Title: RM7 modification to allow important macro-block identification for selective coding.

Source: AT&T

Introduction

In RM7 every macro-block (MB) is coded with a quantizer step-size that is based solely on buffer feedback control at each group-of-blocks (GOB), independent of both the contents or subjective importance of the current input block. This, at low bit-rates, results in the degradation in visual performance, due to the appearance of mosquito effects and other artifacts such as blockiness and blurring of important features.

One solution lies in permitting the control of step-size at every MB, rather than every GOB. This however results in excessive overhead bits, especially at low bit-rates. As an alternative, we propose the use of a tag-bit to identify MB's that need to be well coded. The tag-bit, if 0, could imply normal handling of a MB with step-size as computed for the entire GOB; when 1, it may for e.g. imply coding of the specific MB with half the computed step-size for the GOB. Of course, this does not resolve the problem of how to identify MB's that deserve special treatment, but that part could anyhow be proprietary.

If important MB's are identified, several choices for handling the MB's exist. For instance, the RM7 classification of MB's provides fixed/coded, mc/no mc, and inter/intra mode information. such that important MB's of various classes can be independently processed.

Features

(1) Only a few overhead bits are needed to identify MB's that require special handling in processing. The tag-bit needs to be specified only for the coded MB's, and perhaps runs per GOB can be coded. Alternately, the tag-bit could be provided for every MB, and runs coded per GOB. Advantage of second approach would be to allow special handling not only for some coded MB's, but also for uncoded MB's.

(2) Picture quality degradation can be limited to umimportant regions in the picture, while assigning priority to improve performance in regions of interest. In this way important regions such as facial features, forground/background boundaries, can be identified and well coded.

(4) Its implementation can be proprietary - selective improvements of features of interest by improving coding quality, or by postprocessing. An incompatible decoder can easily discard this information, and follow the default procedure.

(5) Improvement in speed of error recovery in certain regions of picture can be obtained by specifying priority to these areas.

Conclusion

Use of tag-bit for identifying important MB's suggests a simple solution to the problem of adaptation of the quantizer step-size, allowing possible improvements in visually important regions of the picture. It is overhead effective even for low bit-rates. In general, it seems to offer a desirable solution, permitting special treatment of some MB's either for coding, postprocessing, or for error recovery. If necessary it can also be proprietary, with the possibility of resorting to predefined default mode.