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Analysis of Decoding Plaintext Data: Using Enhanced Hamming Code Techniques

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ABSTRACT

In the last decades, data (information) security has become an issue of great concern to data (information) analyst (users). To enhance the efficiency and reliability of data (information), such data (information) must be encoded before been used, send or saved for future use as the case maybe. However, such encoded data (information) need to be decoded before it's efficiency and reliability can be ascertained whenever in use. It is against this background therefore that this study on the analysis of decoding plaintext data: using enhanced hamming code techniques.

KEYWORDS: *ASCII, Data code, Decode, Decoded Plaintext Letter and Parity key code*

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1. INTRODUCTION

In recent times, data (information) security has become issue of great concern [1]. This necessitated the need to encode data (information) to be used, saved or sent as the case maybe [2]. Before the efficiency and reliability of encoded data (information) can be ascertained, it has to be decoded [3]. It is on this basis therefore that this study on analysis of decoding plaintext data: using enhanced hamming code techniques was carried out. Decoding involves the process and procedure of converting the encoded data (information) back to it's original form [4]. This is basically for the receiver's understanding, effective and efficient use (application) of the data (information) received [5]. The results from this study shall in great measure contribute positively to the general knowledge of coding theory.

2. DEFINITION OF ABBREVIATIONS AND BASIC TERMS USED

Throughout this paper, the following abbreviations and basic terms as used are defined accordingly as follows:

A. ASCII: American Standard Code for Information Interchange

B. DC (Data Code): Taking the hexadecimal equivalence of the bit entries

C. DCM: Decimal

D. Decode: This involves the procedures and process of getting back the original data (information) from the encoded data (information).

E. DP: Data Position

F. DPTL: Decoded Plaintext Letter

G. Encode: This as the process which involves the addition of parity (correction) bit to the information being sent, stored or computed. This is to enable the identification of error(s) when they occur. Thus, encoding a bit sequence adds redundant information to aid the intended receiver in correcting symbol error(s). For example, to encode the given data 10010011**,** a parity code

1100, calculated would be imputed in positions 1, 2, 4 and 8 respectively. Thus, the encoded data would be **11**1000**1**00011 [6].

H. EPTL: Encoded Plaintext Letter

I. Parity: A binary digit called parity is used to indicate whether the number of bits with ‘1’ in a given set of bits is even or odd, usually used to detect transmission or computation error. The parity bit is then imputed in the original data and does allow for the restoration of an erroneous bit when its position is detected.

J. Parity Key: Taking the reverse of the parity entries.

K. PKC (Parity Key Code): Taking the hexadecimal equivalence of the parity key entries

L. PTL: Plaintext Letter

3. METHOD / PROCEDURE

The Method and procedures involved in enhanced hamming code techniques to decode plaintext data as used in this study are as follows:

Step i: Divide the encoded (received) data (information) into two blocks **B1 and B2;** such that, the parity key code is in **B1 while the data code is in B2**.

Step ii: Take and place the binary (4-digits for PKL and 8-digits for DC) equivalences of entries in **B1; DP 2^n; n = 0, 1, 2 and 3 (that is positions 1, 2, 4 and 8 respectively)** and **B2** ; **DP 3, 5, 6, 7, ,9, 10, 11 and 12 respectively.**

Step iii: Take the decimal equivalence of the data code (DC), that is, entries in DP 3, 5, 6, 7, 9, 10, 11 and 12

Step iv: Take the ASCII character (alphabet / letter) of the respective decimal equivalences of the data code (DC).

Step v: Concatenate the ASCII character (alphabet / letter) in each block to form the original plaintext sent as encoded data (information), retrieved at the receiver’s end.

4. PRESENTATION OF DECODING COMPUTATION AND RESULT OF THE ENCODED PLAINTEXT, “0D4B0D6E0E6F0977006C0A65096407670A65062006690C73062004500E6F09770A650F72”

The result of the computation of decoding the encoded plaintext “**0D4B0D6E0E6F0977006C0A65096407670A65062006690C73062004500E6F09770A650F72**”, as an example in this work is shown in TABLE 4.0.1 below:

Table 4.0.1 Results Obtained from Decoding Computation on encoded plaintext “0D4B0D6E0E6F0977006C0A65096407670A65062006690C73062004500E6F09770A650F72”

EPTL	PKC	DC	DP 1	DP 2	DP 3	DP 4	DP 5	DP 6	DP 7	DP 8	DP 9	DP 10	DP 11	DP 12	ASCII DCM	DPTL
0D4B	0D	4B	1	1	0	0	1	0	0	1	1	0	1	1	75	K
0D6E	0D	6E	1	1	0	0	1	1	0	1	1	1	1	0	110	n
0E6F	0E	6F	1	1	0	1	1	1	0	0	1	1	1	1	115	o
0977	09	77	1	0	0	0	1	1	1	1	0	1	1	1	119	w
006C	00	6C	0	0	0	0	1	1	0	0	1	1	0	0	108	l
0A65	0A	65	1	0	0	1	1	1	0	0	0	1	0	1	101	e
0964	09	64	1	0	0	0	1	1	0	1	0	1	0	0	100	d
0767	07	67	0	1	0	1	1	1	0	1	0	1	1	1	103	g
0A65	0A	65	1	0	0	1	1	1	0	0	0	1	0	1	101	e
0620	06	20	0	1	0	1	0	1	0	0	0	0	0	0	32	
0669	06	69	0	1	0	1	1	1	0	0	1	0	0	1	105	i
0C73	0C	73	1	1	0	0	1	1	1	0	0	0	1	1	115	s
0620	06	20	0	1	0	1	0	1	0	0	0	0	0	0	32	
0450	04	50	0	1	0	0	1	0	1	0	0	0	0	0	80	P
0E6F	0E	6F	1	1	0	1	1	1	0	0	1	1	1	1	111	o
0977	09	77	1	0	0	0	1	1	1	1	0	1	1	1	119	w
0A65	0A	65	1	0	0	1	1	1	0	0	0	1	0	1	101	e
0F72	0F	72	1	1	0	1	1	1	1	1	0	0	1	0	114	r

Source: Researcher’s Calculations

Therefore, the decoded (original) plaintext retrieved at the receiver’s end is “**Knowledge is Power**”.

5. CONCLUSION

Since efficiency and reliability are the hallmark of every data (information) analyst (user), therefore, decoding the encoded data (information) is one very important step in the right direction to achieving these. Although the decoding procedure of enhanced hamming code techniques was carried out on encoded plaintext "**0D4B0D6E0E6F0977006C0A65096407670A65062006690C73062004500E6F09770A650F72**" in this study, however, the results obtained is applicable to plaintext data (information) in particular and coding theory in general.

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