



California Science Center
CALIFORNIA STATE SCIENCE FAIR
2001 PROJECT SUMMARY

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| Your Name (List all student names if multiple authors.) Allan Chu | Science Fair Use Only <h1 style="margin: 0;">S1106</h1> |
| Project Title (Limit: 120 characters. Those beyond 120 will be ignored. See pg. 9) LZAC Lossless Data Compression: A Novel Approach to Minimum Redundancy Coding | Division <u>S</u> Junior (6-8) <u>S</u> Senior (9-12) |
| Preferred Category (See page 5 for descriptions.) 11 - Mathematics & Software | |
| Abstract (Include Objective, Methods, Results, Conclusion. See samples on page 14.) Use no attachments. Only text inside these boxes will be used for category assignment or given to your judges. | |
| <p>Objective: The purpose of this project was to develop a better compression algorithm suitable for wireless and handheld devices as well as the Internet.</p> <p>Materials and Methods: A new lossless data compression algorithm, LZAC, was derived from the widely used LZ77 family. LZAC presents two new concepts: composite fixed-variable-length coding and offset-difference coding. Composite fixed-variable-length coding combines fixed-length coding and variable-length coding into a single coding scheme. Offset-difference coding removes the redundancy in offset coding from LZ-based compression. LZAC was developed in C and its performance was benchmarked in an 8-Kbyte sliding window using Bell#s Calgary Corpus.</p> <p>Results: The results showed that LZAC achieved an average compression ratio of 3.02 bits per character (non-weighted), which is the equivalent of reducing a file size by more than 62 percent.</p> <p>Conclusions: LZAC#s compression ratio significantly outperforms that of the LZ77 family while still retaining the key LZ77 characteristics. It is simple, and fast in decoding; it is adaptive, and economical in terms of memory consumption; and it is universal. In addition, its two new concepts can be applied to compression algorithms in other families. Future research may explore this possibility.</p> | |
| Summary Statement (In one sentence, state what your project is about.) This project presents a new and better lossless data compression algorithm, LZAC, suitable for wireless and handheld devices as well as the Internet. | |
| Help Received in Doing Project (e.g. Mother helped type report; Neighbor helped wire board; Used lab equipment at university X under the supervision of Dr. Y; Participant in NSF Young Scholars Program) See Display Regulation #8 on page 4. Dr. Chu taught me compression theory; My mom and my teachers (Mrs. Head, Mr. McBride and Mr. Garcia) helped proofread my abstract. | |