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Designing and Build a Hybrid Compression Model in the Era of Distributed On-Line and Mobile Computing

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Abstract – Data compression is a method of bit reduction technique that uses a smaller amount of bits to represent information. A universal compression scheme is needed rather than unique methods for unique data formats. Data compression offers an approach for reducing communication costs, at the same time it is vulnerable to attack during the transmission. If it is compromised then it is not possible to get actual data during the decompression. Therefore security is needed to preserve the compressed data. Compression always relies on high redundant data in order to gain size reduction. The exponential growth equation for image encryption has provided less security against differential and statistical attacks. So, logarithmic function and the Henon-chaotic function for image encryption of heterogeneous data is proposed. It has two stages. At first, to minimize the intensity of the pixel esteems the natural logarithmic function of the image can be utilized and Image fusion is used to encrypt images using the key.

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OVERVIEW

Compression means making the file size smaller by rearranging the information in the file. Compressing imagery is different from zipping files. Imagery compression changes the system and content of the information within a file. Image compressions may used to rearrange the data and decay it to achieve desired compression level, depending on the compression ratio. The sacrifice of the data may or may not be noticeable. The quantity of image compression can be influenced by the type of imagery. Higher compression ratio can be achieved in portions of the image that have similar tone, such as water area that have the same shade. Image compression is one of the brightest disciplines in image processing. Images acquired need to be stored or transmitted over long distances. Untreated image occupies more memory and hence need to be compressed. Due to the demand for high quality video on mobile platforms there is a need to compress untreated images and reproduce the images without any degradation. Lossy compression is the reverse of lossless image compression. It is used to compress images and video files. Lossless compression is a family of data compression that permits the genuine data to be perfectly reconstructed from the compressed data. Superfluous information is removed in compression and added during decompression

IMAGE COMPRESSION

The image compression is used to modify an image into space productive compression frame with the goal that the image should not be degraded when decompressing the image. Presentation of data compression is also known as the image compression that encodes the genuine image with a couple of bits. Decreasing the redundancy of the image is the main aim of the image compression, which is used to convey and store information in an effectual form. Compressed image is basically differed as compared to raw binary information. The common resolution of the compression strategies can be utilized to compress the images which outcome is not as much as the ideal. In these images having particular accurate properties, which can be misused by the encoders. So it is particularly intended for them. Similarly, a portion of the better points of interest within the image can be generated to save a little more bandwidth and the storing space.

Storing images with a few memory bits which reduce cost. Image compression is the fast transmission of information; less information

requires less time to transmit. So, how are images compressed? Maximum of images comprises a few measures of redundancy, which can be eliminated in a few times then the image is stored and exchanged. Finally, that image is reproduced. However, the rejecting redundancy doesn't prompt a higher ratio of compression. By chance, the human eye is inhumane to an extensive collection of data loss. This means that the image is frequently modified in several ways that are measured or not detected by the human eye or does not contribute to the "degradation" of the image. If these fluctuations lead to more redundant data when the redundancy can be sensed then the data can be greatly compressed.

Compression of high-resolution images to a great extent becomes difficult and there is a need to look up at an algorithm that can compress the information, which can keep up the preferred level of resolution, achieving less size in memory. So it is vital that the Lossy image compression system exhibited here must have the capacity to accomplish a high estimation of the compression ratio and PSNR while reconstructing the image with low loss when compared with the unique image. The objective of this research is to inspect the comparative study of different compression algorithms and provides the motivation behind indicating different lossy image compression procedures. Another objective of present research work is to inspect the comparative study of different compression algorithms and motivation behind indicating different lossless medical image compression procedures .The third objective of this research study is to provide more security during the transmission of images and comparative study of different encryption algorithms.

Mobile Computing System

Mobile Computing System a mobile computing system consists of a large number of mobile hosts (MH) and relatively fewer static hosts called mobile support stations (MSS). The MSS are connected by a static wired network which provides reliable First in First out (FIFO) delivery of messages. Cellular network is a logical or geographical area covered by an MSS. An MH can directly communicate with an MSS by a reliable FIFO wireless channel only if it is present in the cell supported by the MSS. The distributed computation consists of N sequential processes denoted by P1, P2…….PN. Processes do not share a common memory or a common clock. Message passing is the only way for processes to communicate with each other. The computation is synchronous i.e., each process progresses at its own speed and messages are exchanged through reliable communication channels, whose transmission delays are finite but arbitrary. The messages generated by the underlying distributed application are referred to as computation messages. Messages generated by the processes to advance checkpoints are referred to as system messages.

Handling Fault Tolerance in Distributed Mobile Computing Fault Tolerance Techniques enables systems to perform tasks in the presence of faults. The likelihood of faults grows as systems are becoming more complex and applications are requiring more resources, including execution speed, storage capacity and communication bandwidth. Reliability and resilience are critical issues in parallel and distributed systems. These systems comprise of various computing devices and communication and storage resources. There are a number of fault sources in a system, including physical failure of components, environmental interference, software errors, security violations, and operator errors. Faults can be classified into two types: namely, permanent and transient faults. Permanent faults are faults that cause a permanent damage to some part of the system. Recovery from permanent faults must include replacement of the damaged part and reconfiguration of the system. Transient faults are short-lived and do not lead to permanent damage. Recovery from transient faults is comparatively simple when compared to the permanent faults.

LITERATURE REVIEW

It is of utmost importance to discuss about the basics of multi modal medical image compression, so that the research community could have a better idea about the processing of CT, MRI and PET image compression. Jian-Jiun Ding et al have presented a variable length coding named as Huffman code which is mostly used to increase coding efficiency. It widely uses the Huffman source-coding algorithm in order to generate the uniquely decodable Huffman code with a minimum expected codeword length when the probability distribution of a data source is known to the encoder. Pawel Turcza et al have proposed image compression using Huffman coding which is based on an integer version of a Discrete Cosine Transform and a low complexity entropy encoder making use of an adaptive Golomb–Rice algorithm, which can be efficiently used in Huffman tables.

Ankita Vaish et al have used PCA and Huffman coding. Set of principal components (PCs) are used for reconstruction. Ill effects of using number of PCs for reconstruction are overcome by further quantization. Coding redundancy is removed by Huffman coding.

Arif Sameh Arif et al have introduced a new framework based on grouping of images, the correlation of pixels. Combination of Run-length coding and Huffman coding are used. Significant improvement in compression is achieved.

Jagadish et al have explained that the objective of image compression technique is to reduce the amount of data required for representing sampled digital images. It is concluded that Huffman coding

is the most efficient technique for image compression and decompression.

Xiaofeng Li et al have formulated two different stages in lossless compression scheme related to the medical image compression. At first, current pixel is predicted from the least-square-based prediction coefficients. Secondly, residual image is formed by Huffman coding.

Mohamed Abo-Zahhad et al have proposed image compression (DPCM, DWT and the Huffman) approach. If the first image is pre-processed by DPCM, its output will undergo wavelet transformation. Resulting coefficients are encoded using Huffman coding.

Hybrid sorption-compression system

Hybrid sorption-compression systems are gaining interest for heating/cooling/ refrigeration purposes in different applications, since they allow exploiting the benefits of both technologies and a better utilization of renewable sources. However, design of such components is still difficult, due to the intrinsic complexity of the systems and the lack of reliable models. In particular, the combination of adsorption-compression cascade unit has not been widely explored yet and there are no simulations or sizing tools reported in the literature. In this context, the present paper describes a model of a hybrid adsorption-compression system, realised in Modelica language using the commercial software Dymola. The models of the main components of the sorption and vapour compression unit are described in details and their validation presented. In addition, the integrated model is used for proving the feasibility of the system under dynamic realistic conditions and an example of the technical sizing that the model is able to accomplish is given.

Digital image and video in their raw form require an enormous amount of storage capacity and the number of such applications is increasing day by day. Also the huge data systems also contain a lot of redundant information. As massive data transfer is taking place over communication links, compression of data to be stored or transmitted reduces storage space and transmission bandwidth as redundant information is removed. Compression also increases the capacity of the communication channel. Considering the important role played by digital imaging and video in today's world, it is necessary to develop a system that produces high degree of compression while preserving critical image or video information. In this paper, a video which is a combination of a number of still images or frames is divided into a number of frames to form a complete image. Here hybrid DWT-DCT- Huffman algorithm is used for compression and reconstruction of image generated by a combination of number of frames of the inputted video taking benefit from the advantages of all the three algorithms. The need of video divided into individual frame came from the fact that the video is a combination of number of frames displayed at a faster rate and we are not able to distinguish between individual frames. So video conversion process is used and also compression is performed on the generated image.

MOBILE DISTRIBUTED COMPUTING APPROACHES

In recent years early studies began to explore the idea of implementing the distributed computing paradigm in systems based on mobile devices. The approaches and depicted scenarios are however quite different from each other. The wireless network improvements lead researchers to create distributed systems that cooperate in computational intensive tasks and to coin some paradigms. For example, in the opportunistic computing paradigm mobile devices are connected in an ad-hoc local wireless network to take advantage of the computing resources of other devices. The most recent proposal in this direction is the Any Run Computing (ARC) system, which dynamically selects the best device for offloading the execution of tasks. In what follows, we present some recent and noticeable solutions for mobile systems that exploit some well-known.

It is also common to find service-oriented architectures as they enable a high level of transparency for the user, and they are easily extensible with new services and interfaces. An example of a service-oriented approach can be found in .The authors proposed a Web Service Initiation Protocol (WIP) integrated in Android, making the device a web service SO Abased platform with real-time communication capabilities. This solution uses a proprietary application, the 2SAP, to perform the service discovery and registration. It does not allow to include a developer-extension of the application, and the services can be managed only through the given application proxy. Moreover, the solution does not consider the availability of computing resources and energy budget, because the exposure of the service is not linked to the capabilities of the device.

1. Transparent Computing

A service-oriented approach that must be aware of the system resources is presented in where the concept of transparent computing is transposed to the mobile world. Its goal is to provide users with transparent services: users only concern whether they can get the service or not, but without any need to know the underlying details. To do this, the solution requires a lightweight terminal without an operative system installed in advance. The software stack, including the operating system, the applications and the data is downloaded from a remote server as a virtual machine, on the basis of the user requirements and the computing

resources availability. In terms of security there is also the possibility of introducing different authority provisioning to different resources and services. Unfortunately, this approach requires the devices to have an Internet connection. Furthermore, there is no mention of an energy-aware run-time management of the device. The distributed aspect of this approach is given by the possibility of having the same services available for different terminals. However this is not properly what we intend as"distributed computing", since the computation is not distributed among devices but it is locally performed on the current device, once the service or the application is loaded.

2. Elastic Personal Computing

Based on the concept of Flexible Computing this paradigm takes advantage of the interconnected devices, relying on the fact that in many cases processing data in-place and exchanging them directly between devices can overcome bandwidth limitations, hence resulting in a more efficient approach with respect to offloading the entire job to a remote server. Daz-Sanchez et al. proposed the Light Weight Map Reduce (LWMR) framework to enable the possibility of submitting a job by any device or group of devices, collecting the outcome and delegating tasks to other devices upon battery, network or location changes. This refines the Elastic computing concept exposed providing a mobile version of the Hadoop Map Reduce framework. Similarly, the Hyrax system implemented the job distribution mechanism by porting Hadoop to interconnected Android devices. The centralized-architecture limitations of Hyrax are then overcome by MC2, which makes possible the setup of personal cloud computing systems made by nearby mobile devices. MC2 provides the possibility to create a private or public cloud service. Elespuru instead, investigates the feasibility of using smart mobile devices in a Map Reduce system. The author implements a client-server Map Reduce system for mobile devices, which shows that the devices are capable of performing at roughly an order of magnitude more slowly than the traditional clients, demonstrating that a large portion of processing can be moved to them, if many enough exist at a given time to perform the necessary workload. Finally, it is worth to mention GEM Cloud, whose purpose is to exploit mobile devices to execute computationally intensive and parallel tasks with a high degree of energy efficiency. The system is made by a central server and a database, in charge of discovering available devices onto which deploying tasks. On the device side, a client application makes the devices visible or not, according to the device status, e.g. CPU and memory usage, battery level, and running applications. However, what is still missing in this solution is the possibility of implementing a scheduling and task placement policy, aiming at maximizing performance or minimizing energy consumption.

3. Volunteer Computing

The so-called volunteer computing paradigm has been introduced in 1996 by Luis F. G. Sarmenta. In this approach users make their devices available for hosting external computational by intensive tasks. It became more and more attractive for the users so that some projects received considerable media attention, such as home the most representative framework enabling this paradigm is BOINC started as a project for researchers to exploit the processing power of personal computers around the world. It has been extended by the NativeBOINC project for Android devices. Similarly, links the BOINC middleware and the concept of volunteer computing to the mobile world. In the volunteer computing paradigm has been extended to the mobile devices not connected to Internet, exploiting WiFi Direct to setup point-to-point connections. The device (node) can therefore become a distribution point or a simple proxy node towards Internet. The main goal of the solution is to extend the task distribution network, with an eye on the device applications and resources management.

4. Enterprise Computation

The idea of using mobile devices for distributing the computational load has found interest also in the enterprise world. Arslan et al. in proposed a distributed computing infrastructure using smartphones in enterprise context. The main idea is to use employees enterprise device to perform the computation while they are recharging, instead of the company's servers, in order to reduce energy consumption and costs. Although the solution is quite complete and takes into account also the device computation capability and power status, the application context is closely linked to enterprise workloads. Moreover, the client-server architecture represents a limitation in terms of scalability and flexibility. Another lack of this solution is the fact that the computation capability of the device is evaluated by the server by estimating the task completion time from previous task executions. It does not rely instead on a resource manager instance, running on the device that can expose capabilities and perform local optimizations, taking into account also the workload launched on the device by the user. Moreover, the recharging status is the only condition for which the mobile device is considered available.

5. High-Performance Computing (HPC)

The High Performance Computing (HPC) area had also considered mobile devices as computational nodes of a parallel system. In this regard, the DroidCluster proposal proved to be feasible with collaborative Android systems by using the Message Passing Interface (MPI) as reference programming paradigm. DroidCluster claims to be non-invasive, i.e., the framework does not interfere

with the devices primary function. Obviously, in this case the target workload is made by parallel HPC applications, and no resource management is considered.

Experimental Results and Limitations

Analyzing the previous works we noticed that they do not consider some aspects of the devices that could be interesting to study in depth. First of all they do not perform resource and energy management, and optimization at single device level: and are the only that consider device resource capabilities, even if in the first work the estimation is done remotely by the server basing on the previous completion time of the tasks, whereas in the second one it is delegated to a local"passive" application. In future works it will be interesting to investigate how a local resource manager affects resources utilization and remote server decision.

CONCLUSION

A model is created to compress hybrid data. Whenever the model sees text kind of data, it calls the Huffman coding for compression. On the other hand whenever it sees the image like data it performs image peeling and then on each peeled image a multi depth compression scheme is applied. In a multi depth compression scheme, four different color depths are identified and are named as D1, D2, D3 and D4 where each depth indicates a range of color depths. Because of this range color depth, the time taken to compress is very less and reading and understanding the pixel value is very easier since each color pane contains only single color depth. Image compression and encryption are two important aspects of Information Science. Image compression is performed to use store and transmit the information efficiently. It is possible to transmit the information at high speed and at low cost since high volume information is reduced to low volume in image compression. But it alone is not enough since the compressed image can be corrupted while transmit, if it is transmitted in a public channel. Once the information is corrupted then it is impossible to get original information hence a suitable encryption is needed on compressed information to secure it. In this thesis, a novel compression scheme called multi depth compression is introduced along with implementation of a non linear chaotic map security mechanism.

A multiagent system is a system composed of multiple autonomous agents to solve the network challenges. The goal of this research is to develop and propose an advanced method of multiagent system for progressive communication of images with lossless compression. The server agent and the client agents communicate each other to transmit the progressively compressed images (with lossless compression). This research applies one of the image processing methods known as image compression to develop a multiagent based broadcasting.

Data compression is a method of bit reduction technique that uses a smaller amount of bits to represent information. A universal compression scheme is needed rather than unique methods for unique data formats. In this thesis, a novel hybrid multi depth compression scheme was introduced which was able to compress different data format. A scan method can convert a difficult to use signal into an easy to use one by exploring source redundancies within the input signal, which could be very useful in image compression. In JPEG image compression, encoding an image can lead to not an optimum result, if the quantized two-dimensional discrete cosine transform coefficients are not arranged in linear sufficiently. An efficient linearization scheme is necessary to keep highly redundant coefficients consecutively in one dimensional sequence space so that other techniques involved in the compression process can be expected to yield better ii results.

Data compression offers an approach for reducing communication costs, at the same time it is vulnerable to attack during the transmission. If it is compromised then it is not possible to get actual data during the decompression. Therefore security is needed to preserve the compressed data. Compression always relies on high redundant data in order to gain size reduction. Since encryption destroys redundancy, the compression algorithm would not be able to give much size reduction, if it is applied on encrypted data.

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