import numpy as np

import matplotlib.pyplot as plt

import seaborn as sns

import pandas as pd

def step\_function(x):

if x<0:

return -1

else:

return 1

training\_set = [((-.1,-.1,-.1),-1), ((-.1,.3,-.1),-1), ((0.2,0,-.2),-1), ((0,1,2), 1), ((1,0,1.1), 1), ((1,1,1.5),1)]

num\_of\_samples = 6;

plt.figure(0)

x1 = [training\_set[i][0][0] for i in range(num\_of\_samples)]

x2 = [training\_set[i][0][1] for i in range(num\_of\_samples)]

x3 = [training\_set[i][0][2] for i in range(num\_of\_samples)]

y = [training\_set[i][1] for i in range(num\_of\_samples)]

#print("x1 =",x1)

#print("x2 =",x2)

#print("x3 =",x3)

#print("y =",y)

#df = pd.DataFrame({'x1':x1, 'x2':x2,'x13':x3, 'y':y})

#sns.lmplot("x1","x2", "x3", data=df, hue='y', fit\_reg=False, markers=["o", "s"])

w = np.random.rand(3)

errors = []

alpha = .5

epoch = 30

b = 0

for i in range(epoch):

for x, y in training\_set:

u = sum(x\*w) + b

#print("x=",x)

#print("w=",w)

#print("u=",u)

y\_hat = step\_function(u)

error = y - y\_hat

#print("y=",y)

#print("yhat=",y\_hat)

#print("error=",error)

errors.append(error)

for index, value in enumerate(x):

#print("index=",index)

#print("vlaue=",value)

w[index] += alpha \* error \* value

b += alpha \* error

#a = [0,-b/w[1]]

#c = [-b/w[0],0]

#plt.plot(a,c)

plt.figure(2)

plt.ylim([-2,2])

plt.plot(errors)