Creación de arrays

[6]:
```
# Array cuyos valores son todos 0.
np.zeros((2, 3, 4))
```

[6]:
```
array([[[0., 0., 0., 0.],
        [0., 0., 0., 0.],
        [0., 0., 0., 0.]],

       [[0., 0., 0., 0.],
        [0., 0., 0., 0.],
        [0., 0., 0., 0.]]])
```

[7]:
```
# Array cuyos valores son todos 1.
np.ones((2, 3, 4))
```

[7]:
```
array([[[1., 1., 1., 1.],
        [1., 1., 1., 1.],
        [1., 1., 1., 1.]],

       [[1., 1., 1., 1.],
        [1., 1., 1., 1.],
        [1., 1., 1., 1.]]])
```

[8]:
```
# Array cuyos valores son todos el valor indicado como segundo parámetro de la función.
np.full((2, 3, 4), 8)
```

[8]:
```
array([[[8, 8, 8, 8],
        [8, 8, 8, 8],
        [8, 8, 8, 8]],

       [[8, 8, 8, 8],
        [8, 8, 8, 8],
        [8, 8, 8, 8]]])
```

[9]:
```
# El resultado de np.empty no es predecible
# Se inicializa con los valores del array con lo que haya en memoria en ese momento
np.empty((2, 3, 9))
```

[9]:
```
array([[[ 1.29131186e-316,  0.00000000e+000,  3.77172086e-317,
          7.23123644e-298,  6.80073566e-310,  3.77170505e-317,
         -4.28080863e-096,  6.80073700e-310,  6.80073566e-310],
        [ 6.38080118e-140,  6.80073566e-310,  6.80073565e-310,
          3.81849787e+301,  6.80073566e-310,  3.77170505e-317,
         -1.03628049e-287,  6.80073566e-310,  6.80073804e-310],
        [ 7.56244875e+056,  6.80073566e-310,  3.77172086e-317,
         -5.56741067e-194,  6.80073568e-310,  6.80073566e-310,
         -1.20231946e+047,  6.80073566e-310,  3.77170505e-317]],



       [[-1.05471104e-286,  6.80073566e-310,  6.80073565e-310,
          6.08198946e-135,  6.80073566e-310,  1.50654528e-316,
         -4.99722324e+286,  6.80073566e-310,  6.80073568e-310],
        [ 7.48765886e-252,  6.80073566e-310,  6.80073566e-310,
         -2.09574284e+061,  6.80073566e-310,  3.77170505e-317,
         -1.45904605e-048,  6.80073566e-310,  3.77170505e-317],
        [-6.67149675e-082,  6.80073566e-310,  6.80073566e-310,
         -7.96297795e+078,  6.80073568e-310,  1.53190548e-316,
          1.97350947e+257,  6.80073566e-310,  1.54040736e-316]]])
```

[10]:
```
# Inicializando el array utilizando un array de Python
b = np.array([[1, 2,3], [4, 5, 6]])
b
```

[10]:
```
array([[1, 2, 3],
       [4, 5, 6]])
```

[11]:
```
b.shape
```

[11]:
```
(2, 3)
```

[12]:
```
# Crear un array utilizando una funcion basada en rangos
# (minimo, maximo, número de elemnts del array)
print(np.linspace(0, 6, 10))
```

```
[0.         0.66666667 1.33333333 2.         2.66666667 3.33333333
 4.         4.66666667 5.33333333 6.        ]
```

[13]:
```
# Inicializar el array con valores aleatorios.
np.random.rand(3, 3, 4)
```

[13]:
```
array([[[0.8426538 , 0.63755323, 0.51598983, 0.20923109],
        [0.89424774, 0.20489325, 0.90608485, 0.42176238],
        [0.56077529, 0.95576148, 0.78320915, 0.87110942]],

       [[0.3556085 , 0.68551554, 0.61837179, 0.54159098],
        [0.69324717, 0.12820094, 0.61481465, 0.79865897],
        [0.44368247, 0.14055149, 0.79498261, 0.90699857]],

       [[0.79403823, 0.81083356, 0.45631048, 0.98065189],
        [0.52556711, 0.002982  , 0.7156606 , 0.02572611],
        [0.40145605, 0.38100935, 0.49776159, 0.6625365 ]]])
```

[14]:
```
# Iniciar array con valores aleatorios conforme a una distribucion normal .
np.random.randn(2,4)
```

[14]:
```
array([[-2.60783208, -0.47897186,  1.54360315,  0.6337982 ],
       [-0.5421408 ,  0.99664992,  0.02803407, -0.1404264 ]])
```

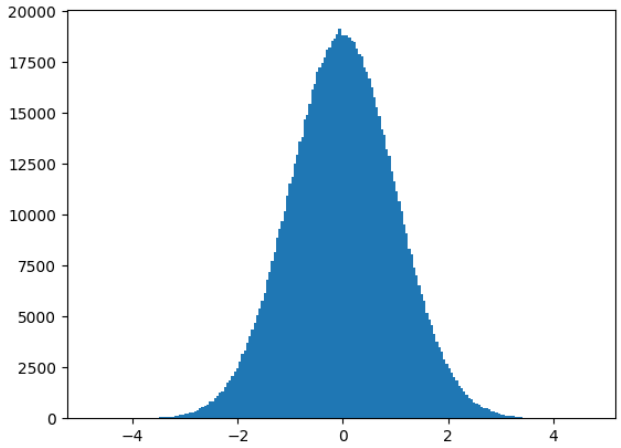
[15]:
```
%matplotlib inline
import matplotlib.pyplot as plt
```

[14]:
```
# Iniciar array con valores aleatorios conforme a una distribucion normal .
np.random.randn(2,4)
```

[14]:
```
array([[-2.60783208, -0.47897186,  1.54360315,  0.6337982 ],
       [-0.5421408 ,  0.99664992,  0.02803407, -0.1404264 ]])
```

[15]:
```
%matplotlib inline
import matplotlib.pyplot as plt

c = np.random.randn(1000000)
plt.hist(c, bins=200)
plt.show()
```



[16]:
```
# Inicializar un array, utilizando una función personalizada.

def func(x, y):
    return x + 2 * y

np.fromfunction(func, (3, 5))
```

[16]:
```
array([[ 0.,  2.,  4.,  6.,  8.],
       [ 1.,  3.,  5.,  7.,  9.],
       [ 2.,  4.,  6.,  8., 10.]])
```

Acceso a los elementos de un array

Array Unidimensional

[17]:
```
# Acceder a los elementos de un array.
array_uni = np.array([1, 3, 5, 7, 9, 11])
print("Shape:", array_uni.shape)
print("Array_uni", array_uni)
```

```
Shape: (6,)
Array_uni [ 1  3  5  7  9 11]
```

[18]:
```
# Accediendo al quinto elemento del array.
array_uni[4]
```

[18]:
```
np.int64(9)
```

[19]:
```
# Acceder al tercer y cuarto elemento del array
array_uni[2:4]
```

[19]:
```
array([5, 7])
```

Array multidimensional

[20]:
```
# Crear un array multidimensinal.
array_multi = np.array([[1, 2, 3, 4], [5, 6, 7, 8]])
print("Shape:", array_multi.shape)
print("Array_multi:\n", array_multi)
```

```
Shape: (2, 4)
Array_multi:
 [[1 2 3 4]
 [5 6 7 8]]
```

[21]:
```
# Acceder al cuarto elemnto del array.
array_multi[0,3]
```

[21]:
```
np.int64(4)
```

[22]:
```
# Acceder a la segunda fila del array
array_multi[1, :]
```

[22]:
```
array([5, 6, 7, 8])
```

[23]:
```
# Accediendo al primer elemento de las dos primeras filas del array
array_multi[0:2, 2]
```

Modificacion de un array

[24]:
```
# Crear un arreglo unidimensional e inicializarlo con un rango
# de elementos 0-27
array1 = np.arange(28)
print("Shape:", array1.shape)
print("Array:\n", array1)
```

```
Shape: (28,)
Array:
 [ 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]
```

[25]:
```
# Cambiar las dimensiones del array y sus longuitudes.
array1.shape = (7, 4)
print("Shape:", array1.shape)
print("Array:\n", array1)
```

```
Shape: (7, 4)
Array:
 [[ 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]]
```

[26]:
```
# El ejemplo anterior devuelve un array que apunta a los mismos datos.
# Modificaciones en el array, modificaran el otro array.
array2 = array1.reshape(4,7)
print("Shape:", array2.shape)
print("Array:\n", array2)
```

```
Shape: (4, 7)
Array:
 [[ 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]]
```

[27]:
```
# Modificacion del nuevo array devuelto
array2[1, 3] = 30
print("Array2:\n", array2)
```

```
Array2:
 [[ 0  1  2  3  4  5  6]
 [ 7  8  9 30 11 12 13]
 [14 15 16 17 18 19 20]
 [21 22 23 24 25 26 27]]
```

[28]:
```
print("Array1:\n", array1)
```

```
Array1:
 [[ 0  1  2  3]
 [ 4  5  6  7]
 [ 8  9 30 11]
 [12 13 14 15]
 [16 17 18 19]
 [20 21 22 23]
 [24 25 26 27]]
```

[29]:
```
# Si queremos devolver el array a su estado original
print("Array1: ", array1.ravel())
```

```
Array1:  [ 0  1  2  3  4  5  6  7  8  9 30 11 12 13 14 15 16 17 18 19 20 21 22 23
 24 25 26 27]
```

Operaciones Aritméticas con Arrays

[30]:
```
array1 = np.arange(2, 18, 2)
array2 = np.arange(8)
print("Array 1:", array1)
print("Array 2:", array2)
```

```
Array 1: [ 2  4  6  8 10 12 14 16]
Array 2: [0 1 2 3 4 5 6 7]
```

[31]:
```
# Suma
print(array1 + array2)
```

```
[ 2  5  8 11 14 17 20 23]
```

[32]:
```
# Resta
print(array1 - array2)
```

```
[2 3 4 5 6 7 8 9]
```

[33]:
```
# Multiplicacion
# Nota: no es una multiplicacion de matrices
print(array1 * array2)
```

```
[  0   4  12  24  40  60  84 112]
```

Broadcasting

Si se aplican operaciones aritméticas sobre arrays que no tienen la misma forma (shape), Numpy aplica una propiedad que se llama Broadcasting

[34]:
```
array1 = np.arange(5)
array2 = np.array([3])
print("Shape:", array1.shape)
print("Array:\n", array1)
print("\n")
print("Shape:", array2.shape)
print("Array:\n", array2)
```

```
Shape: (5,)
Array:
 [0 1 2 3 4]


Shape: (1,)
Array:
 [3]
```

[36]:
```
# Suma de ambos arrays
array1 + array2
```

[36]:
```
array([3, 4, 5, 6, 7])
```

[37]:
```
# Multiplicación
array1 * array2
```

[37]:
```
array([ 0,  3,  6,  9, 12])
```

Funciones estadisticas sobre Arrays

[38]:
```
# Creación de un array unidimensional
array1 = np.arange(1, 20, 2)
print("Array:\n", array1)
```

```
Array:
 [ 1  3  5  7  9 11 13 15 17 19]
```

[39]:
```
# Media de los elementos del array
array1.mean()
```

[39]:
```
np.float64(10.0)
```

[40]:
```
# Suma de los elementos del array
array1.sum()
```

[40]:
```
np.int64(100)
```

Funciones universales proporcionadas por numpy: **unfunc**.

[41]:
```
# Cuadrado de los elementos del array
np.square(array1)
```

[41]:
```
array([  1,   9,  25,  49,  81, 121, 169, 225, 289, 361])
```

[42]:
```
# Raiz cuadrada de los elementos del array.
np.sqrt(array1)
```

[42]:
```
array([1.        , 1.73205081, 2.23606798, 2.64575131, 3.        ,
       3.31662479, 3.60555128, 3.87298335, 4.12310563, 4.35889894])
```

[43]:
```
# Exponencial de los elementos del array.
np.exp(array1)
```

[43]:
```
array([2.71828183e+00, 2.00855369e+01, 1.48413159e+02, 1.09663316e+03,
       8.10308393e+03, 5.98741417e+04, 4.42413392e+05, 3.26901737e+06,
       2.41549528e+07, 1.78482301e+08])
```

[44]:
```
# log de los elementos del array
np.log(array1)
```

[44]:
```
array([0.        , 1.09861229, 1.60943791, 1.94591015, 2.19722458,
       2.39789527, 2.56494936, 2.7080502 , 2.83321334, 2.94443898])
```

[ ]:
```
```