Report For Exercise Huffman Encoding & Decoding

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1. Problem description / demand analysis 问题描述

1) Huffman (encoding)

①Encode the following text:

An illusory vision is a visionary illusion. Is it?

②Give the corresponding encoding table

③What is the average number of bits per character?

2) Huffman (decoding)

Decode the following:

110001111010110101110000011111101

The encoding table:

Character	Code
!	101
A	11
B	00
C	010
D	100
R	011

2. Results and analysis 结果和分析

1) 解：

①Encode the following text:

An illusory vision is a visionary illusion. Is it?

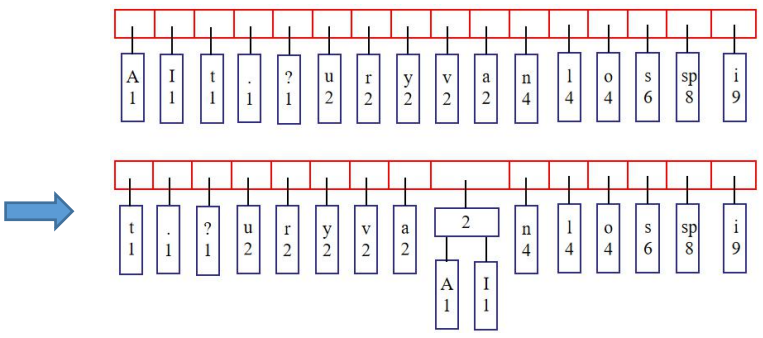
Scan the text and count occurrence of all characters:

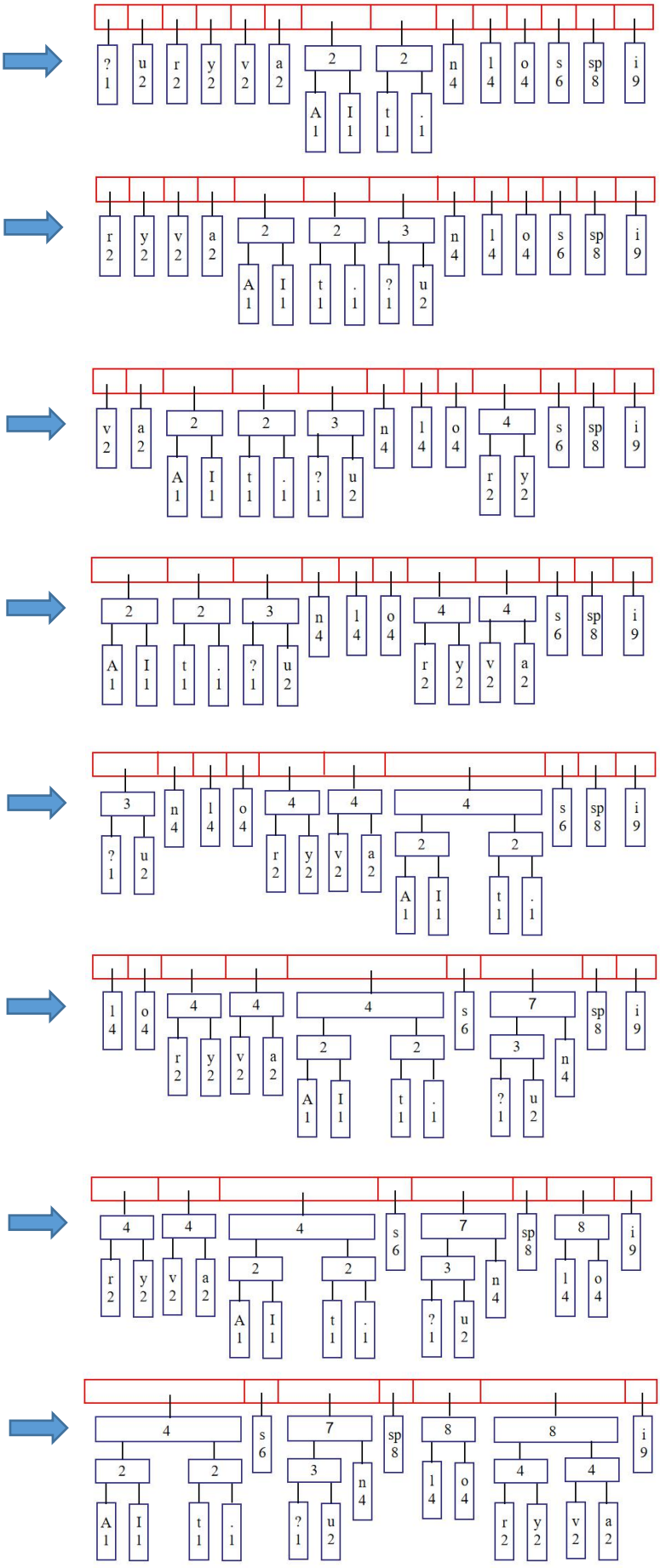
A	n	i	l	u	s	o	r	y	v	a	I	t	“space”	.	?
1	4	9	4	2	6	4	2	2	2	2	1	1	8	1	1

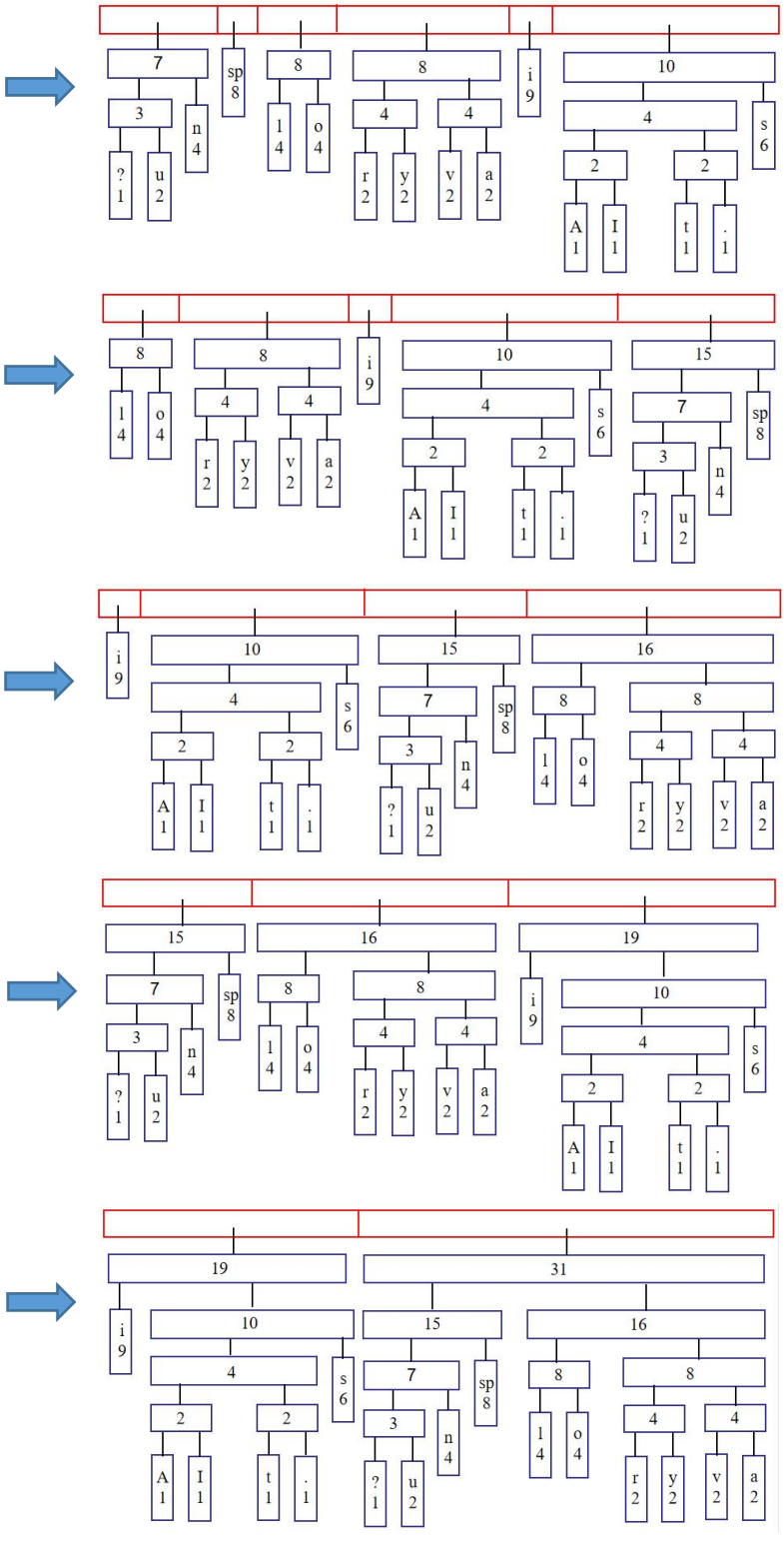
Sort characters based on number of occurrences in text:

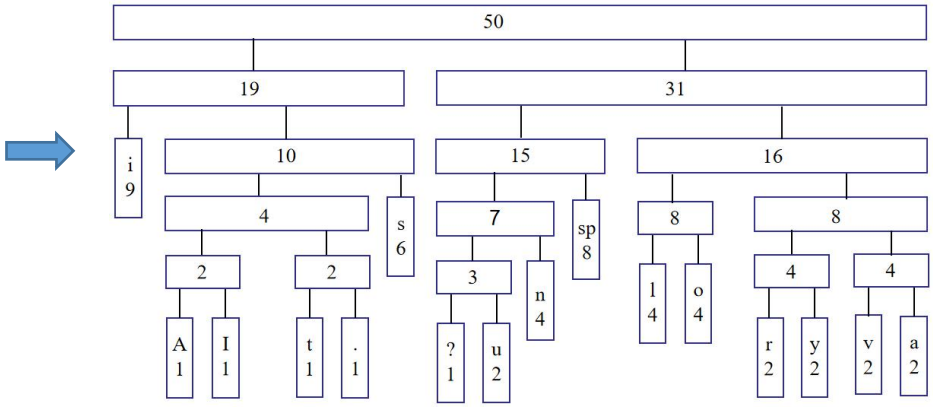
A	I	t	.	?	u	r	y	v	a	n	l	o	s	“space”	i
1	1	1	1	1	2	2	2	2	2	4	4	4	6	8	9

Build Huffman code tree based on prioritized list:




? 1 u 2 r 2 y 2 v 2 a 2 2 A 1 I 1 2 t 1 . 1 n 4 l 4 o 4 s 6 sp 8 i 9
r 2 y 2 v 2 a 2 2 A 1 I 1 2 t 1 . 1 3 ? 1 u 2 n 4 l 4 o 4 s 6 sp 8 i 9
v 2 a 2 2 A 1 I 1 2 t 1 . 1 3 ? 1 u 2 n 4 l 4 o 4 4 r 2 y 2 s 6 sp 8 i 9
2 A 1 I 1 2 t 1 . 1 3 ? 1 u 2 n 4 l 4 o 4 4 r 2 y 2 v 2 a 2 s 6 sp 8 i 9
3 ? 1 u 2 n 4 l 4 o 4 4 r 2 y 2 4 v 2 a 2 4 2 A 1 I 1 2 t 1 . 1 s 6 sp 8 i 9
l 4 o 4 4 r 2 y 2 4 v 2 a 2 4 2 A 1 I 1 2 t 1 . 1 s 6 7 3 ? 1 u 2 n 4 sp 8 i 9
4 r 2 y 2 4 v 2 a 2 4 2 A 1 I 1 2 t 1 . 1 s 6 7 3 ? 1 u 2 n 4 sp 8 8 l 4 o 4 i 9
4 2 A 1 I 1 2 t 1 . 1 s 6 7 3 ? 1 u 2 n 4 sp 8 8 l 4 o 4 8 4 r 2 y 2 4 v 2 a 2 i 9


7
sp 8
8
8
i 9
10
3
n 4
l 4
o 4
4
4
4
s 6
? 1
u 2
r 2
y 2
v 2
a 2
2
2
A 1
I 1
t 1
. 1
8
8
i 9
10
15
l 4
o 4
4
4
4
s 6
7
sp 8
r 2
y 2
v 2
a 2
2
2
3
n 4
A 1
I 1
t 1
. 1
? 1
u 2
i 9
10
15
16
4
s 6
7
sp 8
8
8
2
2
3
n 4
l 4
o 4
4
4
A 1
I 1
t 1
. 1
? 1
u 2
r 2
y 2
v 2
a 2
15
16
19
7
sp 8
8
8
i 9
10
3
n 4
l 4
o 4
4
4
4
s 6
? 1
u 2
r 2
y 2
v 2
a 2
2
2
A 1
I 1
t 1
. 1
19
31
i 9
10
15
16
4
s 6
7
sp 8
8
8
2
2
3
n 4
l 4
o 4
4
4
A 1
I 1
t 1
. 1
? 1
u 2
r 2
y 2
v 2
a 2



②Give the corresponding encoding table

Character	Code
i	00
A	01000
I	01001
t	01010
.	01011
s	011
?	10000
u	10001
n	1001
“space”	101
l	1100
o	1101
r	11100
y	11101
v	11110
a	11111

the Huffman codes:

An illusory vision is a visionary illusion. Is it?

01000100110100110011001000101111011110011101101111100001100110110
01101000111011111110111110000110011011001111111110011101101001100110
10001011001101100101011101010010111010001010100 00

③What is the average number of bits per character?

183/50=3.66

2) 解：解码为 ABRACACADBRA!。