

New lossless data compression system with quick operation and high compression efficiency

A joint UB/UPC team has developed a new lossless data compression system excellent for applications requiring at the same time high compression ratios and quick operation with low CPU load. The system under the name FAPEC (Fully Adaptive Prediction Error Coder) is an algorithm that combines low processing requirements with high compression efficiency under almost any scenario. Partners to further develop the system and/or to establish license agreements with technical cooperation are sought.

The Challenge

In ICT theory, lossless data compression is a class of data compression algorithm that allows the exact data reconstruction from the compressed data. This type of compression is used in many applications such as the commonly known ZIP file format. The data compression is useful because it helps to reduce the consumption of expensive resources, such as disk space or transmission bandwidth. On the downside, compressed data must be uncompressed to be viewed (or heard) and this processing may be detrimental to some applications.

For example, in the framework of space missions, satellite payloads have tight data compression requirements and high compression ratios are needed. Nevertheless, available processing power is modest and data must be compressed in small independent blocks. So, adaptive algorithms that need large sample sizes can not be used in these space missions. In this domain the approach currently in use is based on the use of an adaptive entropy coder based on Rice-Golomb codes, in the data, leading to low compression efficiencies in realistic conditions despite of the adaptive stage.

The Technology

On the contrary, FAPEC uses a different approach based on a segmentation strategy, making it much more resilient to outliers in the data, and an adaptive layer that removes the need for any prior calibration. It is based on an algorithm that combines low processing requirements with high compression efficiency and quick operation. This system performs an efficient statistical analysis of the prediction errors arriving from a previous pre-compression stage, allowing it to optimally adapt to any type of data.

Innovative advantages

- Quick operation and low CPU load
- High compression efficiency (Typ. >90% Shannon limit)
- Excellent for large sample sizes (≥ 32 bit)
- Optimally adapt to any type of data

Current stage of development

The FAPEC algorithm is fully defined and well tested. A software implementation is available, although it may be further optimized. A hardware prototype on FPGA has been built, although it's still pending of final integration. Other hardware implementations, such as ASIC, are being considered.

Applications and Target Market

This technology is useful for any application requiring high processing performance with quick operation. Such as in earth systems that need massive astronomical data transfers between data acquisition points (observatories, remote GPS receivers, laboratories, ...).

Reference number

MKT2010/0001_I

An efficient adaptive layer that removes the need for any prior calibration



Suitable for ground-based systems requiring high compression throughput

Optimally adapt to any type of data and excellent for large

Business Opportunity
Technology available for licensing with technical cooperation

Patent Status
PCT application filed

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