INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

Steganography is an art of covert communication where a message is hidden in some natural-looking objects such that no one can even suspect the ongoing communication. On the other hand, steganalysis is science for detecting such hidden communication. In this dissertation, we have proposed few steganalysis algorithms which can detect some very recent embedding schemes using the deep learning models. In literature, it is assumed that embedding noise generally presents in the image's high-frequency components, but this assumption may not always be valid. Besides, very recently, deep learning-based image steganalysis schemes have become popular for their increasing detection performance. It is also observed that a proper balance between width and depth of a deeper architecture may improve the detection performance. These observations mainly motivate us to propose few steganalysis algorithms which are primarily based on deep neural models. The four major contributions of this dissertation are as follows. In the first part of our first contributory chapter, we propose a steganalytic approach to break the CMD embedding scheme. In the second part of the first chapter, we have introduced a neural network-based dynamic filter kernel. We show that such a denoising kernel can extract steganographic noise more efficiently than fixed kernel-based filters. In the second contributory chapter, two CNN-based methods are proposed, which exploit different contextual representations of the stego image for tracing the embedding more precisely. In the third contributory chapter, we have used the concept of Fractal Net to design a steganlytic detector such that the balance between the depth and width of the network is maintained. In the final contributory chapter, we have proposed a steganographic embedding model as data hiding application where we have used a Generative Adversarial Network (GAN)-based model to hide an image within another image. The proposed method ensures the visual quality, statistical undetectability, and noise-free extraction.

Finally, the thesis is concluded by summarizing the significant contributions and proposing future research directions.

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