Numpy

Slicing

```python
import numpy as np
arr = np.array([[1, 2, 3, 4, 5], [6, 7, 8, 9, 10], [[-3,-4, 8, -1, 1]]])

# remove column 1
print(arr[:,1:])
#[[ 2  3  4  5]
# [ 7  8  9 10]
# [-4  8 -1  1]]
```

Reshape

```python
arr = np.array([1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12])
newarr = arr.reshape(4, 3)
# newarr = arr.reshape(-1, 3) automatically calculate parameter to have 3
columns
print(newarr)

#[[ 1  2  3]
# [ 4  5  6]
# [ 7  8  9]
# [10 11 12]]
```

Concatinate

1D

```python
arr1 = np.array([1, 2, 3])
arr2 = np.array([4, 5, 6])
arr = np.concatenate((arr1, arr2))
```

2D

```python
arr1 = np.array([[1, 2], [3, 4]])
arr2 = np.array([[5, 6], [7, 8]])
arr = np.concatenate((arr1, arr2), axis=1)
print(arr)
```

Generate columns

```python
# 2d array of 5 rows and 1 column with all ones
ones = np.ones((5, 1))

# vector of random values of size 6
W = np.random.rand(6)
```

Add column with all ones

```python
self.W = np.random.rand(no_features + 1)
extra_feature_with_value_1 = np.ones((no_samples, 1))
X = np.concatenate((extra_feature_with_value_1, X), axis = 1)
```