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Comments on "Homomorphic image watermarking with a singular value decomposition algorithm"

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ABSTRACT

In the recent paper entitled "Homomorphic image watermarking with a singular value decomposition algorithm" by Abdallah et al., a homomorphic image watermarking using a singular value decomposition is presented. This comment shows that this watermarking scheme is fundamentally flawed in that the extracted watermark is not the embedded watermark but determined by the reference watermark.

The recent paper by Abdallah et al. (2014) proposed a homomorphic image watermarking using a singular value decomposition and demonstrated its high robustness against several attacks. The overall SVD-based watermarking algorithm is described in Section 3 of Abdallah et al. (2014), which is exactly similar to Liu and Tan watermarking algorithm (Liu & Tan, 2002).

The scheme proposed by Abdallah et al. (2014) is mainly based on Liu and Tan (2002), they followed the same embedding and extraction process. The only difference is in the embedding watermark domain. In the scheme of Liu and Tan (2002), the embedding process is done directly on host image. In the scheme of Abdallah et al. (2014) the embedding process is done on homomorphic image, which is modeled as a product of a constant illumination and a varying reflectance.

However, watermarking algorithm of Liu and Tan (2002) is fundamentally flawed because the singular vectors matrices U_W and V_W of the watermark W, which represent the important information (Tian, Tan, Wang, & Fang, 2003) of the reference watermark, which will cause the false positive detection even if the embedded watermark is different or nonexistent. Hence the method proposed by the scheme of Abdallah et al. (2014) is fundamentally flawed, too.

The detailed discussion of the false positive detection of the watermarking algorithm proposed by Liu and Tan (2002) can be consulted in Zhang and Li (2005), Rykaczewski (2007) and Section II of Yongdong (2005).

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