

python™

for engineers

Barış Deniz Sağlam

bdsaglam@gmail.com



What is Python?

An interpreted, high-level programming language
for general-purpose programming.

open source

multi-paradigm

large standard library

automatic memory
management

dynamic & strong
type

huge community

History

- Guido Van Rossum started in 1989
- Python 1.0 released in 1994
- Python 2.0 released in 2000
- Python Software Foundation (PSF) formed in 2001
- Python 3.0 released in 2008



Philosophy

Python has a design philosophy that emphasizes code readability.

A syntax that allows programmers to express concepts in fewer lines of code notably using significant whitespace.

It provides constructs that enable clear programming on both small and large scales.

The Zen of Python (PEP 20)

Beautiful is better than ugly

Explicit is better than implicit

Simple is better than complex

Complex is better than complicated

Flat is better than nested

Sparse is better than dense

Readability counts

Special cases aren't special enough to break the rules

Although practicality beats purity

Errors should never pass silently

Unless explicitly silenced

In the face of ambiguity, refuse the temptation to guess

There should be one-- and preferably only one -- obvious way to do it

Although that way may not be obvious at first unless you're Dutch

Now is better than never

*Although never is often better than *right* now*

If the implementation is hard to explain, it's a bad idea

If the implementation is easy to explain, it may be a good idea

Namespaces are one honking great idea -- let's do more of those!

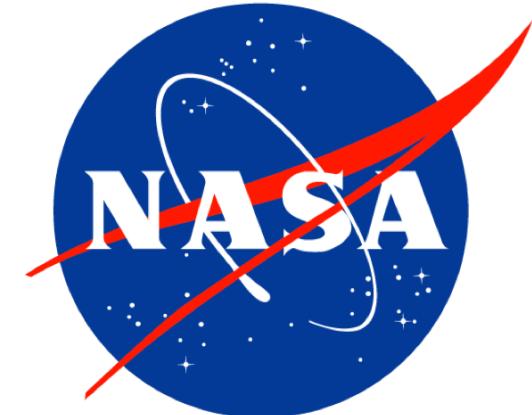
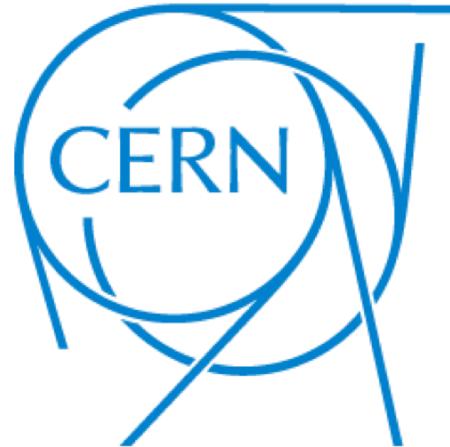
TIOBE Index

Jan 2018	Jan 2017	Change	Programming Language	Ratings	Change
1	1		Java	14.215%	-3.06%
2	2		C	11.037%	+1.69%
3	3		C++	5.603%	-0.70%
4	5	▲	Python	4.678%	+1.21%
5	4	▼	C#	3.754%	-0.29%
6	7	▲	JavaScript	3.465%	+0.62%
7	6	▼	Visual Basic .NET	3.261%	+0.30%
8	16	▲	R	2.549%	+0.76%
9	10	▲	PHP	2.532%	-0.03%

Google



WIKIPEDIA
The Free Encyclopedia



YAHOO!



Instagram

You Tube

Quora

Applications

- Scientific & Numeric
- Desktop GUIs
- Web and Internet Development
- Education
- Database Access
- Network Programming
- Software & Game Development

Resources for Language

Python Docs

Beginning Python From Novice to Professional, Magnus Lie Hetland

Learning Python, Mark Lutz

Problem Solving with Algorithms and Data Structures, Brad Miller & David Ranum

Python Essential Reference, David M. Beazley

Python Cookbook, David M. Beazley

Pro Python, J. Burton Browning & Marty Alchin

Python için Türkçe Kılavuz, Fırat Özgül

Resources for Engineering

[Scipy Documentation](#)

[Scipy Lecture Notes](#)

[Matplotlib](#)

Python For Data Analysis, Wes McKinney (creator of pandas)

Resources – People

Raymond Hettinger

Kenneth Reitz

Brandon Rhodes

Kevin London

David Beazley

Ned Batchelder

Greg Ward

Yaşar Arabacı

Alex Martelli

Resources – Events

PyCon

Scipy Conference

PyData

DjangoCon

PyBay

Django Girls

EuroPython

Resources – Websites

[Runestone Interactive](#)

[Automate the Boring Stuff with Python](#)

[Full Stack Python](#)

[Python Cheatsheet](#)

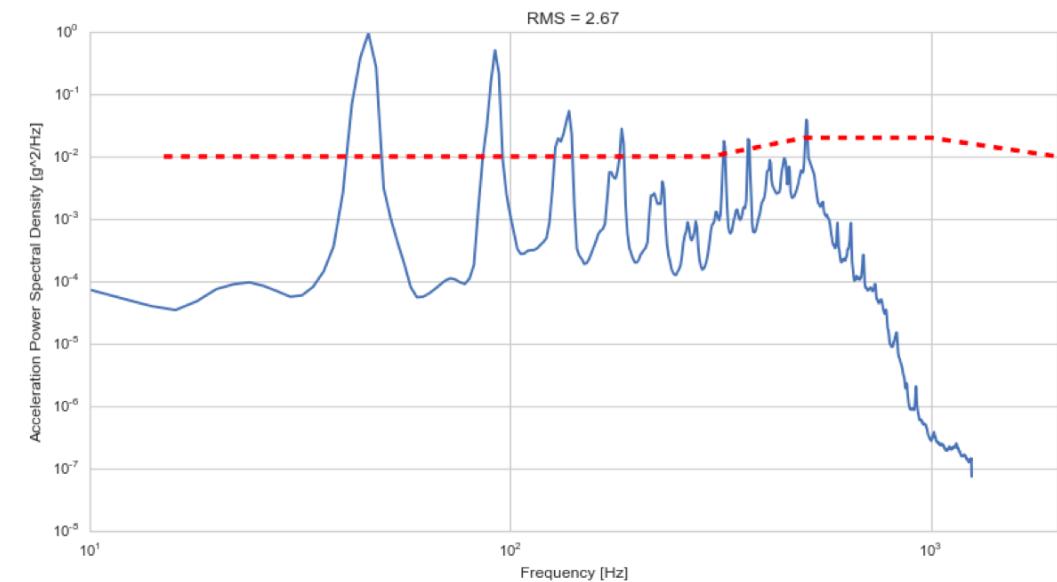
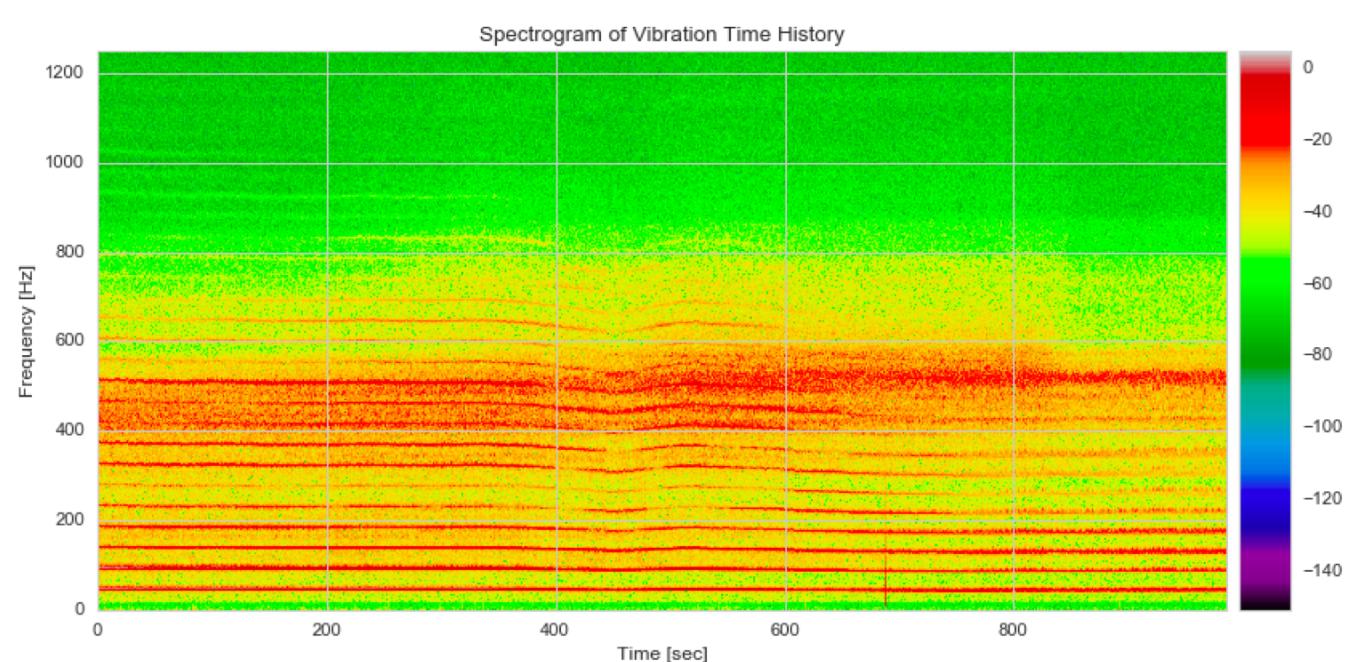
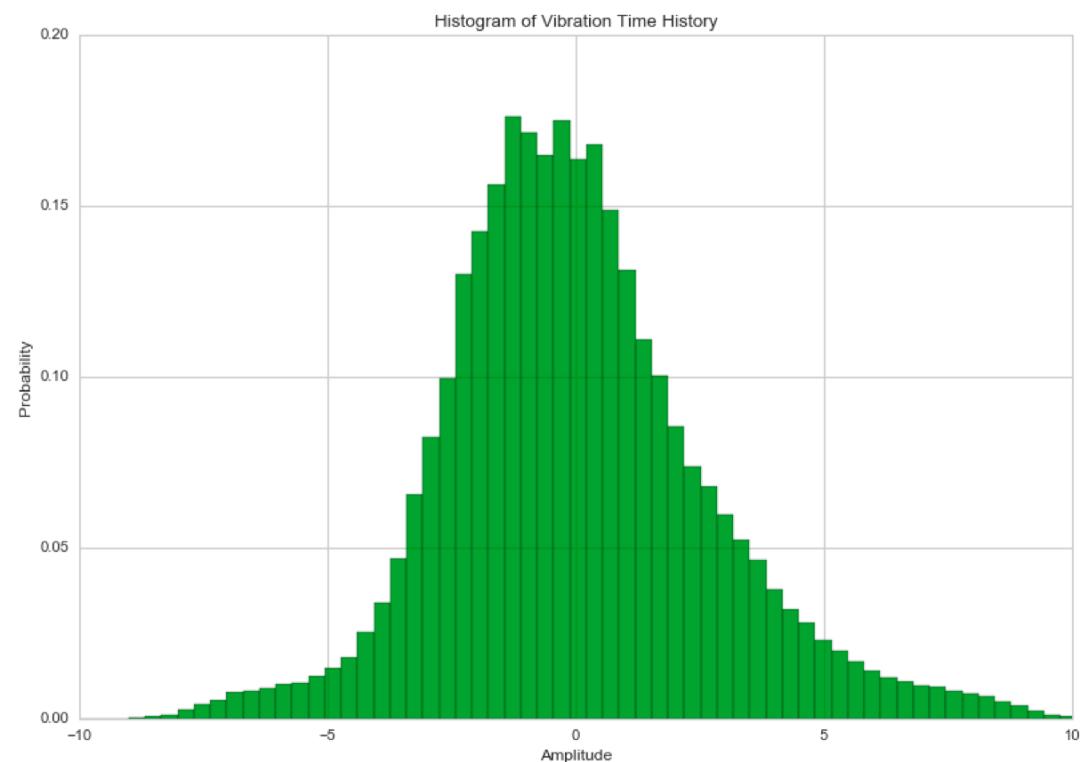
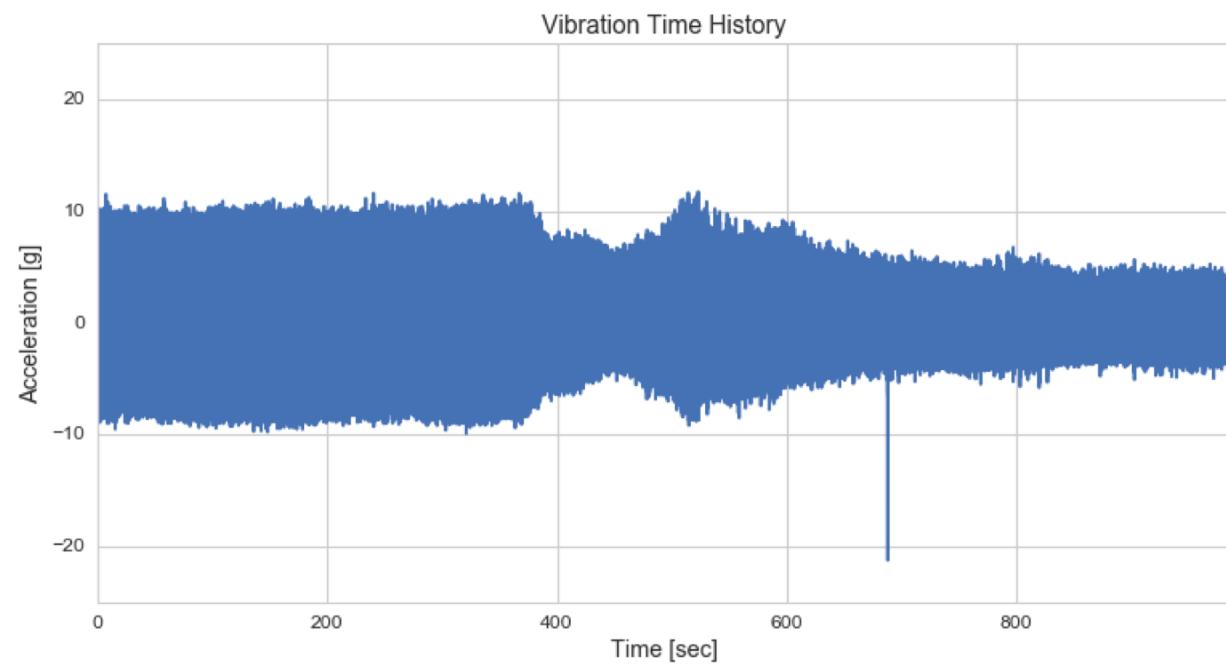
Resources

huge collection of

Jupyter (IPython) notebooks

Outline

- Intro, Environment setup
- Syntax, Primitives
- Data Structures
- Functions and Generators
- Error Handling
- Regular Expressions
- Input/Output, File Operations
- Module Package
- Standard Library
- Object Oriented Programming
- Arrays with numpy
- Plotting, animation with matplotlib
- Data analysis with pandas
- Scientific computations with scipy
- Graphical User Interface with PyQt
- Thread
- Code Profiling
- Testing
- Virtual Environments
- Advanced OOP



Data Analysis

```
In [2]: df_1 = pd.read_csv("../data/ozone.csv")
```

Get a summary of the DataFrame:

```
In [3]: df_1.describe()
```

Out[3]:

	Ozone	Solar.R	Wind	Temp	Month	Day
count	116.000000	146.000000	153.000000	153.000000	153.000000	153.000000
mean	42.129310	185.931507	9.957516	77.882353	6.993464	15.803922
std	32.987885	90.058422	3.523001	9.465270	1.416522	8.864520
min	1.000000	7.000000	1.700000	56.000000	5.000000	1.000000
25%	18.000000	115.750000	7.400000	72.000000	6.000000	8.000000
50%	31.500000	205.000000	9.700000	79.000000	7.000000	16.000000
75%	63.250000	258.750000	11.500000	85.000000	8.000000	23.000000
max	168.000000	334.000000	20.700000	97.000000	9.000000	31.000000

List the first five rows of the DataFrame:

Statistical Modelling

```
In [7]: # example with non-linear relationship
nsample = 50
sig = 0.5
x = np.linspace(0, 20, nsample)
X = np.column_stack((x, np.sin(x), (x-5)**2, np.ones(nsample)))
beta = [0.5, 0.5, -0.02, 5.]
y_true = np.dot(X, beta)
y = y_true + sig * np.random.normal(size=nsample)

res = sm.OLS(y, X).fit()
print(res.summary())
```

```
OLS Regression Results
=====
Dep. Variable:                      y      R-squared:                 0.933
Model:                            OLS      Adj. R-squared:            0.928
Method:                           Least Squares      F-statistic:             211.8
Date:          Sun, 16 Nov 2014      Prob (F-statistic):       6.30e-27
Time:              20:59:31      Log-Likelihood:           -34.438
No. Observations:                  50      AIC:                   76.88
Df Residuals:                      46      BIC:                   84.52
Df Model:                           3
=====

      coef    std err        t     P>|t|    [95.0% Conf. Int.]
-----
x1      0.4687    0.026   17.751      0.000      0.416    0.522
x2      0.4836    0.104    4.659      0.000      0.275    0.693
x3     -0.0174    0.002   -7.507      0.000     -0.022   -0.013
const    5.2058    0.171   30.405      0.000      4.861    5.550
-----
Omnibus:                          0.655   Durbin-Watson:            2.896
Prob(Omnibus):                     0.721   Jarque-Bera (JB):         0.360
Skew:                             0.207   Prob(JB):                  0.835
Kurtosis:                          3.026   Cond. No.                  221.
=====
```

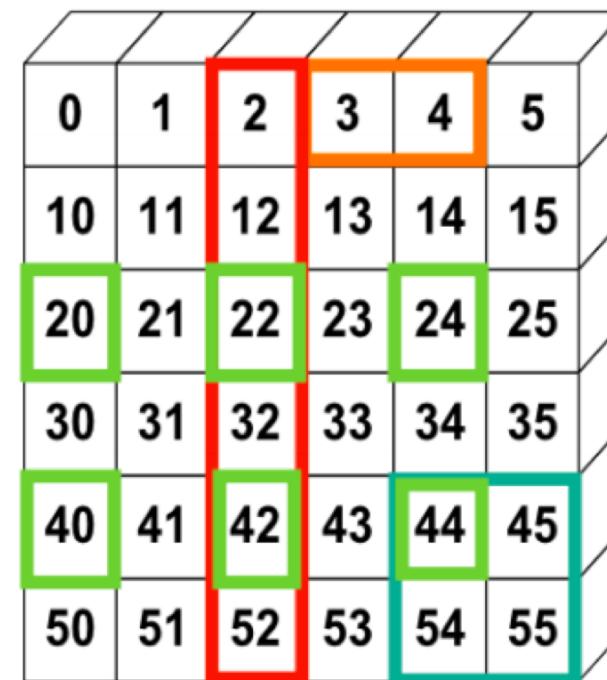
Array Operations

```
>>> a[0,3:5]  
array([3,4])
```

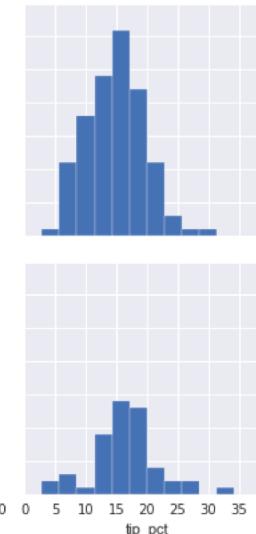
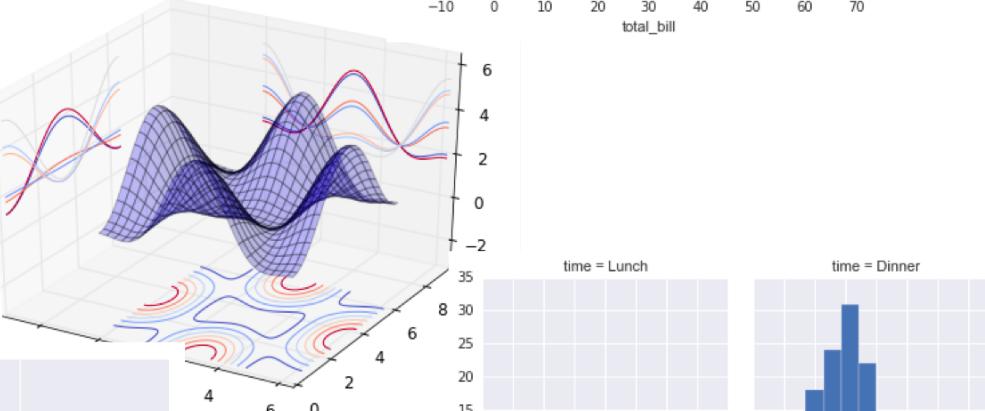
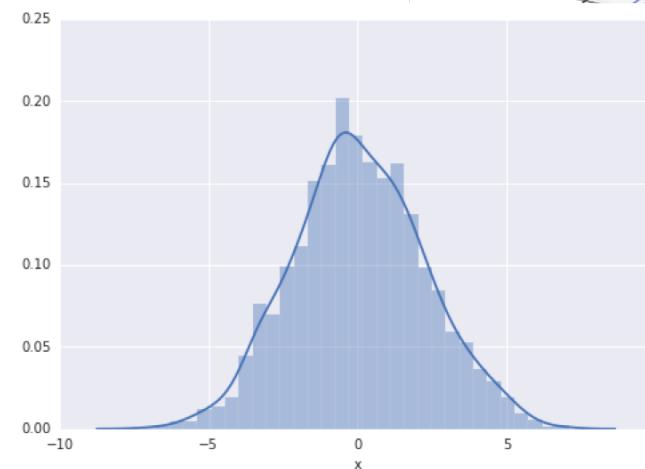
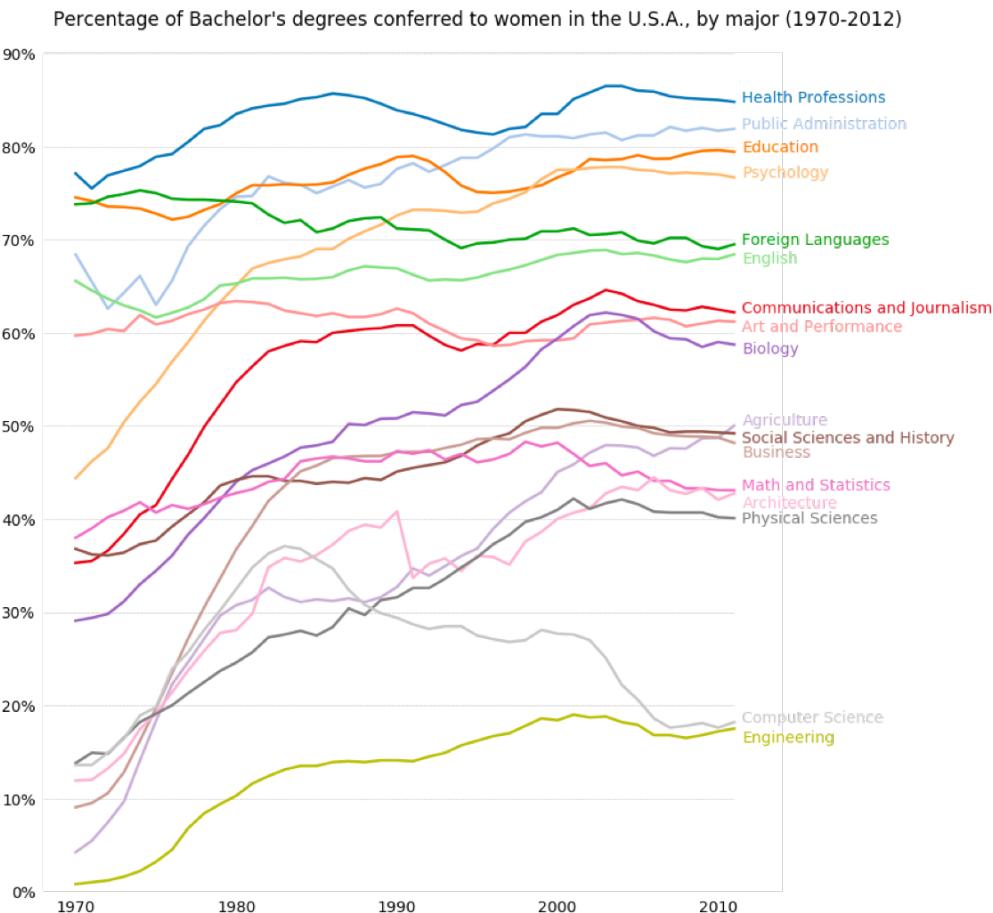
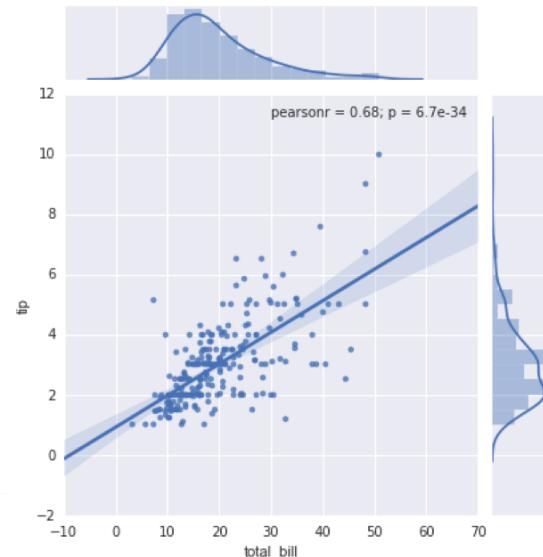
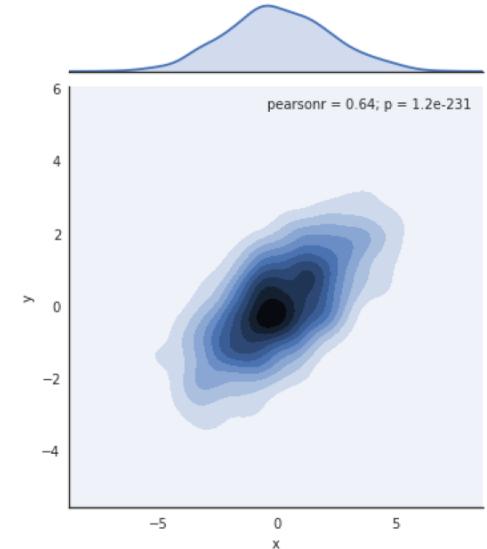
```
>>> a[4:,:4:]  
array([[44, 45],  
      [54, 55]])
```

```
>>> a[:,2]  
array([2,12,22,32,42,52])
```

```
>>> a[2::2,:,:2]  
array([[20,22,24],  
      [40,42,44]])
```



0	1	2	3	4	5
10	11	12	13	14	15
20	21	22	23	24	25
30	31	32	33	34	35
40	41	42	43	44	45
50	51	52	53	54	55

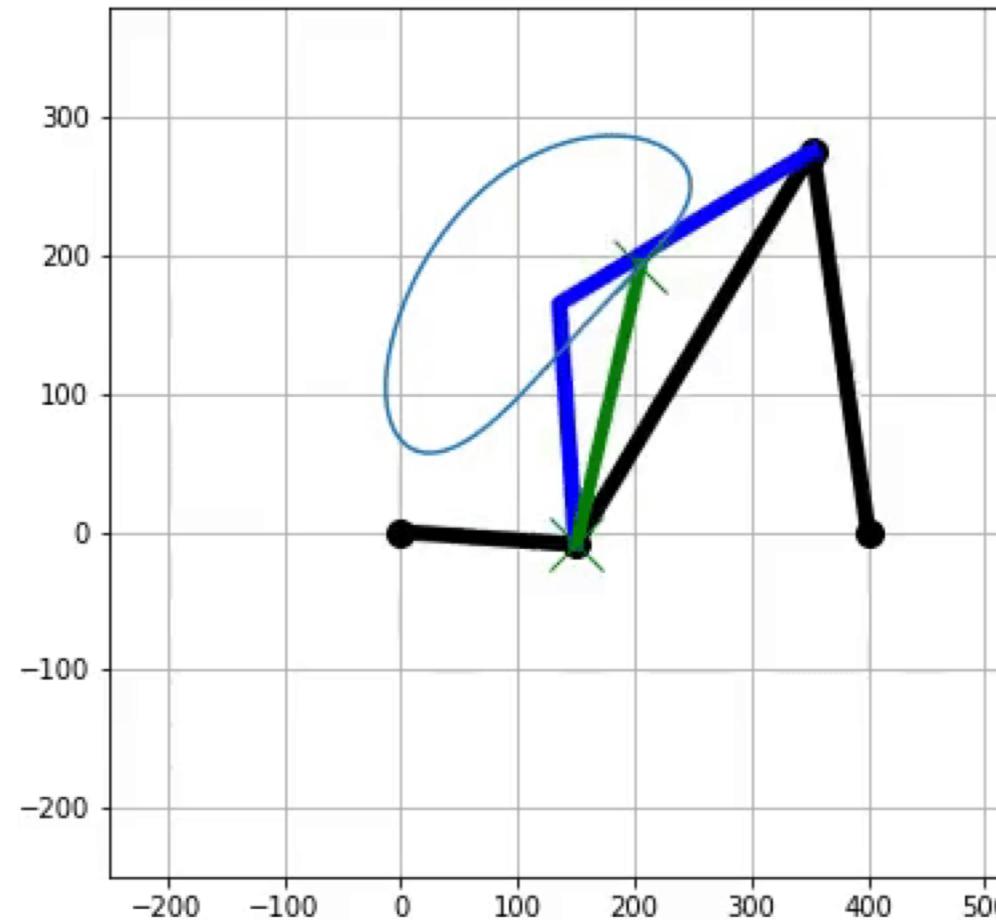


sex = Male

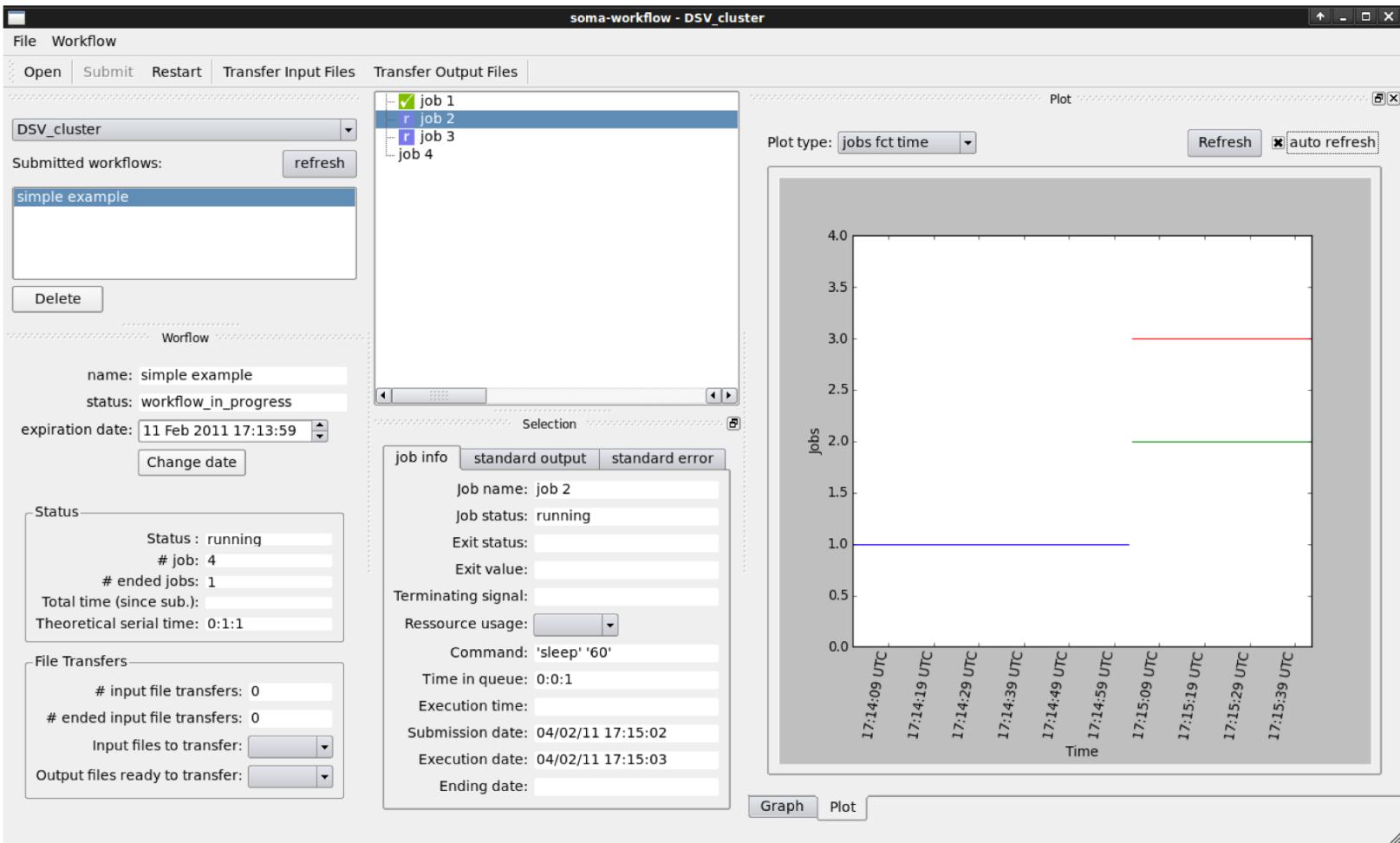
sex = Female

Data source: nces.ed.gov/programs/digest/2013menu_tables.asp
Author: Randy Olson (randalolson.com / @randal_olson)
Note: Some majors are missing because the historical data is not available for them

Animation



Graphical User Interface



Development Environments and Distributions

- Plain Python
- Anaconda
- WinPython
- PyCharm
- Sublime
- Visual Studio
- Spyder
- Pydev Eclipse
- IDLE