RESEARCH INTERESTS

IN

COMPUTER SCIENCE AND SOFTWARE ENGINEERING

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INTRODUCTION

I am a creative, rigorous researcher and conversant in Computer Science, Software Engineering, as well as Modular Sciences, inclusive of Physics and Mathematics [3, 4].

My M.Sc. thesis project entitled "**An Introduction and Evaluation of a Lossless Fuzzy Binary AND/OR Compressor**" (FBAR) [1], was evaluated by the board of examiners at BTH and, included theoretical and experimental methods as follows:

An introduction and evaluation on the FBAR (Fuzzy Binary AND/OR) algorithm was made to prove a new lossless data compression (LDC) technique: *regardless of any number of inputs, delivers a fixed ratio as its output* (see thesis Abstract [1] or, the short version of the M.Sc. thesis as attached [1]). The premise on a minimum 50% fixed compression ratio commences with a 2 string characters being in two places at the same time or in entanglement via traversing a hamming distance of 65,536 addresses (memory rows) in a new hypercube compression model. The *lossless decompression* is done by decoding the entangled strings by a static *translation table* (dictionary or a **TT** file) in size and performance. To this account, for managing very large databases (VLDBs), I have written a PhD proposal on the topic, called "**Near Zero-Byte Database Entropies *via* Fuzzy Binary AND/OR Lossless Compression Tables**" (LCTs) [2] for obtaining highest fixed compression ratios ($\geq$ 87.5%). It is aimed for to continue this research with a concrete work plan (time plan, including costs) which is deemed to be highly economical as specified in my PhD proposal, § VI [2]. This proposal is thought to be helpful and relevant to any related PhD topic with common interests.

The focus would be achieving *the most efficient lossless compression* compared to other algorithms, with *predictable results* (a "*universal predictability*" is also demonstrated) contrary to regular techniques known as e.g., Shannon entropies. The currently defended and proposed entropy is FBAR as a new *combinatorial logic*. It is quite suitable for color coding information techniques on collated data via satellite systems on a VLDB; industries like aviation, oceanography, radar, etc. could benefit significantly from this LDC algorithm (on the temporal and spatial factors of it) for their data retrieval systems, telecommunications, internet, etc. Current publications are being finalized on different parts of the initial M.Sc. report as highly publishable works in Information Theory inclusive of Quantum Information Theory, expectably.

INTEREST PARTICULARS

During my graduate studies, my research interests have been intertwined with the following aspects of my work:

1- Cryptography, encryption; encoding and decoding techniques: To prove the various aspects of the claims made initially, the hypotheses, theory as well as practice of the newcomer LDC.
2- Mathematics: modeling the algorithm in coding theory, simulations aligned with information theory, discrete mathematics, and computational complexity mainly on the LDC algorithm, its

performance, computational model and functions. This played a major role in defending my thesis from a theoretical computer science perspective as well as analysis.

    a. Fuzzy logic: Applying this logic for 3 or more states of logic into a focused Boolean logic to reach predictable post-fixed states of binary source coding.

    b. Measuring information in terms of entropy to evaluate the LDC algorithm compared to other entropies, as well as bitrate (spatial and temporal) performance of the algorithms.

3- Server Architectures using MPI and parallel nodes communications, their management with parallel programming techniques. With the new FBAR compression technique, we could obtain high efficiencies in data management, and performance on parallel communications between clusters/nodes, software and streaming of lossless compressible information.

4- Managed to compress "Enriched Information" as lossless "Knowledge", in Knowledge Engineering, by using the new FBAR combinatorial logic, for conducting efficient communications between online peers (Alice-Bob and Eve compressed messaging via email. See recommendation letter by L. E. Henesey.)

5- Software Engineering techniques relative to black box and white box analyses: to evaluate different quantitative and qualitative aspects of the project, corroborating with the infamous ISO-9126 *software quality characteristics* on e.g., reliability, usability, marketability, confidence, scalability, availability, adaptability, etc. of the developed architecture relative to the internal functions (quite white box) and external/overall (black box) functions representing I/O data transmissions and processes of the algorithm.

6- Static and dynamic analysis on memory systems and resource allocation techniques: the study whether the static approach of the algorithmic implementation efficiency aspects of the algorithm or at certain levels, the dynamic approach becomes handy during I/O data transactions/transmissions (Appendices A and B of the M.Sc. Thesis [1]).

TARGETED AUDIENCE

In general, those whom their interests lie within the fields of Computer Science and Software Engineering, specifically, in compression, cryptography, information theory, or any relevant category of research, shall mainly recognize the significance of these findings to a high amount of economic and scientific interest. Moreover, they may find the new LDC idea quite novel, relevant to almost all sciences concerning information gathering, analysis, organization, retrieval systems, etc., and thus a candidate to a latest discovery in information sciences, their efficient management (time and space) and organization. The accruable interests and merits of this research are focused in knowledge engineering, information theory, databases and data retrieval management, software engineering (quality and quantity metrics), and its products useful in all areas of science.

REFERENCES

[1] P. B. Alipour and M. Ali, "An Introduction and Evaluation of a Fuzzy Binary AND/OR Compressor," an A/1st-class M.Sc. Thesis, MSE-2010-21, Blekinge Inst. of Tech., Sweden, May 2010.

[2] P. B. Alipour, A PhD proposal on "Near Zero-Byte Database Entropies via Fuzzy Binary AND/OR Lossless Compression Tables," Sweden, Feb 2010...

[3] Alipour, P. B. (Scientific Award, 2009). Qualified as a "Top Referee" from *the Proceedings of Royal Society A: a Mathematical, Physical and Engineering Sciences Journal, UK*.

[4] Alipour, P. B. (1978-2011). *Curriculum Vitae*, last update, April, 2011.