Python Arrays

Python Arrays

- Python does not have built in support for arrays.
- [1,2,3] used for lists.
- Use the numpy package/library for arrays.
- import numpy as np
- np.ndarray is the class
- np.array creates and returns an ndarray object

numpy.ndarray

```
import numpy as np

x = np.array([12, 3, 6, 14])
print ("x: ", x)
print(type(x))
print("x.ndim: ", x.ndim)
print("x.shape: ", x.shape)
print(x[0])

x:  [12  3  6 14]
<class 'numpy.ndarray'>
x.ndim:  1
x.shape:  (4,)
12
```

2D Array

```
x = np.array([  [1, 2, 3, 4],
                [5, 6, 7, 8],
                [9, 10, 11, 12]
             ])

print(x[0,1])
```

3D array

```
x = np.array([
            [[1, 2, 3, 4], [5, 6, 7, 8], [9, 10, 11, 12]],
            [[21, 22, 23, 24], [25, 26, 27, 28], [29, 30, 31, 32]]
        ])

print(x[0,1,2])
```

Slices

- To get a slice of an array use
  - start:end
  - start:end:step
- Use minus to get an index from the end

Example

```
import numpy as np

arr = np.array([0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10])

print(arr[3:8])
print(arr[3:8:2])
print(arr[3:-1])
print(arr[3:])
print(arr[:5])
```

copy()

- If you assign a slice to a variable “new” say, and then change “new”, then the original array will also change.
- To take a copy of an array, use arr.copy()

Reshape

- Reshape can be used to change the dimension of an array.
- This gives a view of the array, not a copy.
- The number of elements should correctly fit the new shape.
- Use -1 for an unknown dimension. It can be used once. Its size is then calculated from the other dimensions.

Example

```
import numpy as np

arr = np.array([0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11])

b = arr.reshape(3, 4)
print(b)
b = arr.reshape(2,2,3)
print(b)
b = arr.reshape(2,2,-1)
print(b)
```

Array Like Objects

- Anything that can be converted to an np.ndarray using np.array() function is “array like”.
- For example
  - Lists
  - pd.DataFrame (next section)
- The fit() method for models (e.g LinearRegression, DecisionTreeClassifier) often takes array like objects as parameters.
- Often we pass DataFrames to the fit() methods.