

Nth Order Binary Encoding with Split-Protocol

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ABSTRACT

To cope up with the Big Data explosion, the Nth Order Binary Encoding (NOBE) algorithm with the Split-protocol has been proposed. In the earlier papers, the application Split-protocol for security, reliability, availability, HPC have been demonstrated and implemented encoding. This technology will significantly reduce the network traffic, improve the transmission rate and augment the capacity for data storage. In addition to data compression, improving the privacy and security is an inherent benefit of the proposed method. It is possible to encode the data recursively up to N times and use a unique combination of NOBE's parameters to generate encryption keys for additional security and privacy for data on the flight or at a station. This paper describes the design and a preliminary demonstration of (NOBE) algorithm, serving as a foundation for application implementers. It also reports the outcomes of computable studies concerning the performance of the underlying implementation.

KEYWORDS

Adaptive Huffman Coding, Data Compression, Performance, Split-Encoding

INTRODUCTION

The notion of the present-day scientists is that all the world's data can go on a DNA hard drive, the size of a teaspoon (Newscientist.com, n. d.a). It indicates that there are simple algorithms hidden in nature, which allow for storing infinitely large data. In addition, the exploding growth of smart computing devices, which are creating and distributing excessively large data, puts pressure to invent new techniques in addition to existing technologies to cope up with the exploding Big Data. Shortly, the Internet of things will contribute to a market share of \$8.9 trillion in 2020 connecting 212 billion devices.

(Zdnet, n. d.b). These devices will generate extensive Big Data from the day to day operations. Since billions of devices are attached to the network, the quick possibility of congestion on the network demands new methods to reduce the network traffic and improve the data storage capacity.

A significant portion of traffic on the network is generated by Peer to Peer communications. Gaming and medical images are a major contributor to P2P traffic. In North America, 53.3% network traffic is attributed to P2P communication (Lua et al., 2005; Ernesto, 2010). There are immeasurable procedures available to compress and decompress data before transmitting on the Internet. NOBE data encoding technique on top of the existing data compression techniques and the security protocols

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is proposed in this paper. Mission-critical applications such as medical conditions, battleground moments and natural calamities require access to complete information within the minimal amount of time (Rawal, Berman, & Ramcharan, 2013).

The remainder of this paper is organized as follows. A brief Related Work is presented in section II. In Section III, Split-protocol is presented. Section IV describes Adaptive Huffman Coding Algorithm. Section V, illustrates NOBE Algorithm, VI describes Decoding Process, and Section VII shows Experimental Results. Section VIII is Discussion. Finally, we conclude the paper in Section IX.

RELATED WORK

Kecman provides a detailed insight of learning from experimental data and soft computing. Soft computing mimics the intelligent mathematical structures, or models, that underlie learning found in the nature (Kecman, 2001). According to Wang and Fu, the data dimensionality reduction (DDR) can reduce the dimensionality of hypothesis search space, reduce data collection and storage costs, enhance data mining performance and simplify the data mining result. They describe the use of the Genetic algorithm for feature selections as well (Wang & Fu, 2005). Zhang, Wang & Lin propose a unique subspace learning structure, Conjunctive Patches Subspace Learning (CPSL) process by employing the user historical feedback log data for a collaborative image retrieval (CIR) task. The CPSL can assimilate the discriminative information of labeled log images, the geometrical information of labeled log images and the weakly similar information (Zhang, Wang, & Lin, 2012). In addition, they have proposed a CIR for the reduction of labeling works of the user by resorting to the ancillary data. The support vector machine (SVM) vibrant learning can decide vague samples as the most instructive and thus, lessens the labeling works of conventional RF (Zhang, Wang, & Lin, 2014). Chen, Su, Gimson, Liu & Shine propose an object segmentation method to extract the image features, and showed that new feature types can be incorporated into the algorithm to further improve the image retrieval performance. They suggest that content-based image retrieval (CBIR) can be carried out to evaluate the object segmentation capability in dealing with the large-scale database images (Chen, Su, Gimson, Liu & Shine, 2012).

A variety of hardware and software techniques have been studied to improve the image transfer rate on the Internet with Cloud computing paradigms. For instance, a Turbo Gateway™ device optimizes the utilization of Internet bandwidth and transmission of imaging data in the cloud computing environment. Cheng, Wei-Hung, and Cheng-Chang Lu propose Graphics Processing Units (GPUs) for accelerating medical image registration (Wei-Hung Cheng, Wei-Hung, & Cheng-Chang, 2009). However, lossy compression schemes when used at low bit rates introduce compression artifacts resulting in loss of useful clinical information that cannot be tolerated (Sieve, Vijayakumar, & Ahuja, 2012; Tölke & Jonas, 2008).

Grid technology enables sharing, selection, and connection with a wide variety of geographically distributed computational and storage resources of content needed for large-scale data-intensive medical images (Yang, Chao-Tung, Yu-Hsiang, & Lung-Teng, 2010). Medical images play a significant role in detecting anatomical and functional information about the body parts for diagnosis, medical research, and education. The medical images of diverse modalities include computerized tomography (CT), magnetic resonance imaging (MRI), positron emission tomography (PET), and single-photon emission computed tomography (SPECT) and histology images (Ciardo, Gianfranco, Alma, & Evgenia, 2001; Alagendran & Manimurugan, 2012). A wavelet-based compression scheme uses the correlation analysis of wavelet coefficients like “Wavelet-based Medical Image Compression with Adaptive Prediction” (Chen & Tseng, 2007). According to NVIDIA, the device to device transfer rate on GeForce 9600 GT is approximately 57.6 GB/Sec. (Sieve et al., 2012; Tölke & Jonas, 2008). Mahmud Hasan’s Location Based Approach (LBA) offers 4.87% better compression ratio as compared to the existing lossless image compression schemes (Grumbach, Stéphane, & Fariza, 1994). Huffman coding and another encoding technique rely on the probability of encoding strings of data and pattern

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