In [2]:

```
#https://github.com/vrinda1309/deeplearning.git


# Task 1 - Implementing perceptron learning with our own dataset
from numpy import array, random, dot

from random import choice

from pylab import ylim, plot

from matplotlib import pyplot as plt

step_function = lambda x: 0 if x < 0 else 1

training_dataset = [

    (array([0,0,1]), 0),

    (array([0,1,1]), 1),

    (array([1,0,1]), 1),

    (array([1,1,1]), 1),

]

weights = random.rand(3)

error = []

learning_rate = 0.2

n = 100

for j in range(n):

    x, expected = choice(training_dataset)

    result = dot(weights, x)

    err = expected-step_function(result)

    error.append(err)

    weights += learning_rate * err * x

for x, _ in training_dataset:

    result = dot(x, weights)

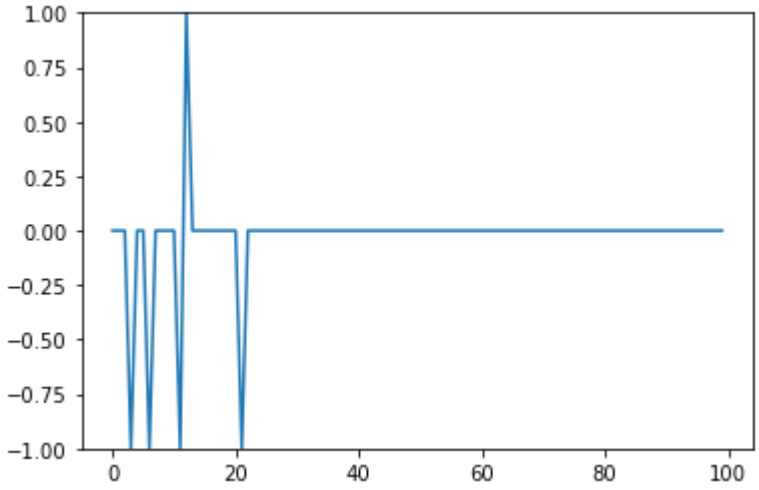
    print('{}: {} -> {}'.format(x[:2], result, step_function(result)))

ylim([-1,1])

plot(error)
```

```
[0 0]: -0.13551552995899868 -> 0
```

```
[0 1]: 0.6273360941844242 -> 1
[1 0]: 0.1779481507106515 -> 1
[1 1]: 0.9407997748540744 -> 1
```



In [5]:

```
#Task 3 - input an imange


# Standard scientific Python imports
import matplotlib.pyplot as plt

# Import datasets, classifiers and performance metrics
from sklearn import datasets, svm, metrics
from sklearn.model_selection import train_test_split

digits = datasets.load_digits()

_, axes = plt.subplots(nrows=1, ncols=4, figsize=(10, 3))
for ax, image, label in zip(axes, digits.images, digits.target):
    ax.set_axis_off()
    ax.imshow(image, cmap=plt.cm.gray_r, interpolation='nearest')
    ax.set_title('Training: %i' % label)

# flatten the images
n_samples = len(digits.images)
data = digits.images.reshape((n_samples, -1))

# Create a classifier: a support vector classifier
clf = svm.SVC(gamma=0.001)

# Split data into 50% train and 50% test subsets
X_train, X_test, y_train, y_test = train_test_split(
    data, digits.target, test_size=0.5, shuffle=False)

# Learn the digits on the train subset
clf.fit(X_train, y_train)

# Predict the value of the digit on the test subset
predicted = clf.predict(X_test)

_, axes = plt.subplots(nrows=1, ncols=4, figsize=(10, 3))
for ax, image, prediction in zip(axes, X_test, predicted):
    ax.set_axis_off()
    image = image.reshape(8, 8)
    ax.imshow(image, cmap=plt.cm.gray_r, interpolation='nearest')
    ax.set_title(f'Prediction: {prediction}')


    print(f"Classification report for classifier {clf}:\n"
      f"{metrics.classification_report(y_test, predicted)}\n")
```

```
Classification report for classifier SVC(gamma=0.001):
              precision    recall  f1-score   support

           0       1.00      0.99      0.99        88
           1       0.99      0.97      0.98        91
           2       0.99      0.99      0.99        86
           3       0.98      0.87      0.92        91
           4       0.99      0.96      0.97        92
           5       0.95      0.97      0.96        91
           6       0.99      0.99      0.99        91
           7       0.96      0.99      0.97        89
```

```
           8       0.94      1.00      0.97        88
           9       0.93      0.98      0.95        92

    accuracy                           0.97       899
   macro avg       0.97      0.97      0.97       899
weighted avg       0.97      0.97      0.97       899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```

```
    macro avg       0.97      0.97      0.97       899
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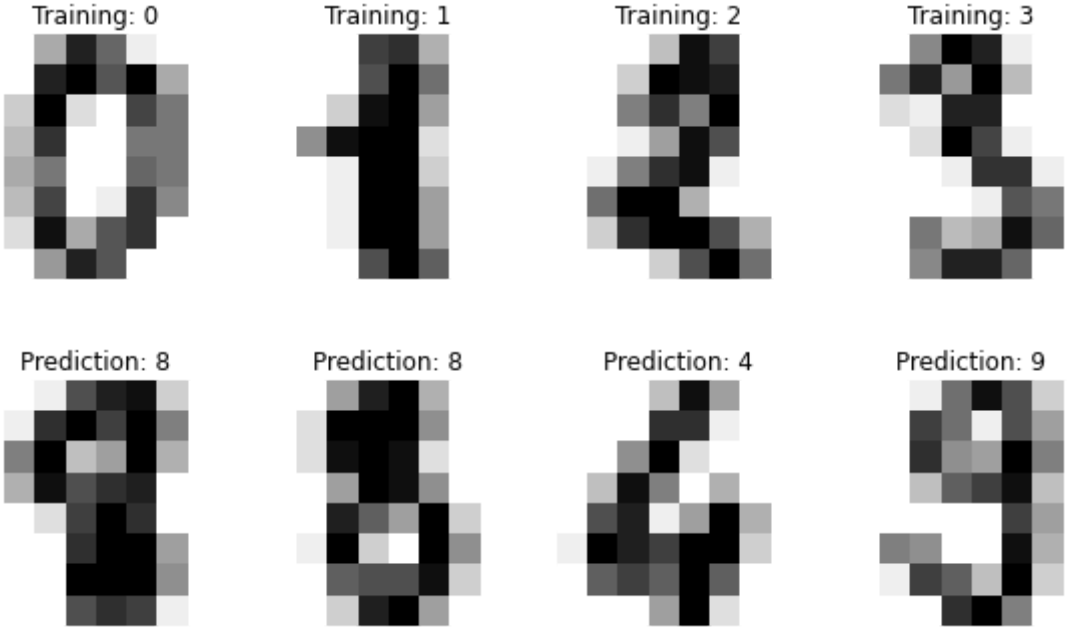
```



In [ ]:

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#Task 2- Implmenting perceptron learning on a csv file available publically

#import the required libraries

import matplotlib.pyplot as plt
import tensorflow as tf
import numpy as np
import pandas as pd
from sklearn.preprocessing import LabelEncoder
from sklearn.utils import  shuffle
from sklearn.model_selection import train_test_split

#define the one hot encode function
def one_hot_encode(labels):
    n_labels = len(labels)
    n_unique_labels = len(np.unique(labels))
    one_hot_encode = np.zeros((n_labels,n_unique_labels))
    one_hot_encode[np.arange(n_labels), labels] = 1
    return one_hot_encode

#Read the sonar dataset
df = pd.read_csv('C:/Users/VRINDA/Downloads/sonar_csv.csv')
print(len(df.columns))
X = df[df.columns[0:60]].values
y=df[df.columns[60]]
#encode the dependent variable containing categorical values
encoder = LabelEncoder()
encoder.fit(y)
y = encoder.transform(y)
Y = one_hot_encode(y)

#Transform the data in training and testing
X,Y = shuffle(X,Y,random_state=1)
train_x,test_x,train_y,test_y = train_test_split(X,Y,test_size=0.20, random_state=42)


 #define and initialize the variables to work with the tensors
learning_rate = 0.1
training_epochs = 1000

#Array to store cost obtained in each epoch
cost_history = np.empty(shape=[1],dtype=float)

n_dim = X.shape[1]
n_class = 2

x = tf.placeholder(tf.float32,[None,n_dim])
W = tf.Variable(tf.zeros([n_dim,n_class]))
b = tf.Variable(tf.zeros([n_class]))

#initialize all variables.
init = tf.global_variables_initializer()

#define the cost function
y_ = tf.placeholder(tf.float32,[None,n_class])
y = tf.nn.softmax(tf.matmul(x, W)+ b)
cost_function = tf.reduce_mean(-tf.reduce_sum((y_ * tf.log(y)),reduction_indices=[1]))
training_step = tf.train.GradientDescentOptimizer(learning_rate).minimize(cost_function)
```

```
#initialize the session
sess = tf.Session()
sess.run(init)
mse_history = []

#calculate the cost for each epoch
for epoch in range(training_epochs):
    sess.run(training_step,feed_dict={x:train_x,y_:train_y})
    cost = sess.run(cost_function,feed_dict={x: train_x,y_: train_y})
    cost_history = np.append(cost_history,cost)
    print('epoch : ', epoch,  ' - ', 'cost: ', cost)

    pred_y = sess.run(y, feed_dict={x: test_x})

 #Calculate Accuracy
correct_prediction = tf.equal(tf.argmax(pred_y,1), tf.argmax(test_y,1))
accuracy = tf.reduce_mean(tf.cast(correct_prediction, tf.float32))
print(&amp;amp;quot;Accuracy: &amp;amp;quot;,sess.run(accuracy))#

plt.plot(range(len(cost_history)),cost_history)
plt.axis([0,training_epochs,0,np.max(cost_history)])
plt.show()
```