



```

>>> a[0, 3:5]
array([3, 4])
>>> a[4:, 4:]
array([[14, 55],
       [54, 55]])
>>> a[1:, 2]
a[12, 12, 22, 32, 42, 52])
>>> a[2:12, :12]
array([[130, 22, 24],
       [40, 42, 44]])

```

```

>>> a[0, 3:5]
array([3, 4])
>>> a[4:, 4:]
array([[14, 55],
       [54, 55]])
>>> a[1:, 2]
a[12, 12, 22, 32, 42, 52])
>>> a[2:12, :12]
array([[130, 22, 24],
       [40, 42, 44]])

```

WHAT IS TO BE LEARNED!!!





Library: modules written in Python that provide standardized solutions for many problems that occur in everyday programming.



Libraries are not part of basic installation of PYTHON

INTRODUCTION TO PYTHON LIBRARIES



NUMPY

- An open-source numerical **Python** library.
- Stands for **Numeric Python** or **Numerical Python**
- contains a multi-dimensional array and matrix data structures
- For numerical data, NumPy arrays are more efficient for storing and manipulating data than the other built-in Python data structures.
- Used to perform a number of mathematical operations on arrays such as trigonometric, statistical, and algebraic routines.
- Tools for reading and writing array-based datasets to disk
- The core of NumPy is well-optimized C code. Enjoy the flexibility of Python with the speed of compiled code.





Scientific Python is often mentioned in the same breath with NumPy.

needs Numpy, as it is based on the data structures of Numpy

extends the capabilities of NumPy with useful functions for minimization, regression, Fourier-transformation and many others

PANDAS

an open source library in Python.

Series is a one-dimensional labeled array object

provides ready to use high-performance data structures and data analysis tools.

DataFrame is the key data structure in Pandas, that is used to store and manipulate tabular data as a 2-D data structure with both row and column labels

runs on top of NumPy and is popularly used for data science and data analytics.

provides a rich feature-set on the DataFrame. For example, data alignment, data statistics, **slicing**, grouping, merging, concatenating data, etc.

has a higher-level interface and provides streamlined alignment of tabular data and powerful time series functionality.

Flexible handling of missing data

Provides for two data structures viz. DataFrame and Series

Handles merge and other relational operations found in popular databases (e.g. SQL-based)



MATPLOTLIB

the most popular
Python library for
producing plots and
other two-dimensional
data visualizations

originally created by
John D. Hunter





general- purpose machine
learning toolkit for Python
programmers, like

Classification: SVM, nearest
neighbors, random forest, logistic
regression, etc.

Regression: Lasso, ridge
regression, etc.

Clustering



1. `sudo apt-get update`
2. `sudo apt-get -y install python3-pip`
3. `sudo pip3 install pandas`
4. `python3.4 -m pip install numpy`
OR `sudo pip3 install numpy`
5. `pip3 install matplotlib`