

PS1

January 15, 2024

0.1 Scikit-learn installation

It comes integrated with Python. But it might not provide the latest release version. For instance, it does not provide `sklearn_extra` package. For installation of the extra package:

```
[1]: pip install scikit-learn-extra
```

```
Requirement already satisfied: scikit-learn-extra in
c:\programdata\anaconda3\lib\site-packages (0.2.0)
Requirement already satisfied: scipy>=0.19.1 in
c:\programdata\anaconda3\lib\site-packages (from scikit-learn-extra) (1.7.1)
Requirement already satisfied: numpy>=1.13.3 in
c:\programdata\anaconda3\lib\site-packages (from scikit-learn-extra) (1.20.3)
Requirement already satisfied: scikit-learn>=0.23.0 in
c:\programdata\anaconda3\lib\site-packages (from scikit-learn-extra) (0.24.2)
Requirement already satisfied: threadpoolctl>=2.0.0 in
c:\programdata\anaconda3\lib\site-packages (from scikit-learn>=0.23.0->scikit-
learn-extra) (2.2.0)
Requirement already satisfied: joblib>=0.11 in
c:\programdata\anaconda3\lib\site-packages (from scikit-learn>=0.23.0->scikit-
learn-extra) (1.1.0)
Note: you may need to restart the kernel to use updated packages.

WARNING: Ignoring invalid distribution -cikit-learn
(c:\programdata\anaconda3\lib\site-packages)
WARNING: Ignoring invalid distribution -cikit-learn
(c:\programdata\anaconda3\lib\site-packages)
WARNING: Ignoring invalid distribution -cikit-learn
(c:\programdata\anaconda3\lib\site-packages)
WARNING: Ignoring invalid distribution -cikit-learn
(c:\programdata\anaconda3\lib\site-packages)
WARNING: Ignoring invalid distribution -cikit-learn
(c:\programdata\anaconda3\lib\site-packages)
WARNING: Ignoring invalid distribution -cikit-learn
(c:\programdata\anaconda3\lib\site-packages)
```

0.2 Scikit-learn: Key packages

```
[1]: from sklearn.datasets import load_iris
      from sklearn.model_selection import train_test_split
      from sklearn.linear_model import RidgeClassifier
      from sklearn.linear_model import LogisticRegression
```

0.3 TensorFlow installation

Easy installation with pip:

```
[3]: pip install tensorflow
```

```
Requirement already satisfied: tensorflow in c:\programdata\anaconda3\lib\site-
packages (2.8.0)
Requirement already satisfied: setuptools in c:\programdata\anaconda3\lib\site-
packages (from tensorflow) (58.0.4)
Requirement already satisfied: gast>=0.2.1 in c:\programdata\anaconda3\lib\site-
packages (from tensorflow) (0.5.3)
Requirement already satisfied: flatbuffers>=1.12 in
c:\programdata\anaconda3\lib\site-packages (from tensorflow) (2.0)
Requirement already satisfied: tf-estimator-nightly==2.8.0.dev2021122109 in
c:\programdata\anaconda3\lib\site-packages (from tensorflow)
(2.8.0.dev2021122109)
Requirement already satisfied: google-pasta>=0.1.1 in
c:\programdata\anaconda3\lib\site-packages (from tensorflow) (0.2.0)
Requirement already satisfied: libclang>=9.0.1 in
c:\programdata\anaconda3\lib\site-packages (from tensorflow) (14.0.1)
Requirement already satisfied: tensorflow-io-gcs-filesystem>=0.23.1 in
c:\programdata\anaconda3\lib\site-packages (from tensorflow) (0.25.0)
Requirement already satisfied: opt-einsum>=2.3.2 in
c:\programdata\anaconda3\lib\site-packages (from tensorflow) (3.3.0)
Requirement already satisfied: six>=1.12.0 in c:\programdata\anaconda3\lib\site-
packages (from tensorflow) (1.16.0)
Requirement already satisfied: astunparse>=1.6.0 in
c:\programdata\anaconda3\lib\site-packages (from tensorflow) (1.6.3)
Requirement already satisfied: wrapt>=1.11.0 in
c:\programdata\anaconda3\lib\site-packages (from tensorflow) (1.12.1)
Requirement already satisfied: grpcio<2.0,>=1.24.3 in
c:\programdata\anaconda3\lib\site-packages (from tensorflow) (1.46.0)
Requirement already satisfied: protobuf>=3.9.2 in
c:\programdata\anaconda3\lib\site-packages (from tensorflow) (3.20.1)
Requirement already satisfied: numpy>=1.20 in c:\programdata\anaconda3\lib\site-
packages (from tensorflow) (1.20.3)
Requirement already satisfied: termcolor>=1.1.0 in
c:\programdata\anaconda3\lib\site-packages (from tensorflow) (1.1.0)
Requirement already satisfied: keras<2.9,>=2.8.0rc0 in
c:\programdata\anaconda3\lib\site-packages (from tensorflow) (2.8.0)
```

Requirement already satisfied: typing-extensions>=3.6.6 in
c:\programdata\anaconda3\lib\site-packages (from tensorflow) (3.10.0.2)

Requirement already satisfied: keras-preprocessing>=1.1.1 in
c:\programdata\anaconda3\lib\site-packages (from tensorflow) (1.1.2)

Requirement already satisfied: h5py>=2.9.0 in c:\programdata\anaconda3\lib\site-
packages (from tensorflow) (3.2.1)

Requirement already satisfied: absl-py>=0.4.0 in
c:\programdata\anaconda3\lib\site-packages (from tensorflow) (1.0.0)

Requirement already satisfied: tensorboard<2.9,>=2.8 in
c:\programdata\anaconda3\lib\site-packages (from tensorflow) (2.8.0)

Requirement already satisfied: wheel<1.0,>=0.23.0 in
c:\programdata\anaconda3\lib\site-packages (from astunparse>=1.6.0->tensorflow)
(0.37.0)

Requirement already satisfied: werkzeug>=0.11.15 in
c:\programdata\anaconda3\lib\site-packages (from
tensorboard<2.9,>=2.8->tensorflow) (2.0.2)

Requirement already satisfied: requests<3,>=2.21.0 in
c:\programdata\anaconda3\lib\site-packages (from
tensorboard<2.9,>=2.8->tensorflow) (2.26.0)

Requirement already satisfied: tensorboard-plugin-wit>=1.6.0 in
c:\programdata\anaconda3\lib\site-packages (from
tensorboard<2.9,>=2.8->tensorflow) (1.8.1)

Requirement already satisfied: google-auth<3,>=1.6.3 in
c:\programdata\anaconda3\lib\site-packages (from
tensorboard<2.9,>=2.8->tensorflow) (2.6.6)

Requirement already satisfied: tensorboard-data-server<0.7.0,>=0.6.0 in
c:\programdata\anaconda3\lib\site-packages (from
tensorboard<2.9,>=2.8->tensorflow) (0.6.1)

Requirement already satisfied: google-auth-oauthlib<0.5,>=0.4.1 in
c:\programdata\anaconda3\lib\site-packages (from
tensorboard<2.9,>=2.8->tensorflow) (0.4.6)

Requirement already satisfied: markdown>=2.6.8 in
c:\programdata\anaconda3\lib\site-packages (from
tensorboard<2.9,>=2.8->tensorflow) (3.3.7)

Requirement already satisfied: cachetools<6.0,>=2.0.0 in
c:\programdata\anaconda3\lib\site-packages (from google-
auth<3,>=1.6.3->tensorboard<2.9,>=2.8->tensorflow) (5.0.0)

Requirement already satisfied: rsa<5,>=3.1.4 in
c:\programdata\anaconda3\lib\site-packages (from google-
auth<3,>=1.6.3->tensorboard<2.9,>=2.8->tensorflow) (4.8)

Requirement already satisfied: pyasn1-modules>=0.2.1 in
c:\programdata\anaconda3\lib\site-packages (from google-
auth<3,>=1.6.3->tensorboard<2.9,>=2.8->tensorflow) (0.2.8)

Requirement already satisfied: requests-oauthlib>=0.7.0 in
c:\programdata\anaconda3\lib\site-packages (from google-auth-
oauthlib<0.5,>=0.4.1->tensorboard<2.9,>=2.8->tensorflow) (1.3.1)

Requirement already satisfied: importlib-metadata>=4.4 in
c:\programdata\anaconda3\lib\site-packages (from

```

markdown>=2.6.8->tensorboard<2.9,>=2.8->tensorflow) (4.8.1)
Requirement already satisfied: zipp>=0.5 in c:\programdata\anaconda3\lib\site-
packages (from importlib-
metadata>=4.4->markdown>=2.6.8->tensorboard<2.9,>=2.8->tensorflow) (3.6.0)
Requirement already satisfied: pyasn1<0.5.0,>=0.4.6 in
c:\programdata\anaconda3\lib\site-packages (from pyasn1-modules>=0.2.1->google-
auth<3,>=1.6.3->tensorboard<2.9,>=2.8->tensorflow) (0.4.8)
Requirement already satisfied: urllib3<1.27,>=1.21.1 in
c:\programdata\anaconda3\lib\site-packages (from
requests<3,>=2.21.0->tensorboard<2.9,>=2.8->tensorflow) (1.26.7)
Requirement already satisfied: certifi>=2017.4.17 in
c:\programdata\anaconda3\lib\site-packages (from
requests<3,>=2.21.0->tensorboard<2.9,>=2.8->tensorflow) (2021.10.8)
Requirement already satisfied: idna<4,>=2.5 in
c:\programdata\anaconda3\lib\site-packages (from
requests<3,>=2.21.0->tensorboard<2.9,>=2.8->tensorflow) (3.2)
Requirement already satisfied: charset-normalizer~=2.0.0 in
c:\programdata\anaconda3\lib\site-packages (from
requests<3,>=2.21.0->tensorboard<2.9,>=2.8->tensorflow) (2.0.4)
Requirement already satisfied: oauthlib>=3.0.0 in
c:\programdata\anaconda3\lib\site-packages (from requests-
oauthlib>=0.7.0->google-auth-
oauthlib<0.5,>=0.4.1->tensorboard<2.9,>=2.8->tensorflow) (3.2.0)
Note: you may need to restart the kernel to use updated packages.

```

```

WARNING: Ignoring invalid distribution -cikit-learn
(c:\programdata\anaconda3\lib\site-packages)
WARNING: Ignoring invalid distribution -cikit-learn
(c:\programdata\anaconda3\lib\site-packages)
WARNING: Ignoring invalid distribution -cikit-learn
(c:\programdata\anaconda3\lib\site-packages)
WARNING: Ignoring invalid distribution -cikit-learn
(c:\programdata\anaconda3\lib\site-packages)
WARNING: Ignoring invalid distribution -cikit-learn
(c:\programdata\anaconda3\lib\site-packages)
WARNING: Ignoring invalid distribution -cikit-learn
(c:\programdata\anaconda3\lib\site-packages)

```

caution: TensorFlow is not supported in ipad and iphone yet.

0.4 Keras: Key packages

```

[2]: from tensorflow.keras.datasets import mnist
from tensorflow.keras.datasets import cifar10
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense
from tensorflow.keras.layers import Flatten
from tensorflow.keras.optimizers import Adam

```

```
from tensorflow.keras.optimizers import SGD
```

0.5 Python basics

Python is an open-source and easy to use programming language. Python requires another software platform which serves to play around it. That is, Jupyter notebook.

0.5.1 Jupyter notebook installation

Three ways depending on environments: 1. Anaconda 2. Google Colab (cloud-based): Packages already installed, but limited use 3. Carnets on ipad: TensorFlow is not supported

0.6 Python: Key packages

0.6.1 math

```
[3]: import math

print(math.log(math.exp(20)))
print(math.sqrt(16))
print(math.dist([1,2], [3,4]))
```

20.0

4.0

2.8284271247461903

0.6.2 numpy.array

```
[4]: import numpy as np

print(np.array([[1,2],[3,4]]))
print(np.ones((2,2)))
x = np.zeros((2,2))
y = np.ones_like(x)
print(y)
```

[[1 2]

[3 4]]

[[1. 1.]

[1. 1.]]

[[1. 1.]

[1. 1.]]

```
[5]: x_grid1=np.arange(0,1,0.1)
print(x_grid1)
```

[0. 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9]

```
[6]: x_grid2=np.linspace(0,1,10)
print(x_grid2)
```

```
[0.          0.11111111 0.22222222 0.33333333 0.44444444 0.55555556
 0.66666667 0.77777778 0.88888889 1.          ]
```

```
[7]: x1 = np.array([1,2])
      x2 = np.array([3,4])
      xc = np.concatenate((x1,x2)) # column-wise
      xr = np.vstack((x1,x2)) # row-wise
      print(xc)
      print(xr)
```

```
[1 2 3 4]
[[1 2]
 [3 4]]
```

```
[8]: print(np.random.normal(0,1,size=(2,2))) # Gaussian with mean 0 and stv 0
      print(np.random.randn(2,2)) # Gaussian with mean 0 and stv 0
      print(np.random.rand(2,2)) # uniform [0,1]
      print(np.random.uniform(1,10,(2,2))) # uniform [1,10]
```

```
[[-1.19535961  0.40553123]
 [ 0.42223564 -0.2505231 ]]
[[0.93441543 0.06848034]
 [0.08187647 0.00332366]]
[[0.76866022 0.43284885]
 [0.9034407  0.31127943]]
[[2.39946157 6.43475304]
 [3.89502525 5.30083165]]
```

```
[9]: x = np.array([1,1])
      print(np.linalg.norm(x))
```

```
1.4142135623730951
```

```
[10]: x = np.array([[1,2],[3,4]])
       print(np.linalg.svd(x))
```

```
(array([[-0.40455358, -0.9145143 ],
        [-0.9145143 ,  0.40455358]]), array([5.4649857 , 0.36596619]),
array([[-0.57604844, -0.81741556],
        [ 0.81741556, -0.57604844]]))
```

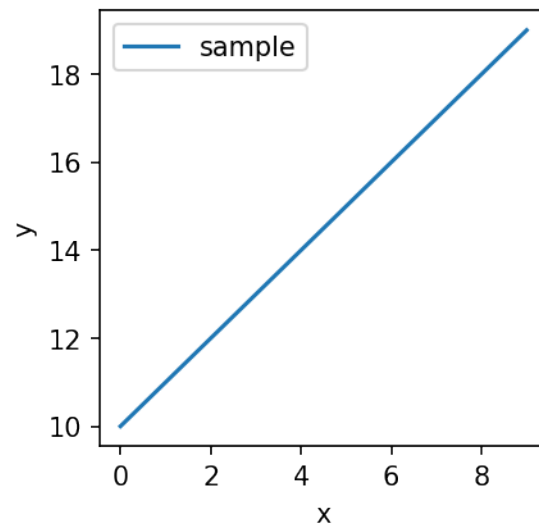
```
[11]: x = np.array([[1,2],[3,4]])
       print(np.linalg.eig(x))
```

```
(array([-0.37228132,  5.37228132]), array([[-0.82456484, -0.41597356],
        [ 0.56576746, -0.90937671]]))
```

```
[12]: import matplotlib.pyplot as plt

      x_value = [x for x in range(10)]
```

```
y_value = [y for y in range(10,20)]  
plt.figure(figsize=(3,3),dpi=150) # figure size and resolution  
plt.plot(x_value,y_value,label='sample') # create a plot  
plt.xlabel('x')  
plt.ylabel('y')  
plt.legend()  
plt.show()
```



[]: