Adaptive and proadaptive image compression

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The most of well-known algorithms on the basis of the "past" (processed) samples make the local properties of the image more precise and adjust some own parameters. At decoding of the image on the basis of restored samples the same decisions are taken. It is the classical adaptive scheme.

In the offered proadaptive approach for tuning parameters of algorithm the prolongation of a signal is used. For estimate of statistical properties of an encoded (current) sample are used both "past", and "future" samples and even current sample. Certainly, the reliability of the estimation will increase. But it is necessary to pay for information on "future" – to save some additional information. The proadaptive algorithm tunes the parameters only at encoding, and at decoding the saved values of parameters are used. The more size of additional data, the more often and/or precisely are adjusted parameters of algorithm and the better efficiency of encoding of the main data stream. If parameters of the coder are adjusted in each image fragment by size $W \times W$, the entropy of the code words in the main and additional data streams will depend from the size of the image fragment like in figure 1. Under some conditions their sum has an optimum. The experimental probing on the real and artificial images have shown that the optimum is present always, but the conditions for its achievement essentially depend of the image context.

Many adaptive algorithms comprise threshold switches and under particular conditions apply those or different ways of adapting. As a rule, the adapting is directional on detection of sharp overfalls of luminance or longitudinal structures and preventing of major errors near to them. The forms of the prediction error distribution at application adaptive and proadaptive methods of encoding are shown in a figure 2. The adaptive methods shorten "tails" of distribution, and the central part does not vary. It is good in mean square sense, but insignificantly has an effect for an entropy of data and accordingly on an aspect ratio. The proadaptive scheme works both at major and at small prediction errors, does to the narrowest all distribution and more much reduces the entropy.

The introduced approach was applied for adapting decorrelation of the image, intercomponent processing and vector entropy encoding in the new version of image compression algorithm "NK". A. Ratushnyak presents the results of the extensive tests of algorithm "NK" and many others on http://geocities.com/SiliconValley/Bay/1995.