International Journal of Current Advanced Research
ISSN: O: 2319-6475, ISSN: P: 2319-6505, Impact Factor: SJIF: 5.995
Available Online at www.journalijcar.org
Volume 6; Issue 12; December 2017; Page No. 8666-8669
DOI: http://dx.doi.org/10.24327/ijcar.2017.8669.1403

Research Article

AN EFFICIENT FRACTAL COMPRESSION TECHNIQUE IN WSN WITH ADAPTIVE HUFFMAN CODING

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A R T I C L E I N F O

Article History:
Received 17th September, 2017
Received in revised form 21st October, 2017
Accepted 05th November, 2017
Published online 28th December, 2017

Key words:

Wireless sensor network, lossless data Compression, Fractal, Huffman Algorithm.

A B S T R A C T

Fractal Data compression is ability used to reduce the number of bits essential to transmit the data in the particular order. The purpose of Fractal data compression is to eliminate the redundancy in a data in order to decrease its size. Data compression can also be lossless or lossy. Data compression recreates the correct unusual data from the compressed data although lossy data compression cannot restore the ideal unique data from the compressed data. The consequence and magnitude of data compression has exposed increasing development from the past few years and is probable to continue remaining the same in the future. The planned will present an overview of popular adaptive Huffman data compression methods of common effectiveness. It evaluated these presented algorithms with a newly planned scheme with improvements to make the algorithm fully absolute. The size data to be transmitted has a crash on the efficient working of WSN. This study reports the simulation & implementation of proficient Fractal data compression algorithms used for wireless sensor network.

INTRODUCTION

Text databases are rising in the last continuation due to the general use of digital libraries, document databases and largely because of the stable rising of the Web. Compression comes up as an ideal solution that permits to decrease both storage space supplies and input/output operations. Therefore, it is practical when transmitting data throughout a network. Those techniques use terms as the symbols to be squashed. They do not only recover the compression ratio obtained by other well-known techniques (e.g. Ziv-Lempel), but also allow to resourcefully attain searches within the compressed text avoiding the need for decompression prior to the search. As a outcome, those searches are very much sooner than searches inside plain text.

Wireless Sensor Networks are extensively used to control a variety of physical environments. The network nodes collect data and route it to give information in a appropriate way as demanded by the major application when necessary. Sensor Networks have a figure of different features such as limited computation, distributed processing and degree of association. The gathered in order is communicated to gateway nodes or sink nodes.

Radio communication is commonly the principal area of power consumption.

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The data compression algorithms are attractive for these networks to decrease the amount of data communicated to the descend. The objective of the future work is to reduce the total number of bits compulsory to be transmitted from the sensor node to decrease the energy moved by the sensor node. The reality of activist correlation in sensed data is considered as a gain. A modified Huffman Data compression algorithm proper for WSN is proposed in this synopsis. The proposed algorithm does not want the figures of the sensed data though however encodes the difference of the present and the preceding value of the sensed data. By this algorithm, a good compression ratio for both extremely connected and medially connected sensor node data has to be achieved. The main obscurity in wireless sensor networks (WSN) is the limited energy deliver. As the broadcast of the data is the largest energy consumption, many studies have turned notice on reducing the quantity of bits transmitted. The counter consists in data density.

LITERATURE REVIEW

A.Gokilavani has proposed Huffman and LZW techniques of image compression[1]. There are many techniques of image compression, but these two are important. The paper also differentiates the concepts of Huffman and LZW techniques. These two techniques are belongs to Lossless compression of image compression.

Chong Fu, Zhi-liang Zhu et-al has proposed a DCT based fractal image coding method[2] which improves the self similarities exploiting scheme. The range and domain blocks are removed into three classes based on their DCT lower

frequency coefficients, and simply the domain blocks with the same class to the range block are considered during best match exploiting process. Experimental grades illustrate that compared with standard fractal coding scheme, the encoding time is noticeably reduced and the PSNR of the reconstructed image is also enhanced. The performance of fractal image coding can be enhanced in terms of PSNR value. The blocks can be more divided into more classes than "S", "D", and "H". More classes specify fewer matches exploiting time.

Preedhi Garg, Richa Gupta and Rajesh K.Tyagi proposed variances of range and domain blocks are compared and only domain blocks under a threshold value are taken[3]. To further optimize the performance, adaptive thresholding in quadtree partitioning is applied in assistant with variance domain selection approach. The combined algorithm will save the search time and raise the compression ratio with image quality as much as possible. Experimental results show that executing the proposed method on gray scale images shortens the encoding time and improves the PSNR.

Utpal Nandi, Jyotsna Kumar Mandal, Sahadeb Santra, Suman Nandi has proposed a new fast classification strategy is proposed for fractal image compression with quad tree partitioning technique[4]. The scheme significantly reduces the number of mean square error (MSE) computations during encoding of images. Performance in terms of compression ratios, compression time and PSNR of the fractal image compression with existing and proposed classification strategy are compared. Both techniques use quad tree partitioning scheme. The proposed classification strategy reduces the compression time significantly of the fractal image compression technique maintaining compression ratio and PSNR almost same with its counterpart.

Mo yuanbin, Qiuyubing, Liu jizhong, Ling Yanxia has proposed,"A data compression algorithm based on adaptive Huffman code for Wireless Sensor Networks[5]" is based on the assumption of Adaptive Huffman Code, a novel compression algorithm for WSNs is intended by creation the full use of the event that the composed temperature data by the sensor nodes are permanent and purposeful altering in real environment. The Principle of the Adaptive Huffman code and the complete procedure of the latest algorithm are introduced in the study. Unlike the predecessors to encode the data as a whole, the algorithm encodes the basic characters in the characteristic value in that order. Based on the algorithm, compression experiments are approved out with Ambient Temperature Data, and the compression properties under the accuracy of 0.1, 0.01 and the varied accuracy are analyzed.

S. Renugadevi and P. S. NithyaDarisini "Performance comparison of Huffman & Lempel-Ziv Welch Data Compression for Wireless sensor node application"[6]. The compression presentations of the Huffman Algorithm & the LZW algorithm with a variety of input data usually decide by a wireless sensor node have been analyzed. For the particular knowledgeable data the Huffman Algorithm shows better presentation when compared to the LZW in provisions of compression ratio & calculation time. From the research the Huffman algorithm is able to attain an average of 43% data reduction. For double compression the LZH could provide up to 9% advance in terms of data decrease but at the cost of an amplify in calculation time.

Mohamed Abdelaal and Oliver Theel, "An Efficient and Adaptive Data Compression Technique for Energy Conservation in Wireless Sensor Networks"[7]. The Fuzzy change has been proposed for a novel confined adaptive data compression to decrease the bandwidth, the memory space, and the energy enthusiastic in radio communication. An assessment of the compression technique is provided. During this assessment, the future method is examined using genuine temperature data. The results have shown that the future technique can extremely decrease the overall power expenditure by up to 90%. Moreover, a alteration of the future technique is presented which improve the accuracy of the recovered. A complexity of prospect technique, even though, is the time delay among consecutive transmissions due to storing and processing the readings. Applications that need information of new or present capacity must wait for these readings to arrive.

Xi Deng and YuanyuanYang, "Online Adaptive Compression in Delay Sensitive Wireless Sensor Networks"[8]. A fresh adaptive density technique has been careful for lossless data compressions which decrease the amount of data that must be approved through the network and to the sink and thus have authority recompense that are multiplicative with the figure of hops the information travel through the network. Probable extensions in this paper, uses RUN LENGTH CODING to compress decompress the data in WSN. Static Huffman coding suffers from the fact that the uncompressed need have some knowledge of the probabilities of the character in the packed in files.

Adaptive Huffman Coding With Fractal Compression

Huffman coding requires correlate of the probabilities of the characters sequence. If this information is not accessible, Huffman coding becomes a two-pass system: the information are composed in the first pass, and the source is encoded in the second pass. In arrange to convert this algorithm into a one-pass procedure independently developed Fractal adaptive algorithms to make the Huffman code. These enhanced Theoretically, if we required to encode the (k+1)-th figure using the figures of the first k symbols, we could recomputed the code with the Huffman coding method each time a symbol is transmitted. However, this would not be a largely useful approach due to the huge amount of computation concerned hence, the fractal adaptive Huffman coding procedures.

The Huffman code with Fractal compression can be described in supplies of a binary tree comparable to the ones shown in Figure 1. The squares signify the outside nodes or leaves and exchange letters to the symbols in the source alphabet. The password for a symbol can be obtained by traversing the tree opportunity the root to the leaf matching to the symbol, where 0 corresponds to a left branch and 1 corresponds to a right branch. In order to illustrate how the adaptive Huffman code works, we add two other parameters to the binary tree: the increase of each leaf, which is written as a figure inside the node, and a node figure. The weight of each outside node is just the digit of times the symbol corresponding to the leaf has been encounter. The weight of every internal node is the sum of the weights of its issue. The node number y_i is a unique number assign to each internal and external node. If we have an alphabet of size n, then the 2n−1 internal and external nodes can be numbered as y1……..,y2n−1 such that if x_j is the solidity of node y_j , we have x1≤ x2≤ · · · ≤ x2n−1.

Furthermore, the nodes y2j−1 and y_{2j} are offspring of the same parent node, or siblings, for $1 \leq j < n$, and the node number for the parent node is greater than y2j−1 and y2j . These last two independence are called the sibling possessions, and any tree that possesses these belongings is a Huffman tree.

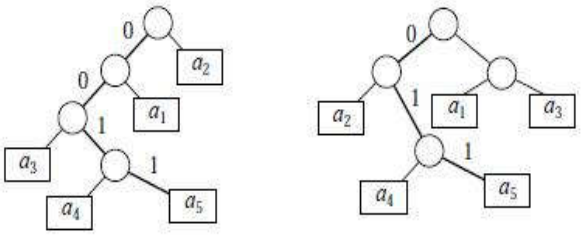

Figure 1 Two Huffman trees corresponding to the same probabilities

In the adaptive Huffman coding with Fractal method, neither transmitter nor receiver knows a little about the statistics of the source succession at the start of transmission. The tree at both the transmitter and the receiver consists of a single node that corresponds to all symbols not yet transmitted (NYT) and has a weight of zero. As broadcast progresses, nodes matching to symbols transmitted will be added to the tree, and the tree is reconfigured using an update procedure. Before the origination of transmission, a fixed code for each symbol is determined upon between transmitter and receiver.

When a symbol is encountered for the first time, the code for the NYT node is transmitted, followed by the fixed code for the symbol. A node for the mark is then created, and the symbol is taken out of the NYT list.Both transmitter and receiver start with the matching tree structure. The updating process used by both transmitter and receiver is matching. Therefore, the encoding and decoding processes wait matched.

Update Procedure with Fractral Compression

The modernize process requires that the nodes be in a static order. This ordering is potted by numbering the nodes.

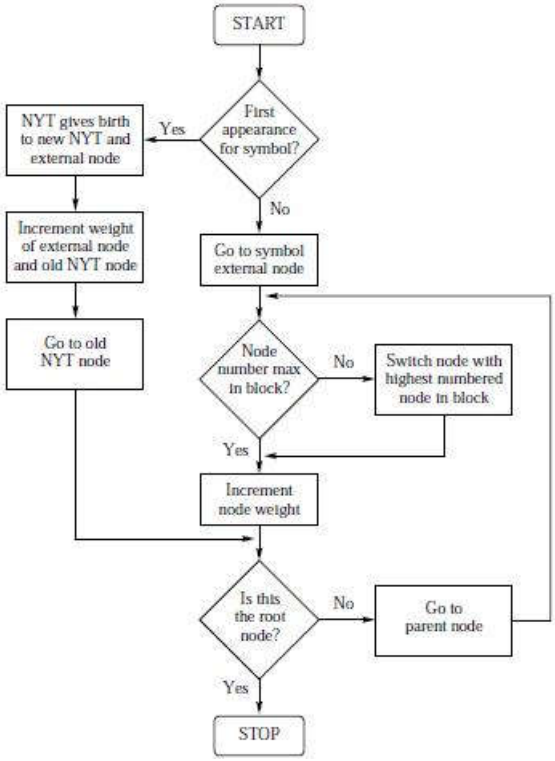

Figure 2 Update procedure with Fractal Compression

The major node number is given to the source of the tree, and the smallest number is assigned to the NYT node. The numbers from the NYT node to the root of the tree are assigned in growing order from left to right and from lower level to upper level. The deposit of nodes with the equal weight makes up a block. Figure 2 is a flowchart of the updating process.

Table 1 Compression Ratio of Propossed

Huffman Based Algorithms	Original bits	Compressed bits	Compression ratio
Adaptive Huffman coding with Fractal Compression	32016	14474	63.55%
Static Huffman coding	32016	11099	65.3330%
Minimum Variance Huffman coding	32016	7976	75.087%

CONCLUSION

In this paper, based on the standard of Adaptive Huffman Code with Fractal data compression, a novel compression algorithm for WSNs is planned. The attitude of the Adaptive Huffman code and the comprehensive procedure of the new algorithm are introduced in the paper.

The experimental work done in this work proves that the Fractal algorithm gives the best performance.

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How to cite this article:

Keerthika S (2017) ' An Efficient Fractal Compression Technique In Wsn With Adaptive Huffman Coding ', *International Journal of Current Advanced Research,* 06(12), pp. 8666-8669. DOI: http://dx.doi.org/10.24327/ijcar.2017.8669.1403

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