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Generalization of Machine Learning-Based Image Compression Methods for video compression

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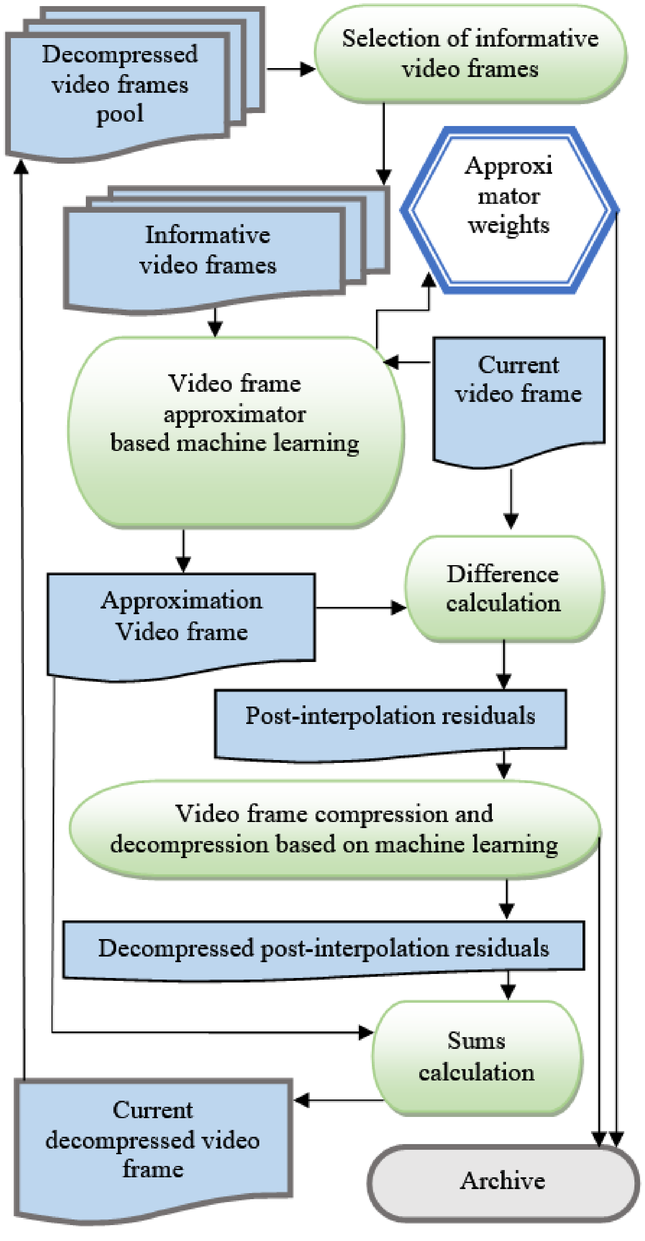
General information

The article explores the adaptation of digital image compression methods based on machine learning to the case of video data compression. The generalized image compression method applies digital image generation and segmentation, pyramid-based digital image coding, and interpolation on hierarchically organized arrays of pixels based on machine learning. Image compression uses artificial convolutional neural networks and generative adversarial neural networks, super-resolution artificial neural network algorithms and autoencoders to implement the basic steps. The proposed generalization approach uses interframe dependencies to reduce information redundancy through a video frame approximator based on machine learning. Approximation can significantly reduce the entropy and variance of the encoded data, which results in a reduction in the size of data. The results of computational experiments on real video sequences prove the high efficiency of the approach proposed in this paper to generalize digital image coding methods based on machine learning for the case of video compression.

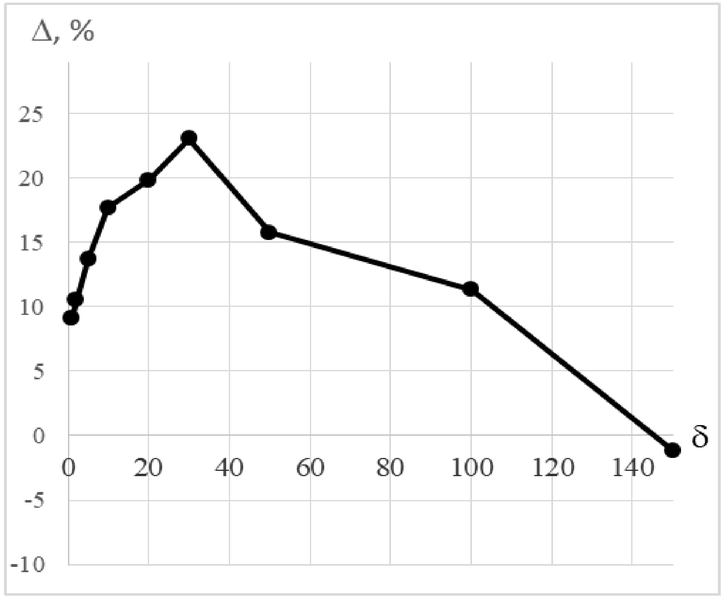
The proposed video frame approximator



Video frame approximator optimization

$$\varepsilon = \sum_{t}\sum_{\tau}\left(V_k(t,\tau) - \sum_{f=1}^{F} w_f \tilde{V}_{k-f}(t,\tau)\right)^2 \to \min_{\{w_f,\,1\le f\le F\}}$$

The experiment



Gain Δ in the size of the archive from the use of the proposed ML-approximator in the test video (δ is the absolute error)

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