

CS290F - Paper Reviews for 2010.01.25

Review of: Didier Le Gall, "MPEG: A Video Compression Standard for Multimedia Applications"

Communications of the ACM Vol. 34. No. 4, April 1991

The article's title indicates that it will discuss the MPEG video compression standard format, which it does to a certain degree, but in fact the article is more about how the standard was created as well as the reasons for decisions that ended up in the MPEG standard. The article is written to summarize the state-of-the-art MPEG standard in 1991, and appears in the *Communications of the ACM*.

To begin with, the article does an excellent job of "setting the stage". Even for an outsider to video compression standards, the article quite nicely sums up the state-of-the-art at the time with respect to available storage mediums (CD-ROM, DAT, etc.) and communication channels (ISDN and local area networks). Even the fact that multimedia as a spanning technology, interwoven amongst "the computer industry, the telecommunications industry, and the consumer electronics industry" being a new concept is communicated nicely to the reader, giving an adequate frame of reference for the more technical portions of the article. All the while, despite the "alphabet soup" of acronyms present in the field, the author ensures that the reader is fully engaged in the context by explaining the meanings and purpose of various terms and acronyms.

Approximately the first half of the article is devoted to discussing how the MPEG standards group was formed, what its motivations were, and how they would go about defining the MPEG standard. Of particular interest for a reader new to understanding the MPEG standard are the features that the standards group deemed important in the standard; these features include: random access, fast forward/reverse searches, reverse playback, audio-visual synchronization, robustness to errors, coding/decoding delay, editability, format flexibility, and cost tradeoffs. The short description provided for each feature explains the reasoning behind the requirement in such a manner that the reader understands why it would be required, without boring the reader with long-winded arguments.

The remainder of the article is devoted to discussing many of the internals of the MPEG standard as published in the November 1990 draft from the standards committee. The bulk of the description is related to the forward/backward frame prediction model used to provide much of the compression feature gains, as well as the reference frames used to provide the random access and editability features required by the standard. Despite the highly domain-specific and technical nature inherent in the topic, the author does a remarkable job of making this discussion accessible to readers who may not be familiar with video encoding technology, at least to the extent of understanding the basic principles of the standard, as well as the interaction among various parameters provided by the standard.

Overall, I find very few problems with the article (in fact, my main frustration with the article was the poor justification used by the magazine itself, which is obviously no fault of the author's). The tables and figures are clear and each help to further explain a point made

by the author, and the description of the technology is complete, while remaining aware of the fact that not all of the readers will be video compression gurus.

Review of: Schwarz, Marpe, and Wiegand, "Overview of the Scalable Video Coding Extension of the H.264/AVC Standard"

IEEE Transactions on Circuits and Systems for Video Technology, Vol. 17, No. 9, September 2007

This paper discusses a Scalable Video Coding (SVC) extension to the H.264/AVC standard, developed from 2003 until 2005. The paper is obviously targeted towards readers with well-above-average familiarity with video compression, encoding and decoding techniques and formats, and quickly becomes bogged down in a torrent of acronyms. Since the target audience of the paper is likely to be familiar with and understand the acronyms, it probably shouldn't be considered a fault of the paper, but as an uninitiated reader, I quickly became overwhelmed.

That said, once my sleeves were rolled up and I dug into the paper in depth, I found that the paper did an adequate job of discussing the background of the H.264 *et. al.* formats (particularly after having read the 1991 ACM article regarding the MPEG video standard). However, reading the paper is an exercise in stubbornness, as the dense content and format continue for sixteen pages of unrelenting fact-after-fact.

Being an overview-style paper, the paper itself doesn't provide much in the way of technical contribution, other than explaining at a relatively high level, the concepts and techniques used in the SVC extension. As such, it is difficult to find fault in the content of the paper, particularly without being intimately familiar with video coding in general and H.264/AVC in particular.