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HauffmanTest.java
=====a=====
a occurs 1 times
==== Tree built in this order=====
Leaf      node 1 Character is a Weight is 1
=====Tree has 1 nodes=====
=====Code for each character in a=====
a Has Code 0
=====Original String=====
a
=====Decoded String=====
0
=====Recoreved 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 is 3
=====Tree has 3 nodes=====
=====Code for each character in aba=====
a Has Code 1
b Has Code 0
=====Original String=====
aba
=====Decoded String=====
101
=====Recoreved String=====
aba
Original string cost = 21.0
Decoded  string cost = 3.0
% reduction = 85.71428571428571
=====aaabbgggghhhhaaaggggaaaa_+@#=====
@ 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

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Internal node 9: Left @(1) Right #(1) Weight is 2
Internal node 10: Left _(1) Right +(1) Weight is 2
Internal node 11: Left b(2) Right (2) Weight is 4
Internal node 12: Left (2) Right (4) Weight is 6
Internal node 13: Left h(4) Right (6) Weight is 10
Internal node 14: Left g(9) Right (10) Weight is 19
Internal node 15: Left a(11) Right (19) Weight is 30
=====Tree has 15 nodes=====
=====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 11111
_ Has Code 11110
=====Original String=====
aaabbggggghhhhaaaggggaaaaa_+@#
=====Decoded String=====
00011110111101010101011011011000010101010000001111101111111110011101
=====Recoreved 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

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==== 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 is 2
Internal  node 30: Left y(1) Right f(1) Weight is 2
Internal  node 31: Left x(1) Right n(1) Weight is 2
Internal  node 32: Left w(1) Right g(1) Weight is 2
Internal  node 33: Left v(1) Right p(1) Weight is 2
Internal  node 34: Left q(1) Right c(1) Weight is 2
Internal  node 35: Left t(1) Right h(1) Weight is 2
Internal  node 36: Left s(1) Right i(1) Weight is 2
Internal  node 37: Left a(1) Right d(1) Weight is 2
Internal  node 38: Left j(1) Right k(1) Weight is 2
Internal  node 39: Left l(1) Right z(1) Weight is 2
Internal  node 40: Left m(1) Right (2) Weight is 3
Internal  node 41: Left (2) Right (2) Weight is 4
Internal  node 42: Left (2) Right e(2) Weight is 4
Internal  node 43: Left (2) Right (2) Weight is 4
Internal  node 44: Left (2) Right u(2) Weight is 4
Internal  node 45: Left (2) Right (2) Weight is 4
Internal  node 46: Left (2) Right r(2) Weight is 4
Internal  node 47: Left (2) Right (3) Weight is 5
Internal  node 48: Left (4) Right (4) Weight is 8
Internal  node 49: Left (4) Right o(4) Weight is 8
Internal  node 50: Left (4) Right (4) Weight is 8
Internal  node 51: Left (4) Right (5) Weight is 9
Internal  node 52: Left (8) Right (8) Weight is 16
Internal  node 53: Left (8) Right (8) Weight is 16
Internal  node 54: Left (9) Right (16) Weight is 25

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Internal node 55: Left (16) Right (25) Weight is 41
=====Tree has 55 nodes=====
=====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=====
011000001010110111101010101110101000110111001111111010100110011000111111001000101001
1011101100100111010000111101000011111001001110001110010111001011101000010111111000000
100011111111011
=====Recoreved 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

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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 is 2
Internal node 29: Left y(1) Right b(1) Weight is 2
Internal node 30: Left x(1) Right f(1) Weight is 2
Internal node 31: Left w(1) Right n(1) Weight is 2
Internal node 32: Left g(1) Right q(1) Weight is 2
Internal node 33: Left r(1) Right c(1) Weight is 2
Internal node 34: Left h(1) Right s(1) Weight is 2
Internal node 35: Left t(1) Right v(1) Weight is 2
Internal node 36: Left a(1) Right d(1) Weight is 2
Internal node 37: Left j(1) Right k(1) Weight is 2
Internal node 38: Left l(1) Right m(1) Weight is 2

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Internal node 39: Left (2) Right (2) Weight is 4
Internal node 40: Left (2) Right (2) Weight is 4
Internal node 41: Left (2) Right u(2) Weight is 4
Internal node 42: Left (2) Right (2) Weight is 4
Internal node 43: Left (2) Right (2) Weight is 4
Internal node 44: Left (2) Right (2) Weight is 4
Internal node 45: Left e(2) Right o(3) Weight is 5
Internal node 46: Left i(3) Right (4) Weight is 7
Internal node 47: Left (4) Right (4) Weight is 8
Internal node 48: Left (4) Right (4) Weight is 8
Internal node 49: Left (4) Right (5) Weight is 9
Internal node 50: Left (7) Right (7) Weight is 14
Internal node 51: Left (8) Right (8) Weight is 16
Internal node 52: Left (9) Right (14) Weight is 23
Internal node 53: Left (16) Right (23) Weight is 39
=====Tree has 53 nodes=====
=====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 11111
=====Original String=====
Pack my box with five dozen liquor jugs
=====Decoded String=====
1111100010000011001111101000101100110011011011011100111001000000001100111111
00100110101100010110111111110101111011010000111001011100110110001011000110100101010
00001
=====Recoreved String=====
Pack my box with five dozen liquor jugs
Original string cost = 273.0
Decoded string cost = 175.0

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% 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 is 2
 Internal node 30: Left v(1) Right A(2) Weight is 3
 Internal node 31: Left k(2) Right (2) Weight is 4
 Internal node 32: Left .(3) Right b(3) Weight is 6
 Internal node 33: Left (3) Right (4) Weight is 7
 Internal node 34: Left p(5) Right c(5) Weight is 10
 Internal node 35: Left g(6) Right (6) Weight is 12
 Internal node 36: Left f(7) Right (7) Weight is 14
 Internal node 37: Left y(8) Right (10) Weight is 18
 Internal node 38: Left u(11) Right ,(11) Weight is 22
 Internal node 39: Left m(12) Right (12) Weight is 24
 Internal node 40: Left (14) Right d(15) Weight is 29
 Internal node 41: Left i(15) Right w(16) Weight is 31
 Internal node 42: Left r(17) Right l(18) Weight is 35
 Internal node 43: Left (18) Right a(20) Weight is 38
 Internal node 44: Left h(20) Right s(21) Weight is 41
 Internal node 45: Left (22) Right (24) Weight is 46
 Internal node 46: Left o(26) Right n(26) Weight is 52
 Internal node 47: Left (29) Right t(29) Weight is 58
 Internal node 48: Left (31) Right (35) Weight is 66
 Internal node 49: Left (38) Right (41) Weight is 79
 Internal node 50: Left (46) Right e(47) Weight is 93
 Internal node 51: Left (52) Right (58) Weight is 110
 Internal node 52: Left (66) Right (79) Weight is 145
 Internal node 53: Left (79) Right (93) Weight is 172
 Internal node 54: Left (110) Right (145) Weight is 255
 Internal node 55: Left (172) Right (255) Weight is 427

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

=====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
l Has Code 11011
, Has Code 01001
m Has Code 01010
n Has Code 1001
. Has Code 0101110
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=====

1010011111000100101011000111000011111011101011111001110101011010000011001011000101011
101101010110011101001011110101110001111110110011001110001011111100010101011111110111
1000100111100001001001110110011010100100110001100100101111110011001011110000101001100
111001110000101001111111001100111110011100100110010110011111111011101110111101100110
10011101010110110101000100001000110100011100101101101110101011001101001001001100010
1100110011111010001101111011111000001000110100011000100100101000010001101111011000101
001111101111101000110100110100100010111101000101100101001000111101011100000111110100
001011111111101111011001101111000110111011110111110000101110101001011011001011111
001100111111011110101000101001100110010001010000010111110011000101011000101011001110
00010110111101100111101000010001101001001001100111110011100100101111110011001100110
001101011011101010011111101101111100101111101001001010011101001101011100011101001
1001110001101111011001110111011010011001100101110000011011110001010000110011101
10011010100101000110100110111010110000101001011100010100101000010100111001101
1001110011100001010011111110100100110011111011000111001111110001110011100001010011111
110001011110100010110011010111011101001111011110000011000100100111101100011111101110
0011010111000010010011001111100111001001100101100111111011011111001000100001000101100
1010001101010000101000101111110011001000110111010100101110000010111111001100100101111
0010100100110011111001110010011101100100111010101100110001110011010111111010010011101
1001101010011001111100111001001011111100110011111100001000110110010001010000011101001
0011110110111100010001001010010011011100010010101100011111010001110010111001011010011
1111111111011101010100100101000110001001101011111100010001011101101111010111011001111
00110110101110

=====Recoreved 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

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% 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 is 2
Internal  node 21: Left k(1) Right v(1) Weight is 2
Internal  node 22: Left w(1) Right ?(1) Weight is 2
Internal  node 23: Left n(1) Right p(1) Weight is 2
Internal  node 24: Left s(1) Right u(1) Weight is 2
Internal  node 25: Left y(2) Right (2) Weight is 4
Internal  node 26: Left (2) Right (2) Weight is 4
Internal  node 27: Left (2) Right l(2) Weight is 4
Internal  node 28: Left b(2) Right h(2) Weight is 4
Internal  node 29: Left (2) Right o(3) Weight is 5
Internal  node 30: Left ,(3) Right e(3) Weight is 6
Internal  node 31: Left (4) Right (4) Weight is 8
Internal  node 32: Left (4) Right (4) Weight is 8
Internal  node 33: Left (5) Right (6) Weight is 11

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Internal node 34: Left a(7) Right (7) Weight is 14
Internal node 35: Left (8) Right (8) Weight is 16
Internal node 36: Left (11) Right (14) Weight is 25
Internal node 37: Left (16) Right (25) Weight is 41
=====Tree has 37 nodes=====
=====Code for each character in Baa, baa, black sheep, have you any
wool?=====
    Has Code 111
a Has Code 110
B Has Code 01000
b Has Code 0010
c Has Code 01001
e Has Code 1011
h Has Code 0011
k Has Code 01100
, Has Code 1010
l Has Code 0101
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=====
0100011011010101110010110110101011100100101110010010110011100010001110111011100011010
11100111100110110111110000100100011111110100000001110111010011001010101111
=====Recoreved 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

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