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A novel cellular automata based technique for visual multimedia content encryption

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Abstract:	<p>This paper proposes a new method for visual multimedia content encryption using Cellular Automata (CA). The encryption scheme is based on the application of an attribute of the CLF XOR filter, according to which the original content of a cellular neighborhood can be reconstructed following a predetermined number of repeated applications of the filter.</p> <p>The encryption is achieved using a key image of the same dimensions as the image being encrypted. This technique is accompanied by the one-time pad (OTP) encryption method, rendering the proposed method reasonably powerful, given the very large number of resultant potential security keys. The method presented here makes encryption possible in cases where there is more than one image with the use of just one key image. A further significant characteristic of the proposed method is that it demonstrates how techniques from the field of image retrieval can be used in the field of image encryption. The proposed method is further strengthened by the fact that the resulting encrypted image for a given key image is different each time. The encryption result depends on the structure of an artificial image produced by the superposition of four 1-D CA time–space diagrams as well as from a CA random number generator.</p> <p>A semi-blind source separation algorithm is used to decrypt the encrypted image. The result of the decryption is a lossless representation of the encrypted image. Simulation results demonstrate the effectiveness of the proposed encryption method. The proposed method is implemented in C# and is available online through the img(Rummager) application.</p>