```
In [2]: from keras.datasets import mnist
        import numpy as np
        import pandas as pd
        (x_train, y_train), (x_test, y_test) = mnist.load_data()
        Exploratory Data Analysis And Data Manipulation
 In [3]: import matplotlib.pyplot as plt
        plt.imshow(x_train[10])
 Out[3]: <matplotlib.image.AxesImage at 0x167fba67d00>
         10
         15
         20 -
         25
               5 10 15 20 25
 In [4]: print('X_train: ' + str(x_train.shape))
        print('Y_train: ' + str(y_train.shape))
        print('X_test: ' + str(x_test.shape))
        print('Y_test: ' + str(y_test.shape))
        #reshape data
        x_train = x_train.reshape(x_train.shape[0],-1)
        x_{test} = x_{test.reshape}(x_{test.shape}[0], -1)
        y_train = y_train.reshape(y_train.shape[0],-1)
        y_test = y_test.reshape(y_test.shape[0],-1)
        print(x_train.shape)
        print(y_train.shape)
        print(y_test.shape)
        x_train.shape[0]
        x_{train_{temp}} = np.zeros((300,784))
        x_{test_{temp}} = np.zeros((300,784))
        y_train_temp = np.zeros((300,1))
        y_{test_{temp}} = np.zeros((300,1))
        data_train = np.concatenate((x_train_temp, x_test_temp), axis = 0)
        data_test = np.concatenate((y_train_temp,y_test_temp),axis = 0)
        data = np.concatenate((data_train, data_test),axis = 1)
        # data arrayi mini-batchler oluşturmak için
        # bu kod parçasında data boyutunu azalttım
        for i in range(300):
            for q in range(784):
                x_{train_{temp}[i][q]} = x_{train_{temp}[i][q]}
                x_{test_{in}}[q] = x_{test_{in}}[q]
        for i in range(300):
            y_{train_temp[i][0]} = y_{train[i][0]}
            y_{test_{in} = y_{test}[i][0]} = y_{test}[i][0]
        x_train_temp
        X_train: (60000, 28, 28)
        Y_train: (60000,)
        X_test: (10000, 28, 28)
        Y_test: (10000,)
        (60000, 784)
        (60000, 1)
        (10000, 1)
Out[4]: array([[0., 0., 0., ..., 0., 0., 0.],
               [0., 0., 0., \ldots, 0., 0., 0.],
               [0., 0., 0., ..., 0., 0., 0.],
               [0., 0., 0., ..., 0., 0., 0.],
               [0., 0., 0., ..., 0., 0., 0.],
               [0., 0., 0., ..., 0., 0., 0.]
 In [5]: x_train_df = pd.DataFrame(x_train)
        x_{test_df} = pd.DataFrame(x_{test_d})
        y_train_df = pd.DataFrame(y_train)
        y_test_df = pd.DataFrame(y_test)
 In [6]: | print(x_train_df.describe())
        print(x_test_df.describe())
        print(y_train_df.describe())
        print(y_test_df.describe())
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 In [7]: | print(x_train_df.isna().any().any())
        print(x_test_df.isna().any().any())
        print(y_train_df.isna().any().any())
        print(y_test_df.isna().any().any())
        False
        False
        False
        False
 In [8]: print(x_train_df.shape)
        print(x_test_df.shape)
        print(y_train_df.shape)
        print(y_test_df.shape)
        (60000, 784)
        (10000, 784)
        (60000, 1)
        (10000, 1)
 In [9]: print(x_train_df.info())
        print(x_test_df.info())
        print(y_train_df.info())
        print(y_test_df.info())
        <class 'pandas.core.frame.DataFrame'>
        RangeIndex: 60000 entries, 0 to 59999
        Columns: 784 entries, 0 to 783
        dtypes: uint8(784)
        memory usage: 44.9 MB
        None
        <class 'pandas.core.frame.DataFrame'>
        RangeIndex: 10000 entries, 0 to 9999
        Columns: 784 entries, 0 to 783
        dtypes: uint8(784)
        memory usage: 7.5 MB
        None
        <class 'pandas.core.frame.DataFrame'>
        RangeIndex: 60000 entries, 0 to 59999
        Data columns (total 1 columns):
         # Column Non-Null Count Dtype
         0 0
                    60000 non-null uint8
        dtypes: uint8(1)
        memory usage: 58.7 KB
        None
        <class 'pandas.core.frame.DataFrame'>
        RangeIndex: 10000 entries, 0 to 9999
        Data columns (total 1 columns):
         # Column Non-Null Count Dtype
        0 0
                    10000 non-null uint8
        dtypes: uint8(1)
        memory usage: 9.9 KB
        None
        Training Of The Classifier
In [10]: from logreg import LogisticRegression
        logreg = LogisticRegression(learning_rate = 0.01, epoch = 10, batch_size = 2)
In [12]: #Bu kısımda veri boyunu küçülttüğüm arrayler ile fit ve predict işlemi yaptım fakat
        #buradaki problemde veri setinin doğru ayrılamaması
        parameters = logreg.fit(x_train_temp, y_train_temp, x_test_temp,y_test_temp,data)
        logreg.predict(y_test_temp, x_test_temp, parameters)
        test accuracy: -341.8928571428571 %
In [13]: parameters = logreg.fit(x_train, y_train, x_test,y_test,data,)
        logreg.predict(y_test, x_test, parameters)
        #Veri seti çok büyük olduğundan dolayı işlem tamamlnamıyor
                                               Traceback (most recent call last)
        <ipython-input-13-039b6dd5a126> in <module>
        ----> 1 parameters = logreg.fit(x_train, y_train, x_test,y_test,data,)
              2 logreg.predict(y_test,x_test,parameters)
              4 #Veri seti çok büyük olduğundan dolayı işlem tamamlnamıyor
        ~\logreg.py in fit(self, x_train, y_train, x_test, y_test, data)
                       dimension = x_train.shape[0]
                       w, b = self.initialize_weights_and_bias(dimension)
             17
                       parameters, gradients, cost_list = self.update(w, b, x_train, y_train, x_test, y_test, 
        ---> 18
        ep)
             19
                       return parameters
             20
        ~\logreg.py in update(self, w, b, x_train, y_train, x_test, y_test, data, learning_rate, number_of_iterarion)
                           mini_batches = self.create_mini_batches(x_train, y_train,data, batch_size = batch_s)
             87
                           for mini_batch in mini_batches:
        ---> 88
                              cost,gradients = self.forward_backward_propagation(w,b,x_train,y_train)
             89
                              cost_list.append(cost)
                              X_mini, y_mini = mini_batch
        ~\logreg.py in forward_backward_propagation(self, w, b, x_train, y_train)
             71
        ---> 72
                       derivative\_weight = (np.dot(x\_train,((y\_head-y\_train).T)))/x\_train.shape[1]
             73
                       derivative_bias = np.sum(y_head-y_train)/x_train.shape[1]
                       gradients = {"derivative_weight": derivative_weight, "derivative_bias": derivative_bias}
             74
```

<__array_function__ internals> in dot(*args, **kwargs)

MemoryError: Unable to allocate 26.8 GiB for an array with shape (60000, 60000) and data type float64