

Pandas_and_numpy

January 5, 2019

```
In [1]: import pandas as pd
        iris_filename = "iris.csv"
        iris = pd.read_csv(iris_filename, sep=',', decimal='.', header=None, names = ['sepal_length', 'petal_length', 'target'])
```

```
In [5]: iris.values
```

```
[[5.1 3.5 1.4 0.2 'Iris-setosa']
 [4.9 3.0 1.4 0.2 'Iris-setosa']
 [4.7 3.2 1.3 0.2 'Iris-setosa']
 [4.6 3.1 1.5 0.2 'Iris-setosa']
 [5.0 3.6 1.4 0.2 'Iris-setosa']
 [5.4 3.9 1.7 0.4 'Iris-setosa']
 [4.6 3.4 1.4 0.3 'Iris-setosa']
 [5.0 3.4 1.5 0.2 'Iris-setosa']
 [4.4 2.9 1.4 0.2 'Iris-setosa']
 [4.9 3.1 1.5 0.1 'Iris-setosa']
 [5.4 3.7 1.5 0.2 'Iris-setosa']
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 [5.4 3.9 1.3 0.4 'Iris-setosa']
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 [5.2 3.5 1.5 0.2 'Iris-setosa']
 [5.2 3.4 1.4 0.2 'Iris-setosa']]
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[4.7 3.2 1.6 0.2 'Iris-setosa']
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[5.3 3.7 1.5 0.2 'Iris-setosa']
[5.0 3.3 1.4 0.2 'Iris-setosa']
[7.0 3.2 4.7 1.4 'Iris-versicolor']
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[6.8 2.8 4.8 1.4 'Iris-versicolor']

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[6.7 3.0 5.0 1.7 'Iris-versicolor']
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[5.1 2.5 3.0 1.1 'Iris-versicolor']
[5.7 2.8 4.1 1.3 'Iris-versicolor']
[6.3 3.3 6.0 2.5 'Iris-virginica']
[5.8 2.7 5.1 1.9 'Iris-virginica']
[7.1 3.0 5.9 2.1 'Iris-virginica']
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[6.8 3.0 5.5 2.1 'Iris-virginica']
[5.7 2.5 5.0 2.0 'Iris-virginica']
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[6.4 3.2 5.3 2.3 'Iris-virginica']
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[6.7 3.3 5.7 2.1 'Iris-virginica']

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[7.2 3.2 6.0 1.8 'Iris-virginica']
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[7.4 2.8 6.1 1.9 'Iris-virginica']
[7.9 3.8 6.4 2.0 'Iris-virginica']
[6.4 2.8 5.6 2.2 'Iris-virginica']
[6.3 2.8 5.1 1.5 'Iris-virginica']
[6.1 2.6 5.6 1.4 'Iris-virginica']
[7.7 3.0 6.1 2.3 'Iris-virginica']
[6.3 3.4 5.6 2.4 'Iris-virginica']
[6.4 3.1 5.5 1.8 'Iris-virginica']
[6.0 3.0 4.8 1.8 'Iris-virginica']
[6.9 3.1 5.4 2.1 'Iris-virginica']
[6.7 3.1 5.6 2.4 'Iris-virginica']
[6.9 3.1 5.1 2.3 'Iris-virginica']
[5.8 2.7 5.1 1.9 'Iris-virginica']
[6.8 3.2 5.9 2.3 'Iris-virginica']
[6.7 3.3 5.7 2.5 'Iris-virginica']
[6.7 3.0 5.2 2.3 'Iris-virginica']
[6.3 2.5 5.0 1.9 'Iris-virginica']
[6.5 3.0 5.2 2.0 'Iris-virginica']
[6.2 3.4 5.4 2.3 'Iris-virginica']
[5.9 3.0 5.1 1.8 'Iris-virginica']]
object

```

```
In [6]: iris.dtypes
```

```

Out[6]: sepal_length    float64
        sepal_width     float64
        petal_length    float64
        petal_width     float64
        target          object
        dtype: object

```

```

In [12]: import numpy as np
         array = np.arange(5).reshape(1,5)
         print(array)
         x = array + 1
         print(x)
         y = array * array
         print(y)

[[0 1 2 3 4]]
[[1 2 3 4 5]]
[[ 0  1  4  9 16]]

```

```
In [14]: array2 = np.array([1,2,3,4,5] * 5).reshape(5,5)
        array3 = array2.T
        array2 * array3
```

```
Out[14]: array([[ 1,  2,  3,  4,  5],
               [ 2,  4,  6,  8, 10],
               [ 3,  6,  9, 12, 15],
               [ 4,  8, 12, 16, 20],
               [ 5, 10, 15, 20, 25]])
```

```
In [16]: print(np.sum(array2,axis=0))
        print(np.sum(array2,axis=1))
        print(np.average(array2,axis=0))
        print(np.average(array2))
```

```
[ 5 10 15 20 25]
[15 15 15 15 15]
[1.  2.  3.  4.  5.]
3.0
```

```
In [23]: array4 = np.arange(5*5, dtype='float').reshape(5,5)
        coefs = np.array([1.,0.5,0.5,0.5,0.5])
        coefs_matrix = np.column_stack((coefs,coefs[::-1]))
        coefs_matrix
```

```
Out[23]: array([[1. , 0.5],
               [0.5, 0.5],
               [0.5, 0.5],
               [0.5, 0.5],
               [0.5, 1. ]])
```

```
In [24]: #https://docs.scipy.org/doc/numpy-1.15.0/reference/generated/numpy.dot.html
        np.dot(array4, coefs)
```

```
Out[24]: array([ 5., 20., 35., 50., 65.])
```

```
In [25]: np.dot(coefs, array4)
```

```
Out[25]: array([25., 28., 31., 34., 37.])
```

```
In [26]: np.dot(array4, coefs_matrix)
```

```
Out[26]: array([[ 5.,  7.],
               [20., 22.],
               [35., 37.],
               [50., 52.],
               [65., 67.]])
```

```

In [29]: #Indexation (it create data view not copy)
         array5 = np.arange(100, dtype=int).reshape(10,10)
         array5[2:9:2,: ]

Out[29]: array([[20, 21, 22, 23, 24, 25, 26, 27, 28, 29],
                [40, 41, 42, 43, 44, 45, 46, 47, 48, 49],
                [60, 61, 62, 63, 64, 65, 66, 67, 68, 69],
                [80, 81, 82, 83, 84, 85, 86, 87, 88, 89]])

In [30]: array5[2:9:2,5:]

Out[30]: array([[25, 26, 27, 28, 29],
                [45, 46, 47, 48, 49],
                [65, 66, 67, 68, 69],
                [85, 86, 87, 88, 89]])

In [32]: array5[2:9:2,5::-1]

Out[32]: array([[25, 24, 23, 22, 21, 20],
                [45, 44, 43, 42, 41, 40],
                [65, 64, 63, 62, 61, 60],
                [85, 84, 83, 82, 81, 80]])

In [35]: mask = (array5>=20) & (array5<=90) & ((array5/10.) % 1 >=0.5)
         array5[mask]

Out[35]: array([25, 26, 27, 28, 29, 35, 36, 37, 38, 39, 45, 46, 47, 48, 49, 55, 56,
                57, 58, 59, 65, 66, 67, 68, 69, 75, 76, 77, 78, 79, 85, 86, 87, 88,
                89])

In [36]: row_index = [1,1,2,7]
         col_index = [0,2,4,8]
         array5[row_index, col_index]

Out[36]: array([10, 12, 24, 78])

In [40]: #add data (2 dimensions)
         dataset = np.arange(50).reshape(10,5)
         single_line = np.arange(1*5).reshape(1,5)
         few_lines = np.arange(3 * 5).reshape(3,5)

         new_data = np.vstack((dataset, single_line))
         print(new_data)
         new_data = np.vstack((new_data, few_lines))
         print(new_data)

         # alternative w_data = np.vstack((new_data,single_line, few_lines))

```

```

[[ 0  1  2  3  4]
 [ 5  6  7  8  9]
 [10 11 12 13 14]
 [15 16 17 18 19]
 [20 21 22 23 24]
 [25 26 27 28 29]
 [30 31 32 33 34]
 [35 36 37 38 39]
 [40 41 42 43 44]
 [45 46 47 48 49]
 [ 0  1  2  3  4]]
[[ 0  1  2  3  4]
 [ 5  6  7  8  9]
 [10 11 12 13 14]
 [15 16 17 18 19]
 [20 21 22 23 24]
 [25 26 27 28 29]
 [30 31 32 33 34]
 [35 36 37 38 39]
 [40 41 42 43 44]
 [45 46 47 48 49]
 [ 0  1  2  3  4]
 [ 0  1  2  3  4]
 [ 5  6  7  8  9]
 [10 11 12 13 14]]

```

```

In [43]: # add data (3 dimensions)
         np.dstack((dataset *1,dataset *2, dataset *3))

```

```

Out[43]: array([[[ 0,  0,  0],
                  [ 1,  2,  3],
                  [ 2,  4,  6],
                  [ 3,  6,  9],
                  [ 4,  8, 12]],

                [[ 5, 10, 15],
                  [ 6, 12, 18],
                  [ 7, 14, 21],
                  [ 8, 16, 24],
                  [ 9, 18, 27]],

                [[10, 20, 30],
                  [11, 22, 33],
                  [12, 24, 36],
                  [13, 26, 39],
                  [14, 28, 42]]],
              dtype=int64)

```

```

[[ 15, 30, 45],
 [ 16, 32, 48],
 [ 17, 34, 51],
 [ 18, 36, 54],
 [ 19, 38, 57]],

[[ 20, 40, 60],
 [ 21, 42, 63],
 [ 22, 44, 66],
 [ 23, 46, 69],
 [ 24, 48, 72]],

[[ 25, 50, 75],
 [ 26, 52, 78],
 [ 27, 54, 81],
 [ 28, 56, 84],
 [ 29, 58, 87]],

[[ 30, 60, 90],
 [ 31, 62, 93],
 [ 32, 64, 96],
 [ 33, 66, 99],
 [ 34, 68, 102]],

[[ 35, 70, 105],
 [ 36, 72, 108],
 [ 37, 74, 111],
 [ 38, 76, 114],
 [ 39, 78, 117]],

[[ 40, 80, 120],
 [ 41, 82, 123],
 [ 42, 84, 126],
 [ 43, 86, 129],
 [ 44, 88, 132]],

[[ 45, 90, 135],
 [ 46, 92, 138],
 [ 47, 94, 141],
 [ 48, 96, 144],
 [ 49, 98, 147]]])

```

In []: