

Visualizing Compression Algorithms on-the-fly

Guido Rößling
roessling@acm.org

Florian Lindner
florian-lindner@web.de

Department of Computer Science
Technische Universität Darmstadt
64289 Darmstadt, Germany

ABSTRACT

This paper presents a set of generators for visualizing common compression algorithms on-the-fly using the established and freely available ANIMAL algorithm animation system.

Categories and Subject Descriptors

K.3.1 [Computers and Education]: Computer Uses in Education—*Computer-assisted instruction*

General Terms

Management

Keywords

Algorithm, animation, compression, visualization

1. VISUALIZING COMPRESSION ALGORITHMS ON-THE-FLY

Compression algorithms are an important part of everyday work with computers. Typical applications include ZIP archives and installation images for a variety of operating systems. They are thus both interesting and relevant for computing students; however, they are often not addressed in basic CS courses.

We have extended the ANIMAL algorithm animation system [2] to the following established compression and decompression algorithms, as described for example in Wikipedia:

- Arithmetic encoding
- Burrows Wheeler Transformation
- Huffman
- LZ77, LZ78, and LZW
- Run-length encoding
- Sequitur
- Shannon-Fano

All animations can be generated on-the-fly. The user simply starts ANIMAL and selects the desired generator from the *Generator Framework* [1]. After specifying the input parameters—typically, the char array to be (de-)compressed—the animation is

created. The creation uses the built-in ALGOANIM API (formerly ANIMALSCRIPT-API) and can then be run directly in ANIMAL.

Each animation includes the name of the algorithm, the input values, the underlying Java code for the algorithm, and the display of the relevant variables and internal states. ANIMAL also offers a flexible bidirectional navigation of the animation.

We hope that this resource will be helpful for other users, especially those teaching compression or interested in learning compression by self-study. ANIMAL together with the integrated generators can be downloaded at <http://www.algoanim.info/Animal2>. Feedback is welcome!

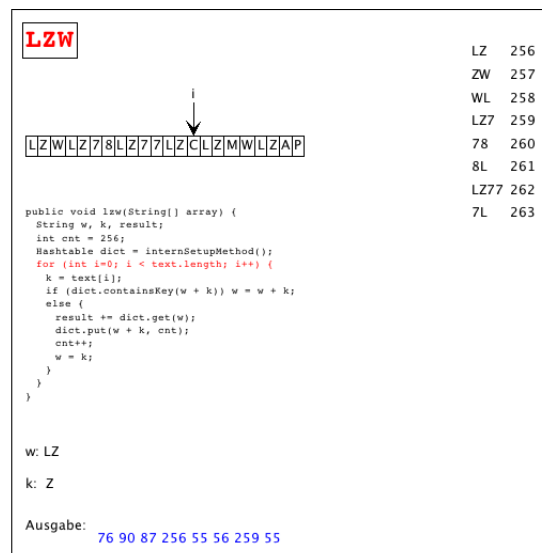


Figure 1: Example animation for the *Lempel-Ziv-Welch* compression algorithm

2. REFERENCES

- [1] Guido Rößling and Tobias Ackermann. A Framework for Generating AV Content on-the-fly. In Guido Rößling, editor, *Proceedings of the Fourth Program Visualization Workshop, Florence, Italy*, pages 106–111, June 2006.
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