HauffmanTest.java

============ a ++++++++++++++

a occurs   1 times

=======================================

==== Tree built in this order===============

Leaf   node 1 Character is a Weight is 1

Internal node 2 : Left a(1) Right null Weight = 1

==== Tree has 2 nodes===============

You can see dot file at C:\Users\Thinkpad\Desktop\CS Study\6205\Assignment9\1.dot

Run the following command to get pdf file

dot -Tpdf C:\Users\Thinkpad\Desktop\CS Study\6205\Assignment9\1.dot -o
C:\Users\Thinkpad\Desktop\CS Study\6205\Assignment9\1.dot.pdf

============Code for each character in a ===============

a Has Code   0

=======================================

======= Original String========

a

======= Decoded String========

0

======= Recovered String========

a

Original string cost = 7.0

Decoded   string cost = 1.0

% reduction = 85.71428571428571

============ aba ++++++++++++++

a occurs   2 times

b occurs   1 times

==

==== Tree built in this order================

Leaf   node 1 Character is a Weight is 2

Leaf   node 2 Character is b Weight is 1

Internal node 3 : Left b(1) Right a(2) Weight = 3

==== Tree has 3 nodes===============

You can see dot file at C:\Users\Thinkpad\Desktop\CS Study\6205\Assignment9\2.dot

Run the following command to get pdf file

dot -Tpdf C:\Users\Thinkpad\Desktop\CS Study\6205\Assignment9\2.dot -o
C:\Users\Thinkpad\Desktop\CS Study\6205\Assignment9\2.dot.pdf

============Code for each character in aba ===============

a Has Code   1

b Has Code   0

==

======= Original String========

aba

======= Decoded String========

101

======= Recovered String========

aba

Original string cost = 21.0

Decoded   string cost = 3.0

% reduction = 85.71428571428571

============ aaabbgggggghhhhaaaggggaaaaa_+@# ++++++++++++++

@ occurs   1 times

a occurs   11 times

b occurs   2 times

occurs   1 times

g occurs   9 times

h occurs   4 times

+ occurs   1 times

_ occurs   1 times

==

==== Tree built in this order===============

Leaf   node 1 Character is @ Weight is 1

Leaf   node 2 Character is a Weight is 11

Leaf   node 3 Character is b Weight is 2

Leaf   node 4 Character is # Weight is 1

Leaf   node 5 Character is g Weight is 9

Leaf   node 6 Character is h Weight is 4

Leaf   node 7 Character is + Weight is 1

Leaf   node 8 Character is _ Weight is 1

Internal node 9 : Left @(1) Right #(1) Weight = 2

Internal node 10 : Left _(1) Right +(1) Weight = 2

Internal node 11 : Left b(2) Right   (2) Weight = 4

Internal node 12 : Left   (2) Right   (4) Weight = 6

Internal node 13 : Left h(4) Right   (6) Weight = 10

Internal node 14 : Left g(9) Right (10) Weight = 19

Internal node 15 : Left a(11) Right (19) Weight = 30

==== Tree has 15 nodes===============

You can see dot file at C:\Users\Thinkpad\Desktop\CS Study\6205\Assignment9\3.dot

Run the following command to get pdf file

dot -Tpdf C:\Users\Thinkpad\Desktop\CS Study\6205\Assignment9\3.dot -o

C:\Users\Thinkpad\Desktop\CS Study\6205\Assignment9\3.dot.pdf

============Code for each character in aaabbggggghhhhaaaggggaaaaa_+@#

===============

@ Has Code   11100

a Has Code   0

b Has Code   11110

Has Code   11101

g Has Code   10

h Has Code   110

+ Has Code   111111

_ Has Code   111110

==

====== Original String========

aaabbggggghhhhaaaggggaaaaa_+@#

====== Decoded String========

00011110111101010101011011011011000010101010000001111101111111110011101

====== Recovered String========

aaabbggggghhhhaaaggggaaaaa_+@#

Original string cost = 210.0

Decoded   string cost = 73.0

% reduction = 65.23809523809524

============ A quick brown fox jumps over the lazy dog ++++++++++++++

A occurs   1 times

  occurs   8 times

a occurs   1 times

b occurs   1 times

c occurs   1 times

d occurs   1 times

e occurs   2 times

f occurs   1 times

g occurs   1 times

h occurs   1 times

i occurs   1 times

j occurs   1 times

k occurs   1 times

l occurs   1 times

m occurs   1 times

n occurs   1 times

o occurs   4 times

p occurs   1 times

q occurs   1 times

r occurs   2 times

s occurs   1 times

t occurs   1 times

u occurs   2 times

v occurs   1 times

w occurs   1 times

x occurs   1 times

y occurs   1 times

z occurs   1 times

=====================================

==== Tree built in this order===============

Leaf   node 1 Character is A Weight is 1

Leaf   node 2 Character is   Weight is 8

Leaf   node 3 Character is a Weight is 1

Leaf   node 4 Character is b Weight is 1

Leaf   node 5 Character is c Weight is 1

Leaf   node 6 Character is d Weight is 1

Leaf   node 7 Character is e Weight is 2

Leaf   node 8 Character is f Weight is 1

Leaf   node 9 Character is g Weight is 1

Leaf   node 10 Character is h Weight is 1

Leaf   node 11 Character is i Weight is 1

Leaf   node 12 Character is j Weight is 1

Leaf   node 13 Character is k Weight is 1

Leaf   node 14 Character is l Weight is 1

Leaf   node 15 Character is m Weight is 1

Leaf   node 16 Character is n Weight is 1

Leaf   node 17 Character is o Weight is 4
Leaf   node 18 Character is p Weight is 1
Leaf   node 19 Character is q Weight is 1
Leaf   node 20 Character is r Weight is 2
Leaf   node 21 Character is s Weight is 1
Leaf   node 22 Character is t Weight is 1
Leaf   node 23 Character is u Weight is 2
Leaf   node 24 Character is v Weight is 1
Leaf   node 25 Character is w Weight is 1
Leaf   node 26 Character is x Weight is 1
Leaf   node 27 Character is y Weight is 1
Leaf   node 28 Character is z Weight is 1
Internal node 29 : Left A(1) Right b(1) Weight = 2
Internal node 30 : Left y(1) Right f(1) Weight = 2
Internal node 31 : Left x(1) Right n(1) Weight = 2
Internal node 32 : Left w(1) Right g(1) Weight = 2
Internal node 33 : Left v(1) Right p(1) Weight = 2
Internal node 34 : Left q(1) Right c(1) Weight = 2
Internal node 35 : Left t(1) Right h(1) Weight = 2
Internal node 36 : Left s(1) Right i(1) Weight = 2
Internal node 37 : Left a(1) Right d(1) Weight = 2
Internal node 38 : Left j(1) Right k(1) Weight = 2
Internal node 39 : Left l(1) Right z(1) Weight = 2
Internal node 40 : Left m(1) Right   (2) Weight = 3
Internal node 41 : Left   (2) Right   (2) Weight = 4
Internal node 42 : Left   (2) Right e(2) Weight = 4
Internal node 43 : Left   (2) Right   (2) Weight = 4
Internal node 44 : Left   (2) Right u(2) Weight = 4
Internal node 45 : Left   (2) Right   (2) Weight = 4
Internal node 46 : Left   (2) Right r(2) Weight = 4
Internal node 47 : Left   (2) Right   (3) Weight = 5
Internal node 48 : Left   (4) Right   (4) Weight = 8
Internal node 49 : Left   (4) Right o(4) Weight = 8
Internal node 50 : Left   (4) Right   (4) Weight = 8
Internal node 51 : Left   (4) Right   (5) Weight = 9
Internal node 52 : Left   (8) Right   (8) Weight = 16
Internal node 53 : Left   (8) Right   (8) Weight = 16

Internal node 54 : Left   (9) Right   (16) Weight = 25

Internal node 55 : Left   (16) Right   (25) Weight = 41

==== Tree has 55 nodes===============

You can see dot file at C:\Users\Thinkpad\Desktop\CS Study\6205\Assignment9\4.dot

Run the following command to get pdf file

dot -Tpdf C:\Users\Thinkpad\Desktop\CS Study\6205\Assignment9\4.dot -o

C:\Users\Thinkpad\Desktop\CS Study\6205\Assignment9\4.dot.pdf

============Code for each character in A quick brown fox jumps over the lazy dog

===============

A Has Code   01100

 Has Code   00

a Has Code   10000

b Has Code   01101

c Has Code   01011

d Has Code   10001

e Has Code   0111

f Has Code   110001

g Has Code   111011

h Has Code   111001

i Has Code   110101

j Has Code   10100

k Has Code   10101

l Has Code   101110

m Has Code   10110

n Has Code   10011

o Has Code   1111

p Has Code   01001

q Has Code   01010

r Has Code   11001

s Has Code   110100

t Has Code   111000

u Has Code   11011

v Has Code   01000

w Has Code   111010

x Has Code   10010

y Has Code   110000

z Has Code   101111

```
=======================================
======= Original String========
A quick brown fox jumps over the lazy dog
======= Decoded String========
011000001010110111101010101110101000110111001111111101010011001100011111
100100010100110111011001001110100001111010000111110010011100011100101110010
0111010000101111110000001000111111111011
======= Recovered String========
A quick brown fox jumps over the lazy dog
Original string cost = 287.0
Decoded   string cost = 185.0
% reduction = 35.54006968641115
============ Pack my box with five dozen liquor jugs +++++++++++++++
P occurs   1 times
  occurs   7 times
a occurs   1 times
b occurs   1 times
c occurs   1 times
d occurs   1 times
e occurs   2 times
f occurs   1 times
g occurs   1 times
h occurs   1 times
i occurs   3 times
j occurs   1 times
k occurs   1 times
l occurs   1 times
m occurs   1 times
n occurs   1 times
o occurs   3 times
q occurs   1 times
r occurs   1 times
s occurs   1 times
t occurs   1 times
u occurs   2 times
v occurs   1 times
w occurs   1 times
```

x occurs   1 times

y occurs   1 times

z occurs   1 times

==

==== Tree built in this order===============

Leaf   node 1 Character is P Weight is 1

Leaf   node 2 Character is   Weight is 7

Leaf   node 3 Character is a Weight is 1

Leaf   node 4 Character is b Weight is 1

Leaf   node 5 Character is c Weight is 1

Leaf   node 6 Character is d Weight is 1

Leaf   node 7 Character is e Weight is 2

Leaf   node 8 Character is f Weight is 1

Leaf   node 9 Character is g Weight is 1

Leaf   node 10 Character is h Weight is 1

Leaf   node 11 Character is i Weight is 3

Leaf   node 12 Character is j Weight is 1

Leaf   node 13 Character is k Weight is 1

Leaf   node 14 Character is l Weight is 1

Leaf   node 15 Character is m Weight is 1

Leaf   node 16 Character is n Weight is 1

Leaf   node 17 Character is o Weight is 3

Leaf   node 18 Character is q Weight is 1

Leaf   node 19 Character is r Weight is 1

Leaf   node 20 Character is s Weight is 1

Leaf   node 21 Character is t Weight is 1

Leaf   node 22 Character is u Weight is 2

Leaf   node 23 Character is v Weight is 1

Leaf   node 24 Character is w Weight is 1

Leaf   node 25 Character is x Weight is 1

Leaf   node 26 Character is y Weight is 1

Leaf   node 27 Character is z Weight is 1

Internal node 28 : Left P(1) Right z(1) Weight = 2

Internal node 29 : Left y(1) Right b(1) Weight = 2

Internal node 30 : Left x(1) Right f(1) Weight = 2

Internal node 31 : Left w(1) Right n(1) Weight = 2

Internal node 32 : Left g(1) Right q(1) Weight = 2

Internal node 33 : Left r(1) Right c(1) Weight = 2

Internal node 34 : Left h(1) Right s(1) Weight = 2

Internal node 35 : Left t(1) Right v(1) Weight = 2

Internal node 36 : Left a(1) Right d(1) Weight = 2

Internal node 37 : Left j(1) Right k(1) Weight = 2

Internal node 38 : Left l(1) Right m(1) Weight = 2

Internal node 39 : Left   (2) Right   (2) Weight = 4

Internal node 40 : Left   (2) Right   (2) Weight = 4

Internal node 41 : Left   (2) Right u(2) Weight = 4

Internal node 42 : Left   (2) Right   (2) Weight = 4

Internal node 43 : Left   (2) Right   (2) Weight = 4

Internal node 44 : Left   (2) Right   (2) Weight = 4

Internal node 45 : Left e(2) Right o(3) Weight = 5

Internal node 46 : Left i(3) Right   (4) Weight = 7

Internal node 47 : Left   (4) Right   (4) Weight = 8

Internal node 48 : Left   (4) Right   (4) Weight = 8

Internal node 49 : Left   (4) Right   (5) Weight = 9

Internal node 50 : Left   (7) Right   (7) Weight = 14

Internal node 51 : Left   (8) Right   (8) Weight = 16

Internal node 52 : Left   (9) Right   (14) Weight = 23

Internal node 53 : Left   (16) Right   (23) Weight = 39

==== Tree has 53 nodes===============

You can see dot file at C:\Users\Thinkpad\Desktop\CS Study\6205\Assignment9\5.dot

Run the following command to get pdf file

dot -Tpdf C:\Users\Thinkpad\Desktop\CS Study\6205\Assignment9\5.dot -o

C:\Users\Thinkpad\Desktop\CS Study\6205\Assignment9\5.dot.pdf

============Code for each character in Pack my box with five dozen liquor jugs

==============

P Has Code   111110

   Has Code   110

a Has Code   00100

b Has Code   01101

c Has Code   00011

d Has Code   00101

e Has Code   1010

f Has Code   01111

g Has Code   01010

h Has Code   00000

i Has Code   1110

j Has Code   00110

k Has Code   00111

l Has Code   10000

m Has Code   10001

n Has Code   111101

o Has Code   1011

q Has Code   01011

r Has Code   00010

s Has Code   00001

t Has Code   01000

u Has Code   1001

v Has Code   01001

w Has Code   111100

x Has Code   01110

y Has Code   01100

z Has Code   111111

=======================================

======= Original String=======

Pack my box with five dozen liquor jugs

======= Decoded String=======

1111100010000011001111101000101100110011011011011101101111001100100000000
01100111111100100110101100010110111111111010111101110100001110010111001101
1000101100011010010101000001

======= Recovered String=======

Pack my box with five dozen liquor jugs

Original string cost = 273.0

Decoded   string cost = 175.0

% reduction = 35.8974358974359

============ Long years ago we made a tryst with destiny, and now the time comes when we shall redeem our pledge, not wholly or in full measure, but very substantially.At the stroke of the midnight hour, when the world sleeps, India will awake to life and freedom. A moment comes, which comes but rarely in history, when we step out from the old to the new, when an age ends, and when the soul of a nation, long suppressed, finds utterance. +++++++++++++++

A occurs   2 times

I occurs   1 times
L occurs   1 times
  occurs   79 times
a occurs   20 times
b occurs   3 times
c occurs   5 times
d occurs   15 times
e occurs   47 times
f occurs   7 times
g occurs   6 times
h occurs   20 times
i occurs   15 times
k occurs   2 times
, occurs   11 times
l occurs   18 times
m occurs   12 times
n occurs   26 times
. occurs   3 times
o occurs   26 times
p occurs   5 times
r occurs   17 times
s occurs   21 times
t occurs   29 times
u occurs   11 times
v occurs   1 times
w occurs   16 times
y occurs   8 times
=======================================
==== Tree built in this order===============
Leaf   node 1 Character is A Weight is 2
Leaf   node 2 Character is I Weight is 1
Leaf   node 3 Character is L Weight is 1
Leaf   node 4 Character is   Weight is 79
Leaf   node 5 Character is a Weight is 20
Leaf   node 6 Character is b Weight is 3
Leaf   node 7 Character is c Weight is 5
Leaf   node 8 Character is d Weight is 15

Leaf   node 9 Character is e Weight is 47
Leaf   node 10 Character is f Weight is 7
Leaf   node 11 Character is g Weight is 6
Leaf   node 12 Character is h Weight is 20
Leaf   node 13 Character is i Weight is 15
Leaf   node 14 Character is k Weight is 2
Leaf   node 15 Character is , Weight is 11
Leaf   node 16 Character is l Weight is 18
Leaf   node 17 Character is m Weight is 12
Leaf   node 18 Character is n Weight is 26
Leaf   node 19 Character is . Weight is 3
Leaf   node 20 Character is o Weight is 26
Leaf   node 21 Character is p Weight is 5
Leaf   node 22 Character is r Weight is 17
Leaf   node 23 Character is s Weight is 21
Leaf   node 24 Character is t Weight is 29
Leaf   node 25 Character is u Weight is 11
Leaf   node 26 Character is v Weight is 1
Leaf   node 27 Character is w Weight is 16
Leaf   node 28 Character is y Weight is 8
Internal node 29 : Left I(1) Right L(1) Weight = 2
Internal node 30 : Left v(1) Right A(2) Weight = 3
Internal node 31 : Left k(2) Right   (2) Weight = 4
Internal node 32 : Left .(3) Right b(3) Weight = 6
Internal node 33 : Left   (3) Right   (4) Weight = 7
Internal node 34 : Left p(5) Right c(5) Weight = 10
Internal node 35 : Left g(6) Right   (6) Weight = 12
Internal node 36 : Left f(7) Right   (7) Weight = 14
Internal node 37 : Left y(8) Right   (10) Weight = 18
Internal node 38 : Left u(11) Right ,(11) Weight = 22
Internal node 39 : Left m(12) Right   (12) Weight = 24
Internal node 40 : Left   (14) Right d(15) Weight = 29
Internal node 41 : Left i(15) Right w(16) Weight = 31
Internal node 42 : Left r(17) Right l(18) Weight = 35
Internal node 43 : Left   (18) Right a(20) Weight = 38
Internal node 44 : Left h(20) Right s(21) Weight = 41
Internal node 45 : Left   (22) Right   (24) Weight = 46

Internal node 46 : Left o(26) Right n(26) Weight = 52

Internal node 47 : Left   (29) Right t(29) Weight = 58

Internal node 48 : Left   (31) Right   (35) Weight = 66

Internal node 49 : Left   (38) Right   (41) Weight = 79

Internal node 50 : Left   (46) Right e(47) Weight = 93

Internal node 51 : Left   (52) Right   (58) Weight = 110

Internal node 52 : Left   (66) Right   (79) Weight = 145

Internal node 53 : Left   (79) Right   (93) Weight = 172

Internal node 54 : Left   (110) Right   (145) Weight = 255

Internal node 55 : Left   (172) Right   (255) Weight = 427

==== Tree has 55 nodes===============

You can see dot file at C:\Users\Thinkpad\Desktop\CS Study\6205\Assignment9\6.dot

Run the following command to get pdf file

dot -Tpdf C:\Users\Thinkpad\Desktop\CS Study\6205\Assignment9\6.dot -o
C:\Users\Thinkpad\Desktop\CS Study\6205\Assignment9\6.dot.pdf

============Code for each character in Long years ago we made a tryst with destiny, and now the time comes when we shall redeem our pledge, not wholly or in full measure, but very substantially.At the stroke of the midnight hour, when the world sleeps, India will awake to life and freedom. A moment comes, which comes but rarely in history, when we step out from the old to the new, when an age ends, and when the soul of a nation, long suppressed, finds utterance. ================

A Has Code   10100101

I Has Code   101001110

L Has Code   101001111

  Has Code   00

a Has Code   11101

b Has Code   0101111

c Has Code   1110011

d Has Code   10101

e Has Code   011

f Has Code   101000

g Has Code   010110

h Has Code   11110

i Has Code   11000

k Has Code   10100110

, Has Code   01001

l Has Code   11011

m Has Code   01010

. Has Code   0101110

n Has Code   1001

o Has Code   1000

p Has Code   1110010

r Has Code   11010

s Has Code   11111

t Has Code   1011

u Has Code   01000

v Has Code   10100100

w Has Code   11001

y Has Code   111000

======================================

======= Original String=======

Long years ago we made a tryst with destiny, and now the time comes when we shall redeem our pledge, not wholly or in full measure, but very substantially.At the stroke of the midnight hour, when the world sleeps, India will awake to life and freedom. A moment comes, which comes but rarely in history, when we step out from the old to the new, when an age ends, and when the soul of a nation, long suppressed, finds utterance.

======= Decoded String=======

101001111100010010101100011100001111101110101111100111010101101000001100101100010101110110101011001110100101111010111000111111011001100111000101111110001010101111111101111000100111000010010011101100110101001001100011001001011111100110010111100001010011001110011100001010011111110011001111100111001001100101100111111111011101101101111011001101001110101011011010100010000100011010001110010110110111010101011001101001001001100010110011001111101000110111101111000001000110100011000100100101000010001101111011000101001111101111110100011010011010010001011110100010110010100100011110101110000011111010000101111111111011111011001101111000111011101111011111000010111010100101101100101111110011001111110111101010001010011001100100010100000101111110011000101011000101011001110000101101111010110011110100001000110100100100110011111001100100101111110011001100110001101011011101010011111110110110111110010111110100100101001101001101011100011101001100111000110111101100111011100111101101001100110010111000001101111000101000011001110110011010100101000110100110111010110000101001011100010100101000101010000101001110011011001110011100001010011111110100100110011111011000111001111110001110011100001010011111110001011110100010110011010101101111010011110111110 00

0011000100100111101100011111101110001101011100001001001100111110011100100
1100101100111111011011111001000100001000101100101000110101000010100010111
1110011001000110111010100101110000010111111001100100101111001010010011001
1111001110010011101100100111010101100110001110011010101111101001001110110 0
1101010011001111100111001001011111100110011111100001000110110010001010000
0111010010011110110111100010001001010010011011100010010101100011111010001
1100101110010110100111111111111011101010100100101000110001001101011111100
01000101110110111101011101100111100110110101110
======= Recovered String========
Long years ago we made a tryst with destiny, and now the time comes when we shall
redeem our pledge, not wholly or in full measure, but very substantially.At the stroke of the
midnight hour, when the world sleeps, India will awake to life and freedom. A moment
comes, which comes but rarely in history, when we step out from the old to the new, when
an age ends, and when the soul of a nation, long suppressed, finds utterance.
Original string cost = 2989.0
Decoded   string cost = 1799.0
% reduction = 39.812646370023415
============ Baa, baa, black sheep, have you any wool? +++++++++++++++
  occurs   7 times
a occurs   7 times
B occurs   1 times
b occurs   2 times
c occurs   1 times
e occurs   3 times
h occurs   2 times
k occurs   1 times
, occurs   3 times
l occurs   2 times
n occurs   1 times
o occurs   3 times
p occurs   1 times
s occurs   1 times
u occurs   1 times
v occurs   1 times
w occurs   1 times
y occurs   2 times
? occurs   1 times

```
=======================================
==== Tree built in this order===============
Leaf      node 1 Character is     Weight is 7
Leaf      node 2 Character is a Weight is 7
Leaf      node 3 Character is B Weight is 1
Leaf      node 4 Character is b Weight is 2
Leaf      node 5 Character is c Weight is 1
Leaf      node 6 Character is e Weight is 3
Leaf      node 7 Character is h Weight is 2
Leaf      node 8 Character is k Weight is 1
Leaf      node 9 Character is , Weight is 3
Leaf      node 10 Character is l Weight is 2
Leaf      node 11 Character is n Weight is 1
Leaf      node 12 Character is o Weight is 3
Leaf      node 13 Character is p Weight is 1
Leaf      node 14 Character is s Weight is 1
Leaf      node 15 Character is u Weight is 1
Leaf      node 16 Character is v Weight is 1
Leaf      node 17 Character is w Weight is 1
Leaf      node 18 Character is y Weight is 2
Leaf      node 19 Character is ? Weight is 1
Internal node 20 : Left B(1) Right c(1) Weight = 2
Internal node 21 : Left k(1) Right v(1) Weight = 2
Internal node 22 : Left w(1) Right ?(1) Weight = 2
Internal node 23 : Left n(1) Right p(1) Weight = 2
Internal node 24 : Left s(1) Right u(1) Weight = 2
Internal node 25 : Left y(2) Right   (2) Weight = 4
Internal node 26 : Left   (2) Right   (2) Weight = 4
Internal node 27 : Left   (2) Right l(2) Weight = 4
Internal node 28 : Left b(2) Right h(2) Weight = 4
Internal node 29 : Left   (2) Right o(3) Weight = 5
Internal node 30 : Left ,(3) Right e(3) Weight = 6
Internal node 31 : Left   (4) Right   (4) Weight = 8
Internal node 32 : Left   (4) Right   (4) Weight = 8
Internal node 33 : Left   (5) Right   (6) Weight = 11
Internal node 34 : Left a(7) Right   (7) Weight = 14
Internal node 35 : Left   (8) Right   (8) Weight = 16
```

Internal node 36 : Left   (11) Right   (14) Weight = 25

Internal node 37 : Left   (16) Right   (25) Weight = 41

==== Tree has 37 nodes===============

You can see dot file at C:\Users\Thinkpad\Desktop\CS Study\6205\Assignment9\7.dot

Run the following command to get pdf file

dot -Tpdf C:\Users\Thinkpad\Desktop\CS Study\6205\Assignment9\7.dot -o

C:\Users\Thinkpad\Desktop\CS Study\6205\Assignment9\7.dot.pdf

===========Code for each character in Baa, baa, black sheep, have you any wool?

===============

  Has Code   111

a Has Code   110

b Has Code   0010

B Has Code   01000

c Has Code   01001

e Has Code   1011

h Has Code   0011

k Has Code   01100

l Has Code   0101

, Has Code   1010

n Has Code   10000

o Has Code   1001

p Has Code   10001

s Has Code   00010

u Has Code   00011

v Has Code   01101

w Has Code   01110

y Has Code   0000

? Has Code   01111

=======================================

======= Original String=======

Baa, baa, black sheep, have you any wool?

======= Decoded String=======

0100011011010101110010110110101011100100101110010010110011100010001110111
01110001101011100111100110110111110000100100011111110100000000111011101001
1001010101111

======= Recovered String=======

Baa, baa, black sheep, have you any wool?

Original string cost = 287.0

Decoded   string cost = 160.0

% reduction = 44.25087108013937

===============   Done with Test1 ==================

 All Hauffman Test passed. You are great. You should get an award