0852617 曾鈺評 機器學習HW02_2

Online Learning

In [1]:

```
import numpy as np
```

In [62]:

```
directory = "D:\\1091NCTU\Machine learning\\Homework\\"
rawdata = []
with open(directory+"testfile.txt") as file:
    for line in file:
        rawdata.append([int(i) for i in list(line.split("\n")[0])])
```

In [96]:

```
def Factorial(number):
    result = 1
    for i in range(1, number+1, 1):
        result = result*i
    return result

def Combination(n,x):
    return Factorial(n) / (Factorial(x) * Factorial(n-x))

def Gamma(x):
    return Factorial(x-1)

def Beta(a, b):
    return (Gamma(a) * Gamma(b)) / Gamma(a+b)
```

In [137]:

```
alpha = int(input("alpha = "))
beta = int(input("beta = "))
```

```
alpha = 0
beta = 0
```

In [138]:

```
for i in range(len(rawdata)):
    print("case %s:" %(i+1), end=' ')
    for j in rawdata[i]:
        print(j, end='')
    print("")
    n = len(rawdata[i])
    k = sum(rawdata[i])
    mu = k / n
    likelihood = Combination(n, k) * mu**k * (1-mu)**(n-k)
    print("Likelihood: %s" %likelihood)
    print("Beta prior: a= %s b=%s" %(alpha, beta))
    alpha = k + alpha
    beta = n - k + beta
    print("Beta posterior: a= %s b=%s\n" %(alpha, beta))
```

case 1: 0101010101001011010101
Likelihood: 0.16818809509277344
Beta prior: a= 0 b=0
Beta posterior: a= 11 b=11

case 2: 0110101
Likelihood: 0.29375515303997485
Beta prior: a= 11 b=11
Beta posterior: a= 15 b=14

case 3: 010110101101
Likelihood: 0.2286054241794335
Beta prior: a= 15 b=14
Beta posterior: a= 22 b=19

case 4: 0101101011101011010
Likelihood: 0.18286870706509092
Beta prior: a= 22 b=19
Beta posterior: a= 33 b=27

case 5: 111101100011110
Likelihood: 0.2143070548857833
Beta prior: a= 33 b=27
Beta posterior: a= 43 b=32

case 6: 101110111000110
Likelihood: 0.20659760529408
Beta prior: a= 43 b=32
Beta posterior: a= 52 b=38

case 7: 1010010111
Likelihood: 0.25082265600000003
Beta prior: a= 52 b=38
Beta posterior: a= 58 b=42

case 8: 11101110110
Likelihood: 0.2619678932864457
Beta prior: a= 58 b=42
Beta posterior: a= 66 b=45

case 9: 01000111101
Likelihood: 0.23609128871506807
Beta prior: a= 66 b=45
Beta posterior: a= 72 b=50

case 10: 110100111
Likelihood: 0.27312909617436365
Beta prior: a= 72 b=50
Beta posterior: a= 78 b=53

case 11: 01101010111
Likelihood: 0.24384881449471862
Beta prior: a= 78 b=53
Beta posterior: a= 85 b=57

In [139]:

```
alpha = int(input("alpha = "))
beta = int(input("beta = "))
```

```
alpha = 10
beta = 1
```

In [140]:

```
for i in range(len(rawdata)):
    print("case %s:" %(i+1), end=' ')
    for j in rawdata[i]:
        print(j, end='')
    print("")
    n = len(rawdata[i])
    k = sum(rawdata[i])
    mu = k / n
    likelihood = Combination(n, k) * mu**k * (1-mu)**(n-k)
    print("Likelihood: %s" %likelihood)
    print("Beta prior: a= %s b=%s" %(alpha, beta))
    alpha = k + alpha
    beta = n - k + beta
    print("Beta posterior: a= %s b=%s\n" %(alpha, beta))
```

```
case 1: 0101010101001011010101
Likelihood: 0.16818809509277344
Beta prior: a= 10 b=1
Beta posterior: a= 21 b=12

case 2: 0110101
Likelihood: 0.29375515303997485
Beta prior: a= 21 b=12
Beta posterior: a= 25 b=15

case 3: 010110101101
Likelihood: 0.2286054241794335
Beta prior: a= 25 b=15
Beta posterior: a= 32 b=20

case 4: 0101101011101011010
Likelihood: 0.18286870706509092
Beta prior: a= 32 b=20
Beta posterior: a= 43 b=28

case 5: 111101100011110
Likelihood: 0.2143070548857833
Beta prior: a= 43 b=28
Beta posterior: a= 53 b=33

case 6: 101110111000110
Likelihood: 0.20659760529408
Beta prior: a= 53 b=33
Beta posterior: a= 62 b=39

case 7: 1010010111
Likelihood: 0.25082265600000003
Beta prior: a= 62 b=39
Beta posterior: a= 68 b=43

case 8: 11101110110
Likelihood: 0.2619678932864457
Beta prior: a= 68 b=43
Beta posterior: a= 76 b=46

case 9: 01000111101
Likelihood: 0.23609128871506807
Beta prior: a= 76 b=46
Beta posterior: a= 82 b=51

case 10: 110100111
Likelihood: 0.27312909617436365
Beta prior: a= 82 b=51
Beta posterior: a= 88 b=54

case 11: 01101010111
Likelihood: 0.24384881449471862
Beta prior: a= 88 b=54
Beta posterior: a= 95 b=58
```

In [ ]: