

hw3.6

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In [4]: """
        HW3 Problem6
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        """

import numpy as np
import matplotlib.pyplot as plt
n = 10
a = 0.1
Z = 128
B = np.zeros((1,n))

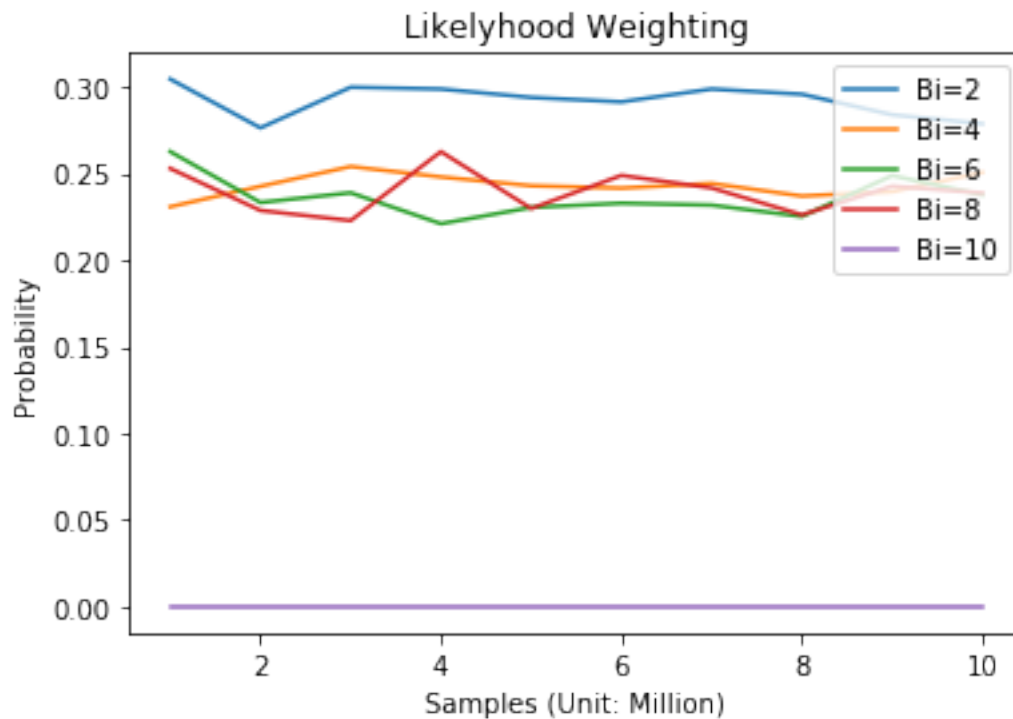
"""
This functions is used to calcuculate the Probability of Z give Bxs
"""
def prob(Z,B,n,a):
    fB = 0
    for i in range(n):
        fB = fB + (2**(i-1))*B[i]
    prob = ((1-a)/(1+a))*a**(abs((Z-fB)));
    return prob

ip = [2,4,6,8,10]
probBgivenZ = np.zeros((len(ip),10))
row = 0
for i in ip:
    nSamp = 10
    for ns in range(1,nSamp+1):
        iter = ns*100000
        numer = 0
        denom = 0
        for k in range(1,iter+1):
            B = np.random.randint(0,2,10)
            weight = prob(Z,B,n,a)
            if(B[i-1] == 1):
                numer = numer + weight
                denom = denom + weight
            probBgivenZ[row][ns-1] = (numer/denom)
        print("P(B[]={1}|Z=128)".format(i))
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print(probBgivenZ[row][nSamp-1])
row += 1
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P(B2=1|Z=128)
0.2787419755539936
P(B4=1|Z=128)
0.2506709526460264
P(B6=1|Z=128)
0.2377214582196297
P(B8=1|Z=128)
0.23880092770261377
P(B10=1|Z=128)
7.551271162748864e-129
```

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In [6]: for i in range(len(ip)):
        plt.plot(range(1,nSamp+1),probBgivenZ[i,:],label="Bi={}".format(ip[i]))
plt.xlabel('Samples (Unit: Million)')
plt.ylabel('Probability')
plt.title('Likelyhood Weighting')
plt.legend(loc='upper right')
plt.show()
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In [ ]:
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