Name: ROTHA Dapravith
ID: e20190915
Group: I5-GIC(B)

Assignment Discussion Lesson09 LZW

Question

1) Explain LZW compression algorithm?

2) By using LZW compression algorithm, find encoder and decoder from 2 different examples? You can choose your own string.

Answer

1). Explain LZW compression algorithm:

LZW compression algorithm is a lossless compression algorithm that replaces recurring patterns with shorter codes to save space. There are two types of algorithm include:

- Encoding algorithm of LZW:

1). Find all different symbols.

2). Initialize the dictionary to contain all strings of length one (build base dictionary).

3). Find the longest string W in the dictionary that matches the current input.

4). Emit the dictionary index for W to output and remove W from the input.

5). Add W followed by the next symbol in the input to the dictionary.

6). Go to Step2 until the last symbol or End Of File(EOF).

- Decoding algorithm of LZW:

1). Read a value from the encoded input.

2). Output the corresponding string from the initialized dictionary.

3). Obtain the next value from the input.

4). Add to the dictionary the concatenation of the current string.

5). Proceed to the next input value.

6). Repeat the process until there is no more input or End Of File (EOF).

2). By using LZW compression algorithm, find encoder and decoder from 2 different examples.

- Example 1: Find encoder and decoder of input string “abbccffeegh”

Given if we have: Input string: “abdcaedbdcecabb”

- Encoder: First, we find all different characters.
  There are “a,b,c,e,f,g,h”
  Then build a base dictionary table:

Entity	Codeword
a	1
b	2
c	3
e	4
f	5
g	6
h	7

- Encoder:

s	c	Item	Codeword	Output
a	b	ab	8	1
b	b	bb	9	2
b	c	bc	10	2
c	c	cc	11	3
c	f	cf	12	3
f	f	ff	13	5

f	e	fe	14	5
e	e	ee	15	4
e	g	eg	16	4
g	h	gh	17	6
h	EOF	-	-	7

Thus, encoder is {1, 2, 2, 3, 3, 5, 5, 4, 4, 6, 7}

- Decoder:

s	k	Item	Codeword	Output
null	1	a	-	a
a	2	ab	8	b
b	2	bb	9	b
b	3	bc	10	c
c	3	cc	11	c
c	5	cf	12	f
f	5	ff	13	f
f	4	fe	14	e
e	4	ee	15	e
e	6	eg	16	g
g	EOF	gh	17	h

Thus, decoder is “abbccffeegh”

- Example 2: Find encoder and decoder of input string “deabbccddeehillo”

Given if we have: Input string: “abdcaedbdcecabb”

- Encoder: First, we find all different characters.

  There are “a,b,c,d,e,h,i,l,o”

  Then build a base dictionary table:

Entity	Codeword
a	1

b	2
c	3
d	4
e	5
h	6
i	7
l	8
o	9

- Encoder :

s	c	Item	Codeword	Output
d	e	de	10	4
e	a	ea	11	5
a	b	ab	12	1
b	b	bb	13	2
b	c	bc	14	2
c	c	cc	15	3
c	d	cd	16	3
d	d	dd	17	4
de	e	dee	18	10
e	h	eh	19	5
h	i	hi	20	6
i	l	il	21	7
l	l	ll	22	8
l	o	lo	23	8
-	o	o	-	9

Thus, Encoder is {4,5,1,2,2,3,3,4,10,5,6,7,8,8,9}

- Decoder:

s	k	Item	Codeword	Output
null	4	d	-	d
d	5	de	10	e
e	1	ea	11	a
a	2	ab	12	b

b	2	bb	13	b
b	3	bc	14	c
c	3	cc	15	c
c	4	cd	16	d
d	10	dd	17	de
de	5	dee	18	e
e	6	eh	19	h
h	7	hi	20	i
i	8	il	21	l
l	8	ll	22	l
l	9	lo	23	o

Thus, Decoder is “deabbccddeehillo”