

Documentation

Developer Blog



Applications on

base (root)

Channels

Refresh



Powershell Prompt

0.0.1

Run a Powershell terminal with your current environment from Navigator activated

Launch



Qt Console

4.7.5

PyQt GUI that supports inline figures, proper multiline editing with syntax highlighting, graphical calltips, and more.

Launch



Spyder

4.1.4

Scientific Python Development EnviRnment. Powerful Python IDE with advanced editing, interactive testing, debugging and introspection features

Launch



Glueviz

0.15.2

Multidimensional data visualization across files. Explore relationships within and among related datasets.

Install



Orange 3

3.26.0

Component based data mining framework. Data visualization and data analysis for novice and expert. Interactive workflows with a large toolbox.

Install



RStudio

1.1.456

A set of integrated tools designed to help you be more productive with R. Includes R essentials and notebooks.

Install

Anaconda Navigator: Community



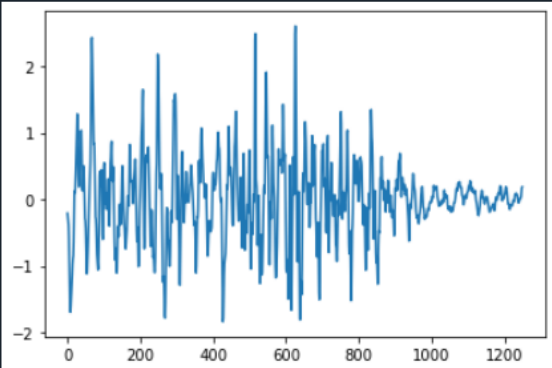
Spyder Integrated Development Environment

Spyder (Python 3.8)

File Edit Search Source Run Debug Consoles Projects Tools View Help

C:\Users\ud0114v\Documents\spyder\easybutter.py

```
29 y = np.genfromtxt(srcf[1], delimiter=',')
30 y = y[1:,1]
31 z = np.genfromtxt(srcf[2], delimiter=',')
32 z = z[1:,1]
33
34 # print shapes
35 print(x.shape, y.shape, z.shape)
36
37
38 #%%
39 # find max positive amplitude
40 # extract 2.5 seconds left/right
41 lobnd = x.argmax() - 625
42 hibnd = lobnd + 1250
43 xsamp = x[lobnd:hibnd]
44 print(xsamp.size)
45
46 #%%
47 # plot signal samples
48 plt.figure()
49 t = np.arange(0, xsamp.size)
50 plt.plot(t, xsamp)
51
52 #%%
53 # assume 250Hz sample rate
54 # filter: 8th order, 70Hz, lowpass, second-order section
55 sos = signal.butter(8, 70/125, btype='Low', output='sos')
56 xlow = signal.sosfiltfilt(sos, xsamp)
57 plt.plot(t, xlow)
58
59 #%%
60 # filter: 8th order, 70Hz, highpass, second-order section
61 sos = signal.butter(8, 70/125, btype='highpass', output='sos')
62 xhigh = signal.sosfiltfilt(sos, xsamp)
63 plt.figure()
64 plt.plot(t, xhigh)
65
```



Variable explorer Help Plots Files

Console 1/A

```
In [6]: runcell(4, 'C:/Users/ud0114v/Documents/spyder/easybutter.py')
```

Figures now render in the Plots pane by default. To make them also appear inline in the Console, uncheck "Mute Inline Plotting" under the Plots pane options menu.

```
In [7]: runcell(5, 'C:/Users/ud0114v/Documents/spyder/easybutter.py')
In [8]:
```

IPython console History

LSP Python: ready conda: base (Python 3.8.3) Line 56, Col 38 UTF-8 CRLF RW Mem 42%

Jupyter Notebook

Documents/spyder/ x Untitled - Jupyter Notebook x +

localhost:8888/notebooks/Documents/spyder/Untitled.ipynb?kernel_name=python3#

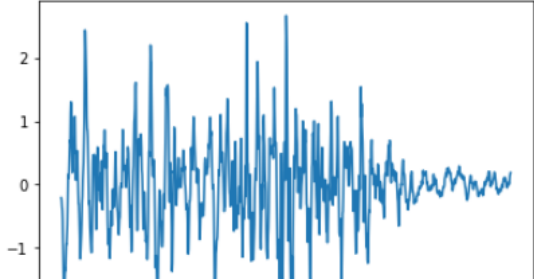
jupyter Untitled Last Checkpoint: 4 minutes ago (autosaved) Logout

File Edit View Insert Cell Kernel Widgets Help Trusted Python 3

In [4]:
find max positive amplitude
extract 2.5 seconds left/right
lobnd = x.argmax() - 625
hibnd = lobnd + 1250
xsamp = x[lobnd:hibnd]
print(xsamp.size)
1250

In [5]:
plot signal samples
plt.figure()
t = np.arange(0, xsamp.size)
plt.plot(t, xsamp)

Out[5]: [matplotlib.lines.Line2D at 0x27c172cc610<]



Training 1: Self-teaching / one-on-one

Free, high-quality Python training is everywhere

- Python.org
- YouTube
- Universities
- Blogs

Both general and application specific training is out there, one must look

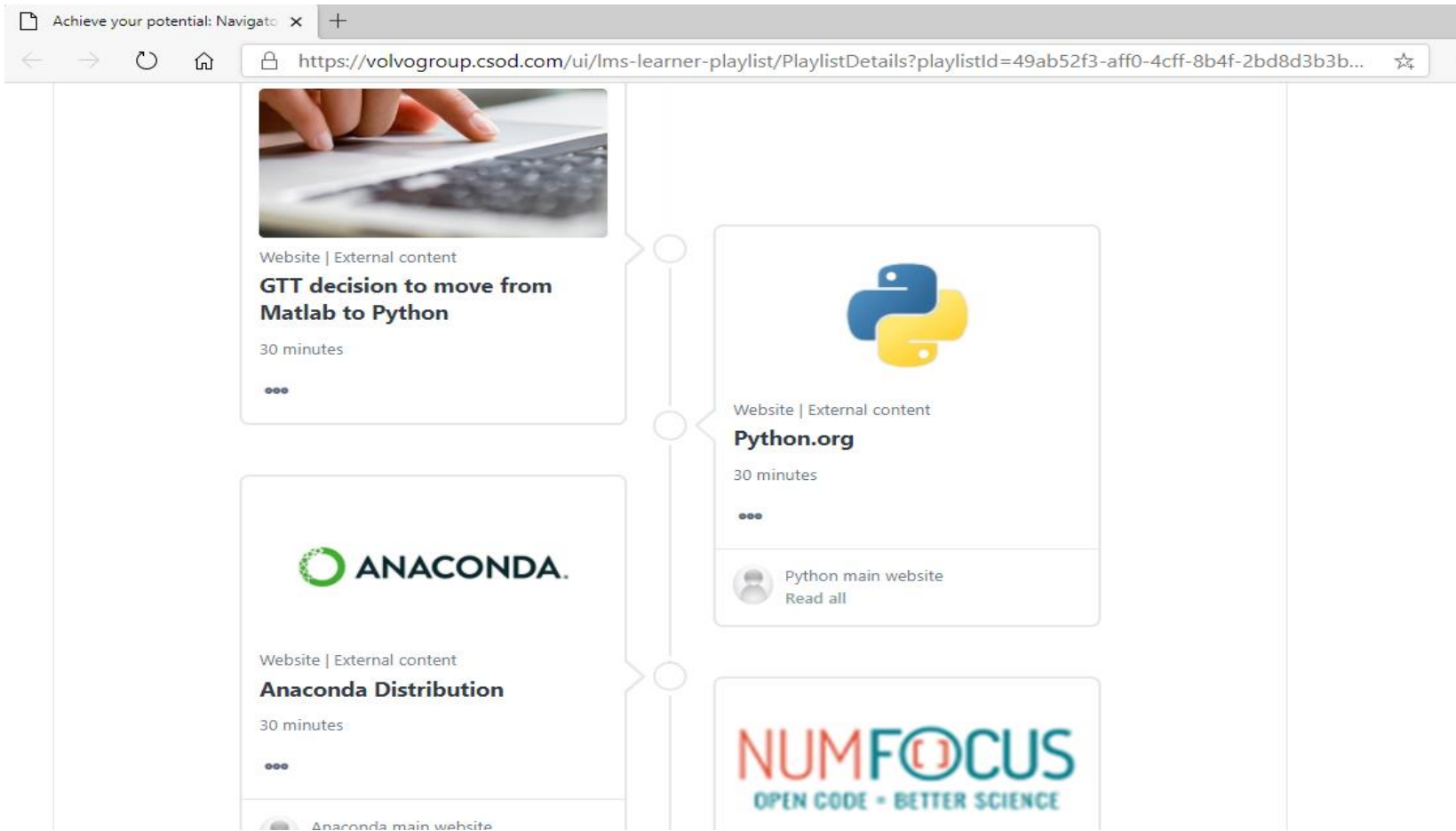
- Open Source Software creates vast user communities
- Most projects consist of highly competent and motivated people
- The likelihood that any meaningful question you have is unique and unanswered is almost zero
- Teaching oneself is the rule, not the exception

I conduct one-on-one training with engineers who can code

- Signals processing
- Plotting essentials
- Log data analysis
- SQL database access
- PowerBI Integration
- Matrix techniques
- Machine learning
- Model Predictive Control

Training 2: VGU Playlist

<https://volvogroup.csod.com/ui/lms-learner-playlist/PlaylistDetails?playlistId=49ab52f3-aff0-4cff-8b4f-2bd8d3b3b955>



The screenshot shows a web browser window with the address bar displaying the URL: <https://volvogroup.csod.com/ui/lms-learner-playlist/PlaylistDetails?playlistId=49ab52f3-aff0-4cff-8b4f-2bd8d3b3b955>. The browser tab is titled "Achieve your potential: Navigato". The main content area displays a playlist of four items, each with a thumbnail image, a title, a duration, and a source link.

- Item 1:** Thumbnail shows a hand on a laptop keyboard. Title: **GTT decision to move from Matlab to Python**. Duration: 30 minutes. Source: Website | External content.
- Item 2:** Thumbnail shows the Python logo. Title: **Python.org**. Duration: 30 minutes. Source: Website | External content. Below the item is a link: "Python main website Read all".
- Item 3:** Thumbnail shows the Anaconda logo. Title: **Anaconda Distribution**. Duration: 30 minutes. Source: Website | External content. Below the item is a link: "Anaconda main website".
- Item 4:** Thumbnail shows the NumFocus logo with the tagline "OPEN CODE - BETTER SCIENCE".

VOLVO



Python

Thanks!